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Water management in Lithuania, Poland and Sweden

– Comparisons of the EU Water Framework Directive in practice

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MOMENT
modern water management

Water management in Lithuania, Poland and Sweden

Comparisons of the EU Water Framework Directive in practice

REPORT 5.3

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ABOUT MOMENT PROJECT

In cooperation between seven regions in four countries around the South Baltic Sea area the project MOMENT aims at reducing the outflow of nutrients and hazardous substances by modern water management. This includes the establishment of Water User Partnerships allowing a “bottom up” approach starting at a local level and working within river basins letting the water set its own independent boarders. The project is co-financed by the South Baltic cross-border programme 2007-2013 and runs from September 2009 until 2012.

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Valdas Langas, Cecilia Näslund and Kinga Skuza on field trip
in Bräkneån river basin, April 2011.
Photo: Tobias Faccini

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Bräkneån River; Photo: Länsstyrelsen i Blekinge

Akmena-Dane River; Photo: Valdas Langas

Bauda River; Photo: Magdalena Kinga Scuza

Baltic Sea mouth Bräkneån River; Photo: Bergslagsbild AB

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Implementation of the European Water Framework Directive – Comparisons of three river basins in Lithuania, Poland and Sweden

Cecilia Näslund, Valdas Langas and Magdalena Kinga Skuza.

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

Abstract in English

The primary aim of this study was to compare measures introduced as a result of the European Water Framework Directive (2000/60/EC). Furthermore, the intention was to provide a picture of the work on environmental protection of waters in Lithuania, Poland and Sweden, in order to increase understanding and exchange between project partners. MOMENT involves 22 project partners working in seven different river basins. The three river basins studied in the project (Akmena-Dane, Lt, Bauda, Pl, and Bräkneån, Sw) all flow to the common Southern Baltic Sea. The comparison addresses conditions in the Water Management Plans and Programmes of Measures for years 2009-2015.

The basic requirement by the Water Framework Directive is to achieve good ecological and chemical status by year 2015. The ecological status of water bodies is assessed to one of five classes; high, good, moderate, poor and bad status. The chemical status (concerning hazardous substances) is assessed to one of two classes; good or bad status.

Many ecological variables are used to determine ecological status. In this study we studied limits for nutrient content. For rivers, Sweden has status limits only for the parameter total phosphorus (P_{tot}) while Lithuania and Poland have status limits for several additional parameters (N_{tot}, NH_4-N, NO_3-N, O_2, BOD), although the Swedish monitoring programmes include these parameters. Comparisons are difficult since the countries use limits based on differing setup of monitoring data; 3-year averages, annual averages, or annual maximum concentration or the 90-percentile. There are significant differences between limits for good status in the three counties, and a deeper investigation is required to determine whether observed differences are explained by differing natural background levels or the setup of monitoring data. The assessment of chemical status is similar in the three countries and limits for good status are identical.

The Water Management Plans include a risk assessment for not reaching good status by year 2015. The comparison shows that the three countries have developed risk assessment criteria based on completely different assumptions. It is clear that the number of water bodies at risk for not reaching good status 2015 can not be compared between countries.

The Programmes of Measures are established to reach good status in water bodies by 2015. All three countries planned a set of general measures, such as developing legal acts,

enforcement of legislation, studies to improve knowledge on water status and human impact. In addition to this, Lithuania and Poland planned a set of specific measures identifying individual water bodies or individual pollution plants/activities. The formulation of the specific measures needed to achieve good status is a very important step to make the planned measures come through.

In the three studied river basins we compared for example a) administrative arrangements, b) monitoring programmes, c) status classification, d) environmental requirements for water bodies, e) procedures for identification of human pressures and impact, f) risk assessment, g) programmes of planned measures and funding measures. Significant differences were observed in several aspects. The Water Framework Directive stretches over a vast field and conditions in various respects of water management are inter-correlated. There is a large variability in the national systems employed in response to the Directive. This makes it difficult to perform comparisons of separate segments of the water management system. To obtain justifying comparisons of conditions in different countries, the water management system must be regarded in a wide perspective, involving many aspects in the analysis.

Abstract in Lithuanian

Bendrosios vandens politikos direktyvos priemonių įgyvendinimo Lietuvoje, Lenkijoje ir Švedijoje palyginimas trijų upių baseinų pagrindu

Svarbiausias šio tyrimo tikslas buvo palyginti priemones, kurios yra įgyvendinamos trijose šalyse vykdant Bendrosios vandens politikos direktyvos (2000/60/EB, toliau – BVPD) reikalavimus. Be to, buvo siekta apžvelgti, kas nuveikta vandens telkinių aplinkos apsaugos srityje Lietuvoje, Lenkijoje ir Švedijoje, kad projekto partneriai geriau pažintų vienas kitą ir apsikeistų naudinga patirtimi. MOMENT projekte dalyvauja 22 partneriai iš septynių upių baseinų. Trijų šio projekto metu tyrinėtų upių baseinų (Akmenos–Danės (Lietuva), Baudos (Lenkija) ir Bräkneån (Švedija) upės suteka į bendrą pietinę Baltijos jūros dalį. Buvo palyginti 2009-2015 metams sudaryti vandens valdymo planai ir priemonių programos. Pagrindinis BVPD reikalavimas yra užtikrinti, kad iki 2015 m. būtų pasiekta gera ekologinė ir cheminė vandens telkinių būklė. Ekologinė vandens telkinių būklė skirstoma į labai gerą, gerą, vidutinę, blogą ir labai blogą, tuo tarpu cheminė būklė (pagal pavojingas medžiagas) gali būti gera arba bloga.

Ekologinė būklė nustatoma atsižvelgiant į daugybę kokybės elementų. Šioje studijoje buvo vertinamos maistingųjų medžiagų kiekiui taikomos vertės (koncentracijos). Kalbant apie upių būklę, Švedijoje nustatyti apribojimai tik bendram fosforui (Pb), tuo tarpu Lietuvoje ir Lenkijoje vertės nustatytos ir keliems papildomiems parametrams (Nb, NH_4-N, NO_3-N, O_2, BDS). Kita vertus, pastarieji rodikliai yra įtraukti į Švedijos stebėsenos (monitoringo) programą. Iš tiesų atlikti tokį palyginimą yra gana sunku, nes šalyse taikomos vertės yra nustatytos remiantis skirtinga stebėsenos duomenų sąranka, t.y. vertinami trejų metų vidurkiai, metiniai vidurkiai, didžiausia metinė koncentracija arba 90-a procentilė. Trijose šalyse gerokai skiriasi „geros būklės“ vertės, todėl reikalingas išsamesnis tyrimas, norint nustatyti ar skirtumai yra susidarę dėl kitokių gamtinio fono lygių ar dėl stebėsenos duomenų sąrankos. Cheminė būklė vertinama panašiai visose trijose šalyse, geros cheminės būklės ribos visur yra vienodos.

Visų šalių vandens valdymo planuose vertinta rizika, kad gera vandens telkinių būklė gali nebūti pasiekta iki 2015 m., tačiau rizikos vertinimo kriterijai remiasi visiškai skirtingomis prielaidomis. Dėl šios priežasties negalima palyginti vandens telkinių, kuriuose nebus pasiekta gera būklė iki 2015 m., skaičiaus skirtingose šalyse.

Šalys turi parengusios priemonių gerai vandens telkinių būklei pasiekti iki 2015 m. programas. Visos trys šalys yra numačiusios bendrųjų priemonių paketą, t.y. parengti reikiamus teisės aktus ir įgyvendinti jų nuostatas, parengti studijas, skirtas geriau suvokti vandens būklę ir žmogaus veiklos poveikius. Be to, Lietuva ir Lenkija yra parengusios ir specifines priemones, taikytinas konkretiems vandens telkiniams, vandenį teršiančioms įmonėms arba taršioms veiklos rūšims. Specifinių priemonių, reikalingų gerai būklei pasiekti, parengimas yra labai svarbus žingsnis diegiant planuojamas priemones.

Trijuose tirtuose upių baseinuose buvo palyginti šie aspektai: a) administracinė struktūra, b) stebėsenos programos, c) būklės klasifikacija (kriterijai), d) aplinkosaugos reikalavimai vandens telkiniams, e) žmogaus poveikio vandens telkiniams vertinimo tvarka, f) rizikos vertinimas, g) planuojamų priemonių programos ir finansavimo priemonės. Pastebėti keli esminiai skirtumai. BVPD reglamentuoja plačią sritį, o vandens valdymo sąlygos yra tarpusavyje susijusios įvairiais aspektais. Nacionalinės sistemos, naudojamos BVPD reikalavimams įgyvendinti, labai skiriasi, todėl sunku palyginti atskirus vandens valdymo sistemų elementus. Norint pagrįstai palyginti skirtingų šalių sąlygas, vandens valdymo sistema turi būti traktuojama pakankamai plačiai, į analizę įtraukiant daugelį aspektų.

Abstract in Polish

Wdrażanie Ramowej Dyrektywy Wodnej - porównanie działań w zlewniach pilotowych na Litwie, w Polsce oraz w Szwecji

Głównym celem pracy było porównanie działań związanych z wdrażaniem Ramowej Dyrektywy Wodnej (2000/60/EC) oraz zaprezentowanie organizacji prac związanych z ochroną wód na Litwie, w Polsce oraz Szwecji, tak, aby ułatwić porozumienie pomiędzy partnerami projektu. W projekcie MOMENT bierze udział 22 partnerów pracujących w 7 zlewniach pilotowych. W niniejszej pracy przeanalizowano 3 z tych obszarów (Akmena-Dane, Lt, Bauda, Pl, Bräkneån, Sw), wszystkie leżące w zlewni morza Bałtyckiego. Porównanie dotyczyło w szczególności prac związanych z opracowywaniem planów gospodarowania wodami oraz ustanawianiem programów działań na lata 2009-2015. Głównym celem stawianym przez Ramową Dyrektywę Wodną jest osiągnięcie przez wszystkie wody dobrego stanu, zarówno ekologicznego i chemicznego. Stan ekologiczny klasyfikowany jest w 5 klasach: bardzo dobry, dobry, umiarkowany, słaby, zły, natomiast stan chemiczny (oceniany na podstawie substancji priorytetowych) może być sklasyfikowany jako dobry lub zły.
Stan ekologiczny oceniany jest na podstawie wielu elementów. W niniejszej prac największy nacisk położono na porównanie wartości granicznych dla substancji biogennych. Dla rzek w Szwecji określone są jedynie wartości graniczne dla fosforu ogólnego (Pog), podczas gdy na Litwie i w Polsce również dla innych parametrów (Nog, NH_4-N, NO_3-N, O_2, BZT). Jednak mimo nieuwzględniania w klasyfikacji program monitoringu w Szwecji uwzględnia również te parametry. Trudne jest porównianie wartości granicznych, ponieważ w każdym z państw są one określane w inny sposób: średnia roczna, średnia z 3 lat bądź percentyl 90. Wartości graniczne dla dobrego stanu znacząco się różnią w 3 krajach i wyjaśnienie czy wynika to z różnych warunków naturalnych, czy jedynie ze sposobu określania wartości granicznych wymaga głębszych analiz, które nie były przedmiotem niniejszej pracy. Sposób oceny stanu chemicznego oraz wartości graniczne dla dobrego stanu są takie same we wszystkich 3 krajach.
W trakcie opracowywania planów gospodarowania wodami przeprowadzono ocenę ryzyka nieosiągnięcia dobrego stanu do roku 2015. Przeprowadzone porównanie pokazuje, iż ocena ta opierała się w każdym z krajów na całkowicie innych założeniach, w związku z czym porównywanie ilości części wód zagrożonych nieosiągnięciem dobrego stanu jest bezcelowe.
W celu osiągnięcia dobrego stanu wód w 2015 każde państwo opracowało program działań. We wszystkich trzech krajach w programie tym ujęto działania ogólne, takie jak opracowywanie aktów prawnych, egzekwowanie przestrzegania prawa, analizy i badania w zakresie oddziaływań antropogenicznych oraz poprawy stanu. Ponadto Litwa i Polska

opracowały zestawienia działań dotyczących poszczególnych części wód oraz konkretnych negatywnych oddziaływań na nie, co jest niezwykle istotnym krokiem z punktu widzenia wdrożenia programów działań.

W trzech analizowanych zlewniach pilotowych porównano między innymi: a) zagadnienia administracyjne, b) programy monitoringu, c) klasyfikację stanu, d) cele środowiskowe dla części wód, e) sposób identyfikacji oddziaływań antropogenicznych i ich wpływu na stan wód, f) ocenę ryzyka, g) programy działań oraz ich finansowanie. W przypadku wielu z tych zagadnień zaobserwowano znaczące różnice. Ramowa Dyrektywa Wodna obejmuje szeroki zakres zagadnień i uwarunkowań związanych z zarządzaniem zasobami wodnymi, które są ze sobą ściśle powiązane. Uwarunkowania administracyjne i organizacja jej wdrażania są różne w poszczególnych krajach, dlatego też niezwykle trudne jest przedstawienie porównania poszczególnych zagadnień. W związku z tym aby porównać wdrażanie postanowień RDW konieczne jest rozpatrywanie systemu jako całości, nie zaś jego poszczególnych elementów.

Abstract in Swedish

Införandet av ramdirektivet för vatten i Litauen, Polen och Sverige
– jämförelser av tre avrinningsområden som mynnar i Södra Östersjön

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 projekt partners.

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.

Flera variabler används för att bestämma vattenförekomsternas ekologiska status. I denna studie har vi jämfört gränserna för näringsämnen. För vattendrag använder Sverige enbart parametern totalfosfor (P_{tot}) medan Litauen och Polen använder betydligt fler parametrar (N_{tot}, NH_4-N, NO_3-N, O_2, BOD) - detta trots att de svenska övervakningsprogrammen ofta undersöker samtliga dessa parametrar. Jämförelser av klassgränserna kompliceras av att de olika länderna använder gränser som 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 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.

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 genomföras i praktiken.

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.

Abbreviations

AU – Animal Unit

AWB – artificial water body

CAB - County Administrative Board, Sweden

CIEP – Chief Inspector for Environmental Protection, Lithuania

EPA – Environmental Protection Agency, Lithuania, Sweden

EQR – Environmental Quality Ratio

EQS – Environmental Quality Standards

GW – Ground Water

HELCOM – Helsinki Commission

HMWB – heavily modified water body

HPP – Hydro power plant

LSU – Live Stock Unit

MoA – Ministry of Agriculture

MoE – Ministry of Environment

MOMENT – Modern Water Management, EU-funded project

N – nutrient substance: nitrogen

NWMB - National Water Management Board, Poland

P - nutrient substance: phosphorous

pHMWB – preliminary heavily modified water body (Swedish term)

RB – river basin

RBD – river basin district

RWMB - Regional Water Management Boards, Poland

SW – Surface Water

UWWTD – Urban Waste Water Treatment Directive

WB – water body

WFD – Water Framework Directive (2000/60/EG)

WG – Working group

WWTP – waste water treatment plant

Link to webpage; Download Water Frame Directive in English and LT/PL/SV

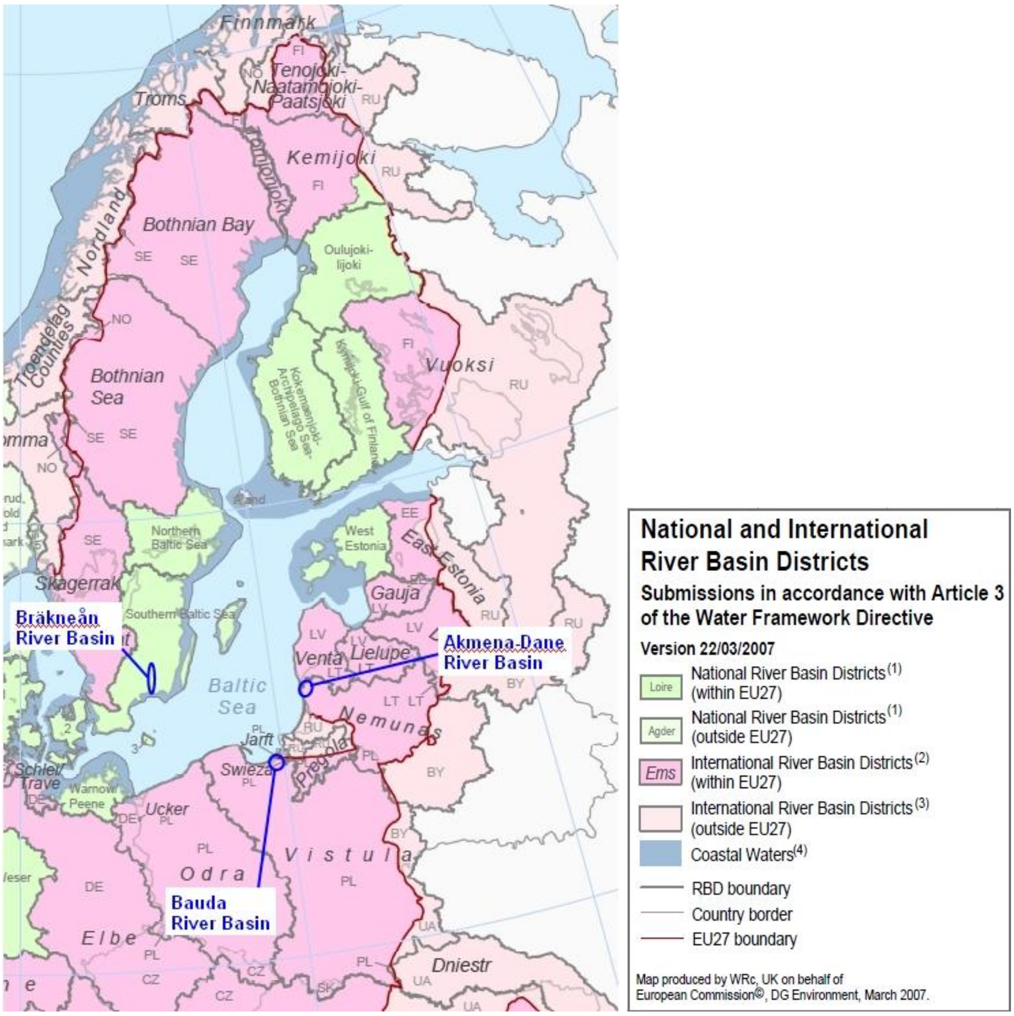
INTRODUCTION

Aims and Background

The primary aim of this study is to compare water management systems in Lithuania, Poland and Sweden after the implementation of the European Water Framework Directive (2000/60/EG). General conditions are described and one pilot river basin within each country is examined in greater detail;

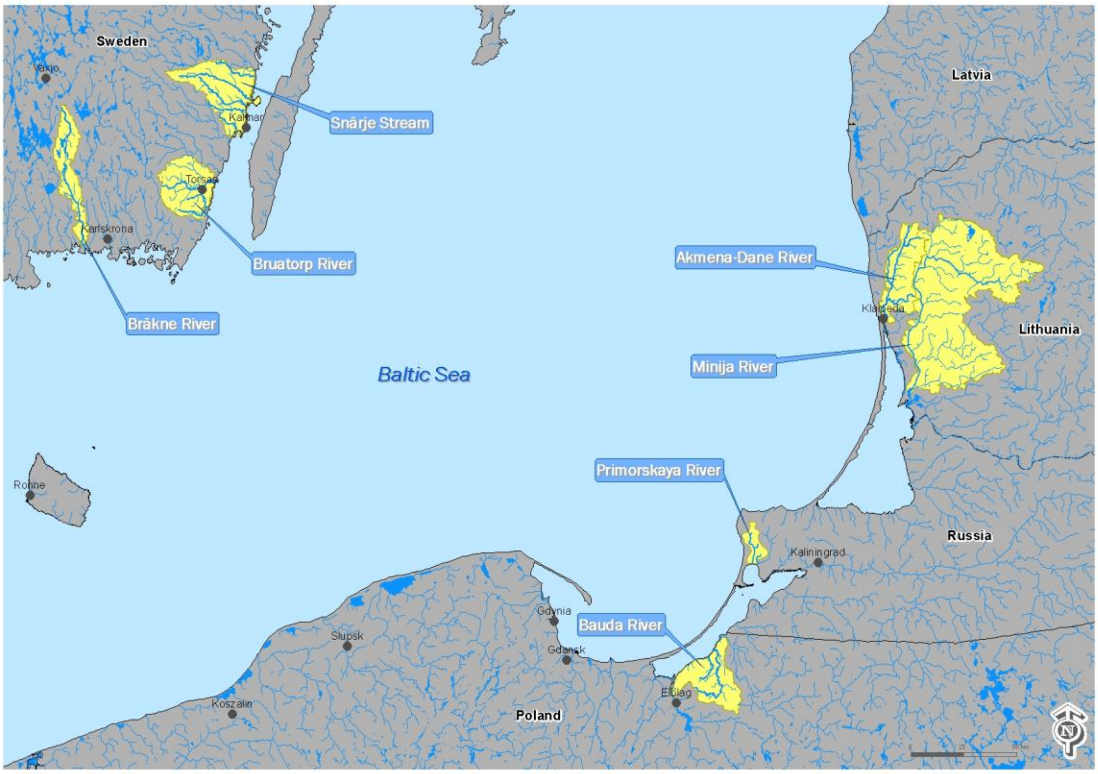
- Akmena-Dane River Basin, Nemunas River Basin District, Lithuania.
- Bauda River Basin, Vistula River Basin District, Poland.
- Bräkneån River Basin, Southern Baltic Sea River Basin District, Sweden.

There is a focus on issues related to eutrophication and dispersal of environmentally hazardous substances. The bases for the comparisons are conditions, Water Management Plans and measures determined for the first six-year cycle 2009-2015. Minor comments are sometimes added if important changes for next cycle are known to the authors.



Map presenting pilot areas together with the national and international river basin districts surrounding the Baltic Sea, as designated by member states (modified, online source).

The study is performed as a part of the EU-project MOMENT (Modern Water Management). MOMENT aims to develop methods for creating collaboration and participation of local stakeholders and the public in the management of water resources. The purpose is to develop well-anchored measures to reduce environmental problems of eutrophication and toxic pollutants in the Southern Baltic Sea. The MOMENT project involves seven pilot river basins and in total 20 project partners in Lithuania, Poland, Russia and Sweden.

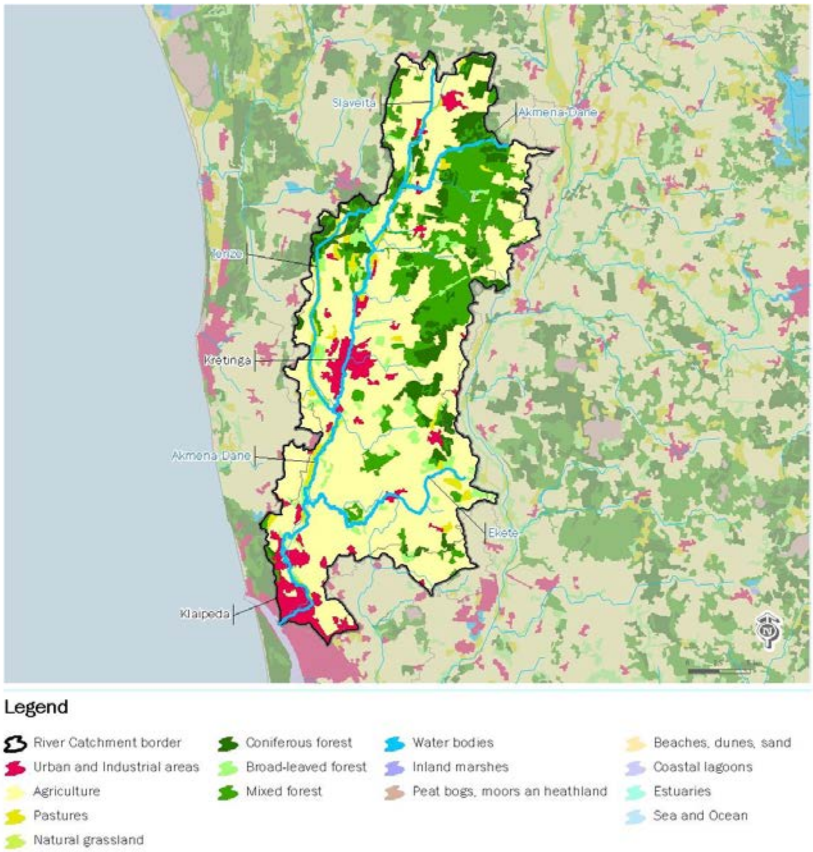


The MOMENT project involves seven pilot river basins (yellow in figure) in Lithuania, Poland, Russia and Sweden. The present comparison study concerns Bräkneån River, Bauda River and Akmena-Dane River.

Presentation of pilot river basins

Akmena-Dane River Basin, Lithuania

Akmena-Dane River, located in the north-western part in Lithuania, belongs to the Nemunas River Basin District. The river is almost 63 km long and the total size of its catchment area is 579 km2. The river starts in the eastern parts consisting mainly of forest areas and meanders through different landscapes before reaching Klaipeda city with its 200 000 inhabitants. With a yearly precipitation of 700 - 800 mm the river never dries out and has an average flow of 7.6 m3/s. Akmena-Danes main pollution problems can be divided up in two main sources. Firstly, of inadequate or no waste water treatment, polluting the water with nutrients, in some of the towns, settlements and households. And secondly, of inadequate or no rain water treatment from urban and industrial areas polluting the water with hazardous substances.



Pilot area land use, Akmena-Dane River basin, Lituania

During the period 1945-1991, the Lithuanian Hydro meteorological Service carried out hydrological observation in the Akmena-Danė River at Tūbausiai station (41 km from the mouth). Since October 1991 observations have been carried out at Kretinga station (28.9 km from the mouth).

The river flow rate is 0.1-0.2 m/s. Discharge at the mouth is as follows: the maximum discharge is 90 m3/s, the minimum discharge is 0.7 m3/s and the average one is 7.6 m3/s. The height of spring flooding is up to 3 m in the middle reaches of the river and up to 1.7 m at Klaipėda. The average annual runoff is 13.1 l/s/km2. The highest runoff in the country is observed in West Lithuania (0.40-0.55) where 40-55% of the annual precipitation is carried away by rivers. The average annual runoff 9-14 l/s/km2 is the highest in the entire country.

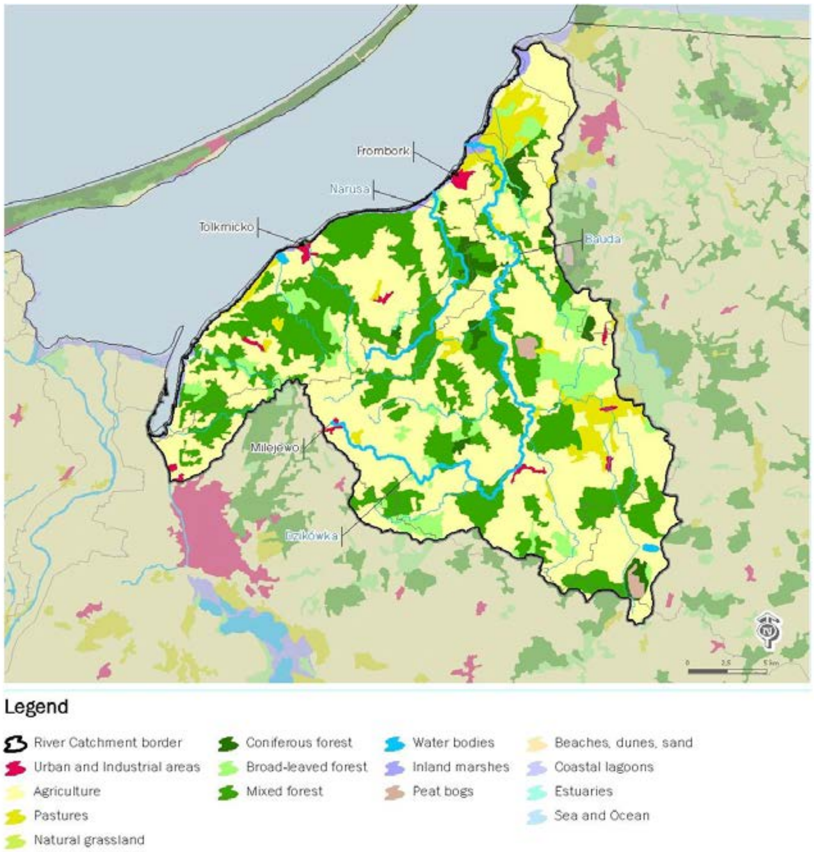
The hydrological regime of rivers in West Lithuania is highly complicated due to frequent thaws and irregular snow cover in winter as well as intensive heavy rains in summer and autumn. Rain storms which determine values of hydrological characteristics higher than those during spring flooding occur almost every year.

The Akmena-Danė belongs to the Coastal Lowland sub-region of the coastal climatic region. The annual precipitation amount typical of the Coastal Lowland sub-region is 700-800 mm, the one typical of the Akmena-Danė totals to 750-800 mm (275-300 mm during the cold season (November-March) and 475-500 mm during the warm season (April-October)). Rain is the main source which feeds rivers in West Lithuania accounting for 40-70% of the annual runoff (rain – 59%, snow – 29%, underground recharge – 12%). As a result of frequent winter thaws, the share of the runoff of melt in spring here is much lower, i.e. about 22-36%.

The type of river feeding in West Lithuania is some years may be different from the prevailing annual one, e.g. snow melt water in the Akmena-Danė at Tūbausiai in 1957 accounted for 5%, rain water – 89%, underground recharge – 6% of the annual runoff, meanwhile in 1968 the figures were 75%, 20% and 5% respectively.

Bauda River Basin, Poland

Bauda River, located in the north-east in Poland, is part of the Lower Vistula Region. The river is about 58 km long and has its outflow to the Vistula Lagoon. The catchment area is approximately 561 km2 and agricultural- and forest areas dominate the landscape. Within the catchment there are three smaller towns with less than 3000 inhabitants. The catchment area also contains several protected areas such as natural reserves, Natura 2000 areas and protective landscape areas. The major problems that have to be addressed are nutrient loads, hydro-morphological changes and flood risk.

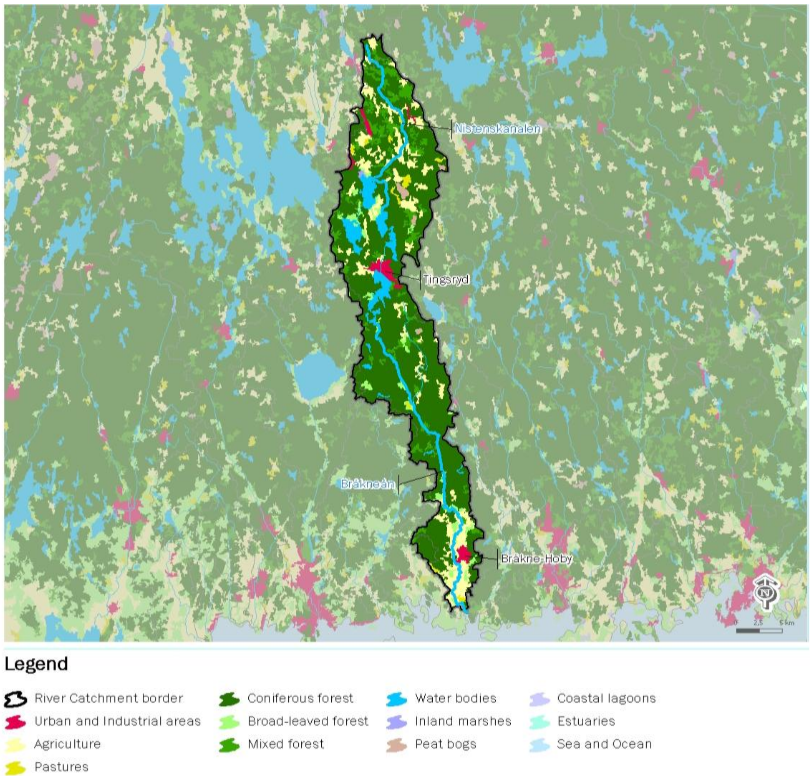


Pilot area land use, Bauda River, Poland

Bräkneån River Basin, Sweden

Bräkneån River, located in the southeast of Sweden, belongs to the Southern Baltic Sea Basin District. The river, which is about 83 km long, flows through two counties and the total size of its catchment area is 462 km2. The catchment area consists mainly of forests and farming land which also is revealed in the low population of not more than 9000 inhabitants. The upper parts of the river have several rapids with fast moving water creating good spawning areas for fish. The yearly precipitation is in average 618 mm. Annual average discharge is 2.85 m3/s (average over 10 years).

Bräkneån River's main pollution sources are diffuse leakage of nutrients from agriculture and forestry, and inadequate waste water treatment from domestic households.



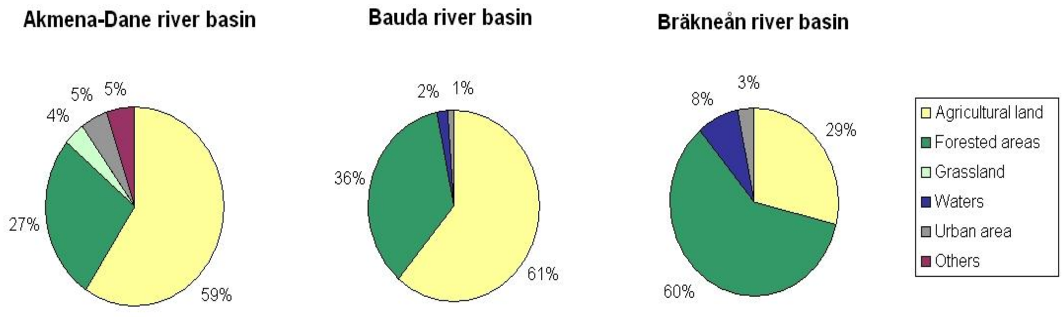
Pilot area land use, Bräkne River, Sweden

Comparative remarks

General characteristics for the three river basins compared in this study.

	Akmena-Dane RB	Bauda RB	Bräkneån RB
Catchment area (km2)	578	561	462
Inhabitants (thousands)	35*	6-8	9
Length (km)	63	58	83
Annual average discharge (m3/s)	7,6		2,9
Water bodies: no of rivers	6	12	7
Water bodies: no of lakes	0	0	4

** including city of Klaipeda: 108*



Land use in the three pilot river basins.

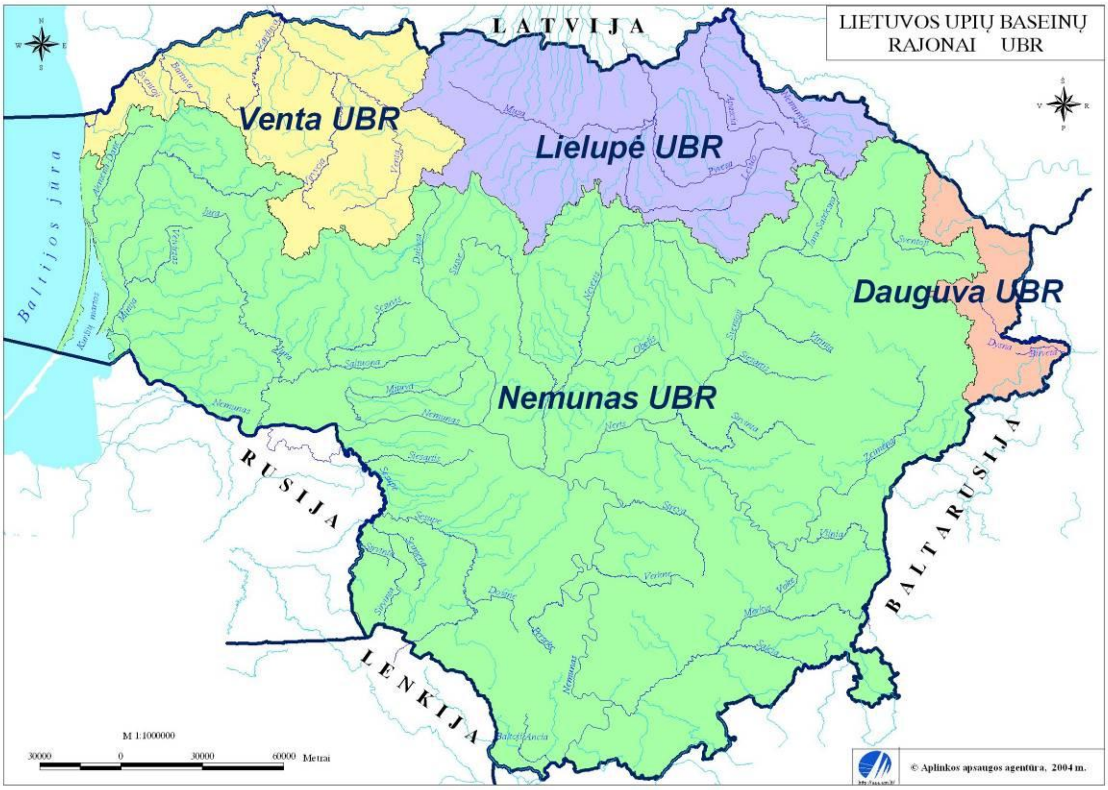
WATER MANAGEMENT - RESPONSIBILITIES AND ADMINISTRATIVE ORGANISATION

Lithuania

The Ministry of the Environment (MoE) is the main governmental institution responsible for water management in Lithuania. It organises water management through several agencies, departments and services functioning within the system of the Ministry.
By Minister of the Environment Order in November 2003 the Environmental Protection Agency (hereinafter – the EPA) was appointed as the authority responsible for producing and coordinating river basin Management Plans across the Lithuanian territory, as well as for reporting to the European Commission.

Hence the EPA is in charge of the administration of all four RBD in Lithuania. It organises, coordinates and performs the drafting of RBD Management Plans and Programmes of Measures. The EPA is responsible for the identification of RBD; identification of heavily modified, artificial and other surface water bodies (rivers and lakes), collection of information for the Register of Protected Areas and administration of the Register; identification of reference conditions in rivers and lakes; development of a system for the assessment of anthropogenic impacts on rivers and lakes, status assessment and identification of water protection objectives; monitoring of lakes (drafts monitoring programmes, coordinates monitoring, analyses complex compounds in its laboratories); public information and consultation as well as for reporting to the European Commission. Other state institutions have to provide information required for the development of RBD Management Plans and Programmes of Measures in the established procedure.

With a view to implement management of surface water bodies on the basis of river basins, the Lithuanian river basins were combined into the following four River Basin Districts (RBD): Nemunas RBD, Venta RBD, Lielupė RBD and Dauguva RBD (see figure).



Map of the four river basin districts, Lituania.

River Basin District Management Plans and Programmes of Measures for the implementation thereof have to be produced by EPA, revised and submitted by MoE for the approval by the Government of the Republic of Lithuania for each of the said River Basin District. The Management Plans will be implemented in the period from 2010 through 2015 and updated every six years, i.e. in 2015, 2021, etc. The Management Plans present an overview of the RBD status and needs, provide information on water protection objectives, identify water bodies at risk of failing to achieve good status by 2015, foresee measures for achieving water protection objectives, etc.

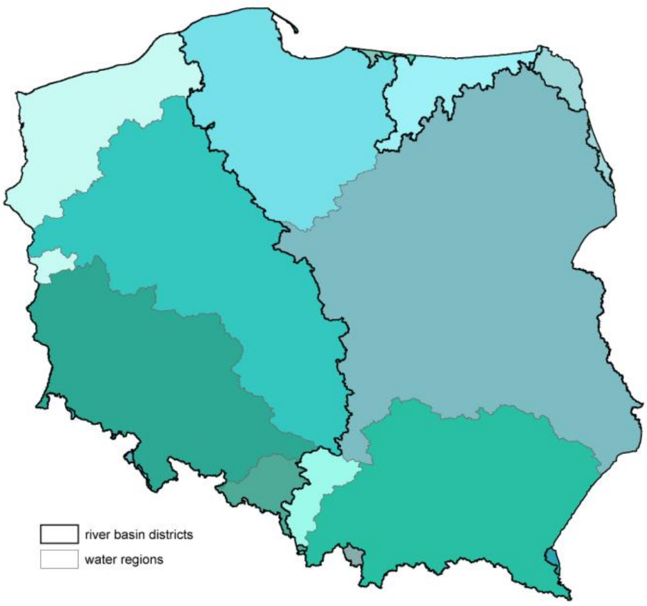
Regional Environmental Protection Departments are responsible for controls over the implementation of environmental and other legislation in the respective regions. The Departments will also be in charge of the controls over the implementation of the WFD requirements in their regions.

With a view to ensure coordination and cooperation between different institutions, Coordination Councils were set for each RBD (Nemunas RBD, Lielupė RBD, Venta RBD and Dauguva RBD) in 2005. The Councils consist of representatives of governmental and non-governmental institutions representing the main interested parties. The institutional

composition and regulations of the Councils is approved by the Government and the personal composition – by the Minister of the Environment. The Council includes representatives of interested state and local authorities and non-governmental organisations. The main task of the Councils is to agree interests of the state and municipal institutions and public organisations when preparing and implementing RBD Management Plans and Programmes of Measures. Resolutions of the Councils are of advisory character only. Activities of the Coordination Council are arranged by the EPA.
It should be noted that meetings of the Councils are open for participation of representatives, consultants, experts of interested parties as well as independent experts with an advisory vote.

Poland

According to the Polish Water Law the President of the National Water Management Board (NWMB), subordinate to the Minister of Environment, is responsible for WFD implementation, in cooperation with 7 regional water management boards (RWMB). Each RWMB covers one or more water regions. There are 21 water regions in Poland located within 10 river basin districts. The water regions and river basin districts are presented in the table and on the map below.



Map showing the ten river basin districts in Poland.

Table of river basin districts with water regions in Poland.

river basin district	water region
Vistula	Upper Vistula
	Vistula
	Lower Vistula
	Small Vistula
Odra	Upper Odra
	Middle Odra
	Lower Odra
	Warta
Dniestr	Dniestr
Dunaj	Czadeczka
	Morawa
	Czarna Orawa
Jarft	Jarft
Niemen	Niemen
Pregola	Lyna and Wegorapa
Ucker	Ucker
Laba	Izera
	Laba and Ostroznica
	Metuje
	Orlica
Swieza	Swieza

The President of the NWMB is responsible for the coordination of all the WFD implementation work. The RWMB collect and deliver data and carry out necessary analysis, i.e. pressures and impact analysis, HMWB designation etc.

The Chief Inspector for Environmental Protection (CIEP), apart from other duties, is responsible for providing water monitoring data and conducting the status assessment. The subordinate organs providing data and analysis are voivodship inspectors for environmental protection.

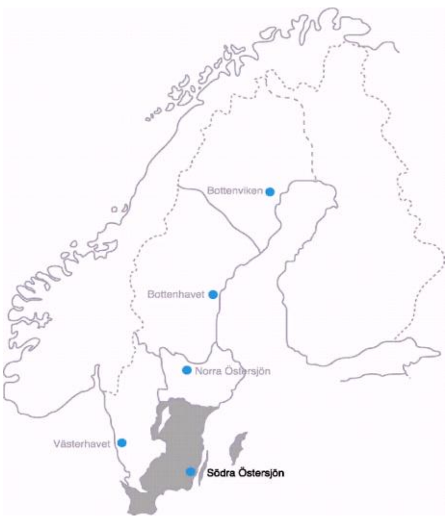
In order to provide the coherence of the works conducted in each RWMB, a number of Working Groups had been appointed on the state level. The members of the working groups are representatives of the NWMB, RWMB, CIEP and others if necessary. There are 6 working groups:

- Water Management Plan and Programme of Measures WG
- economic analysis WG
- HMWB WG
- agriculture WG
- status assessment WG
- public participation WG

The MOMENT pilot area is located in the Lower Vistula Water Region, which is managed by the RWMB in Gdansk.

Sweden

Sweden is divided into five river basin districts. One of the county administrative boards within each district is designated as Water authority. The Water Authority is responsible for decisions and coordinating the work within the district, and for information exchange and coordination between districts. The national authorities the Swedish Environmental Protection Agency and the Geological Survey of Sweden guide the work by creating regulations and guidelines, amongst other things. The Ministry of Environment has the ultimate responsibility for carrying out the Water Framework Directive.



Sweden's five river basin districts.

At every River Basin District Authority there is a Water District Board that makes decisions on the authority's various fields of responsibility. The Water District Board is made up of experts from different fields, and is appointed by the Government. The Water Authority Board is responsible for decisions on EQS (Environmental Quality Standards), the Programme of Measures, Management Plans and analysis of consequences. The water authority office coordinates the work, develops instructions and guidelines for work by County Administrative boards, initiates reference groups for the district, handles information issues within water management and prepares cases for the Water Authority Board. Working groups with representatives from the five water district authority offices are established to coordinate work in the different water districts.

Sweden's 21 County Administrative Boards performs and coordinates the practical work within the county. Their tasks include to

- Support and stimulate formation of voluntary Water Councils for river basins (similar to Water Users Partnership).
- Assist the Water Authority and on delegations from the Water Authority, carry out monitoring, perform status assessment, provide compilations and assessments as a basis for Programme of Measures and Management Plan.

In preparing the EQS, Programme of Measures and Management Plan for management cycle 2009-2015, status classification and risk assessment of individual water bodies were delegated to the county administrative boards. Furthermore they prepared suggestions for specific measures within their respective county. However, in the final documents all specific measures were omitted, but still they constituted a basis for the determined measures of general character.

The pilot area Bräkneån River Basin is located in the Southern Baltic Sea Water District (map). The Water district involves 7 county administrative Boards. The water district includes all or parts of 91 municipalities. The population in the southern Baltic water district is more than 2.2 million and the water district's area is just over 54 000 km ^{2} which gives a population density of 42 persons per sq km. The concentration of population in the water district varies with the focal points in southwestern Scania with the city of Malmö, and around the cities of Linköping and Norrköping. Within the water district there are a number of 119 river basins

Comparative remarks

Responsibilities for water management differ considerably between the three countries. An overview 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 – 3 levels: state, municipal and self monitoring:

- 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 1-2 river basin districts.
Working groups at state level coordinates work between river basin districts.
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.
Assisting in assessment of status and risk, measures etc: the 21 CAB are responsible within their respective regions.
Working groups at state level coordinates work between river basin districts.

Water Councils – voluntary organisations for river basins with representatives from public, operators and municipalities. Resolutions are advisory. Self organised with support from Water Authority/ CAB.

TOPOLOGY SYSTEM AND DESIGNATION OF HEAVILY MODIFIED WATER BODIES

The basic idea of using water body types is to make it possible to compare water with similar natural conditions. The type is defined by any factors that govern the conditions for plant and animal life in the water. The aim is to obtain a system which makes the assessed ecological status comparable between different water types.

Alteration of hydromorphological characteristics leads to corresponding changes in aquatic communities. As a result, good status of aquatic organisms in such bodies of water often cannot be achieved, unless human economic activity is terminated and natural physical characteristics are restored. Should restoration of natural physical characteristics to such water body have significant negative social or economic consequences, or if the benefits of the altered characteristics of a water body cannot be achieved (due to technical or economic reasons) by way of other measures which are more advanced from the environmental point of view, such body of water is deemed to be a heavily modified water body (HMWB). The requirements for the status of aquatic organisms in such water bodies may be reduced; however, measures shall still be provided for aiming at improvement, or prevention, as a minimum, of any further deterioration in the status. Therefore, characterisation of status of HMWB employs the notion of ecological potential instead of ecological status. According to parameters indicative of physico-chemical quality elements, ecological potential of HMWB is also classified into five classes: maximum, good, moderate, poor and bad. Maximum ecological potential of HMWB is deemed to be corresponding to high ecological status in natural bodies of water.

Lithuania

Water bodies within the Nemunas River Basin District which the Akmena-Danė River Basin belongs to are categorised as follows:

- rivers,
- lakes (ponds included),
- transitional waters (Curonian Lagoon, plume of the Curonian Lagoon in the Baltic Sea) and
- Baltic coastal waters (coastal waters are territorial waters extending one nautical mile from the shore)

In addition, artificial and heavily modified water bodies are distinguished.

Five river types were identified in the Nemunas RBD which differs in the characteristics of their aquatic communities (mainly fish communities). The river types are characterized by two main natural factors which determine the major differences between the communities: catchment size and bed slope. The characterization of types also involves the elements which, in accordance with the WFD, are obligatory in the typology of water bodies: absolute altitude and geology. On the basis of the latter factor, almost all rivers in Lithuania belong to one single type. Rivers with the catchment area larger than 100 km2 were additionally divided into types by the criterion of the bed slope.

Typology of rivers in the Nemunas RBD

Factors	Types				
	1	2	3	4	5
Absolute height	< 200				
Geology	calcareous				
Catchment size, km^2	<100	100-1000		>1000	
Bed slope, m/km	-	<0.7	>0.7	<0.3	>0.3

Three main types of lakes (ponds) were identified in the Nemunas RBD. The major factor that determines the most significant differences between the communities of aquatic organisms (fish and macrophytes) is the average depth of lakes. As in the case of rivers, the characterization of the types of lakes also involves other obligatory factors, such as absolute altitude, geology, and surface area. By absolute altitude (obligatory factor), all Lithuanian lakes belong to one type. By geology, almost all lakes (with individual exceptions) are classified as calcareous, that is, also belong to one type. All lakes are classified into one group of lakes larger than 0.5 km2 (according to the WFD, only the lakes with an area >0.5 km2 shall be classified) because no material differences in the structure and composition of the communities of aquatic organisms were identified in the lakes larger than 0.5 km2. By the average depth, the lakes are differentiated into three groups: lakes with the average depth less than 3 m, within the range of 3-9 m, and more than 9 m.

Typology of lakes (ponds) in the Nemunas RBD

Descriptors	Types		
	1	2	3
Average depth (m)	< 3	3-9	>9
Absolute altitude (m)	< 200		
Geology	calcareous (>1.0 meq/lg (Ca >15mg/l))		
Surface area (km^2)	>0.5		

After the identification of the surface water types, assessment of pressures from human economic activities and evaluation of the status of water bodies, the smallest administrative units have been identified for the water management purposes – bodies of water. These are the units for which water protection objectives have been set in the Management Plan of the Nemunas RBD. Hydrologically connected (i.e. uninterrupted) stretches of the same type and status of one river have been aggregated into one body of water. Stretches of one and the same river and of the same type and status situated on both sides of ponds or lakes separating these stretches have also aggregated into one body of water.

Surface waters within the Nemunas RBD were divided into 866 bodies of water (including HMWB and AWB), 584 of which are designated as rivers and canals, 276 – as lakes and ponds, 4 – as transitional waters, and 2 – as coastal waters

It should be noted that water bodies where good status should be achieved also comprise small water objects which are not included among water bodies assigned to different types (i.e. those water objects which are not subject to the typology of water bodies by Nemunas RBD Management Plan, such as lakes and ponds smaller than 0.5 km2 or rivers with the catchment area smaller than 50 km2).

Heavily modified water bodies and Artificial Water bodies

Pursuant to the Law on Water, a heavily modified water body is a body of surface water the hydromorphological, physical and chemical status of which is changed as a result of human activity to an extent that good ecological status cannot be achieved. HMWB can be identified in the first three categories of water bodies: rivers, lakes and transitional waters.

The designation of water bodies as HMWB was conducted following the WFD CIS Guidance Document and some feedback from foreign experience .
The designation process aims at justifying the reason of why the pre-designated HMWB should be finally classified as HMWB and hence should have less stringent objectives in terms of ecological improvements. Indeed, a significant hydromorphological alteration is not sufficient to justify that a water body should be designated as HMWB. It has to be shown that the restoration measures needed to achieve good ecological status would significantly affect the users of a water body in question or the wider environment and that the user(s) do not have any alternative means to achieve the same benefits as those offered by a respective water body under the category of HMWB.

The HMWB designation process consisted of following steps:
1. Pre-designation: identification of the location, size, etc. of the water body, description of the hydromorphological changes and ecological alteration(s);
2. Characterisation of the user(s) benefiting from the changes;
3. Identification of measures to restore good ecological status of the water body (hydromorphological characteristics);
4. Description of the impacts of the measure(s) on the user(s) and on the wider environment;
5. Test: Are the impacts significant?
6. Identification of potential alternative means for the user to achieve the same function;
7. Test: Are these alternative means feasible technically, economically and environmentally?

Having completed the steps listed above, the following water bodies were designated as HMWB within the Nemunas RBD:
1. Klaipėda Strait;
2. Ponds/reservoirs larger than 0.5 km2 – in total 42 water bodies with the aggregate area of 115.6 km2;
3. A stretch of the Merkys downstream of the Merkys-Vokė Canal (discharge decreased by 80 %); this stretch comprises one body of water with the aggregate length of 23.3 km;
4. The Nemunas River below Kaunas Hydropower Plant down to the mouth; this stretch comprises one body of water with the aggregate length of 225 km;
5. Straightened rivers with a low bed slope in urbanized territories of the Nemunas RBD; such rivers comprise 52 bodies of water with the aggregate length of 925 km.

The category of artificial water bodies contains water bodies formed in places where they had not existed before, without having modified the existing water bodies. AWB also include large quarries (>0.5 km2) as well as artificial canals dug for diverting part of the river water flow to other rivers, or for other purposes (King Wilhelm Canal).
Bodies of water identified as artificial water bodies:

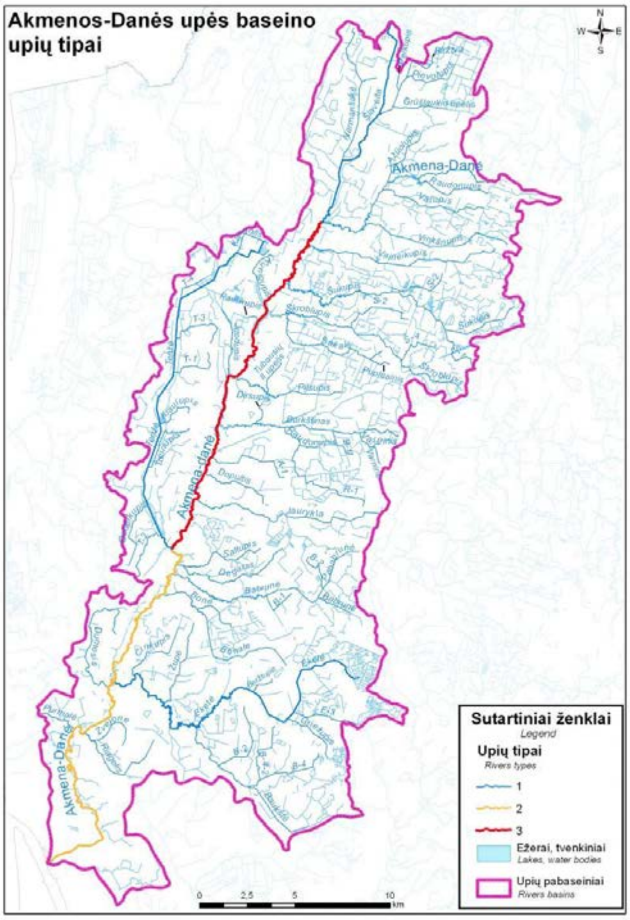
- Quarries (>0.5 km2) – one such quarry with the area of 1.2 km2 in the Nemunas RBD;
- Flow diversion canals (the Merkys-Vokė Canal, the Šventoji-Nevėžis Canal, and the Lėvuo-Nevėžis Canal) constituting three bodies of water with the aggregate length of 17.2 km;
- King Wilhelm Canal, which was identified as one body of water with the length of 23.04 km.

Various rivers, lakes differ in their individual characteristics, such as river size and slope, lake depth, salinity in transitional waters, etc. The variety of such natural characteristics also affects aquatic communities: the species composition of aquatic organisms, as well as relative indicators of various species in communities, largely depends on natural conditions. Therefore, all surface water categories have been further differentiated according to types taking into account the variety of natural characteristics of surface waters and the resulting differences in aquatic communities.

Akmena-Danė catchment area

Accordingly, following the categorisation of water bodies within the Nemunas River Basin District, water bodies in the Akmena-Danė River Basin are assigned to three categories: rivers, lakes (ponds) and heavily modified water sections (e.g. 2 ponds with the area larger than 0.5 km2). There are no artificial water bodies within the Akmena-Danė River Basin.

Following the said typology, only the Akmena-Danė River belongs to Types 1-3 because its catchment size is larger than 100 km2 (578.9 km2). The remaining rivers – all tributaries of the Akmena-Danė – are assigned to Type 1 since their catchments are smaller than 100 km2.
Since the average depths of Tūbausių pond and Padvarių pond are low, 1 and 2.5 meters respectively, they are assigned to Type 1. All other ponds within the river basin are smaller than 0.5 km2.



Topology of water bodies in Akmena Dane River Basin.

There are no artificial water bodies within the Akmena-Danė River Basin.

Water protection objectives have been established for four rivers with catchment sizes larger than 50 km2: Akmena-Danė, its two right tributaries – Šlaveita (58.5 km2) and Tenžė (54.9 km2) and it's left tributary Eketė (96.3 km2) and for ponds larger than 0.5 km2, namely Tūbausių pond and Padvarių pond. These ponds are also classified as heavily modified water bodies.

Poland

According to the definition in WFD the "body of surface water means a discrete and significant element of surface water such as a lake, a reservoir, a stream, river or canal, part of a stream, river or canal, a transitional water or a stretch of coastal water." and "body of groundwater means a distinct volume of groundwater within an aquifer or aquifers." Member states should define water body types according to Annex II. The ways of defining water bodies in member states differ quite a lot; different are especially numbers of types, sizes of the particular bodies etc. Below the way of defining water bodies in Poland is shortly characterized.

Rivers

In Poland the abiotic river typology according to the system A criteria was applied.
26 types were defined using this typology. The main criteria were:

- ecoregion
- altitude
- size of the catchment
- geology

According to these criteria 4586 river water bodies were identified in Poland.

Bauda River Basin

In the MOMENT pilot area – Bauda river catchment - 12 bodies of rivers were differentiated.

The bodies of rivers in the pilot area are presented in the table below. They are of 3 types:
17 – lowland stream with sand bottom,
18 – lowland stream with gravel bottom,
20 - lowland river with gravel bottom.

Water Body Code	Name	Length [km]	Type
PLRW20001755849	Bauda od źródeł do Dzikówki	82,7	17
PLRW2000205589	Bauda od Dzikówki do ujścia	32	20
PLRW20001755852	Okrzejka	14,9	17
PLRW20001755854	Lisi Parów	15,6	17
PLRW20001755869	Wierzenia	7,9	17
PLRW2000175588	Dopływ spod Biedkowa	4,3	17
PLRW2000175514	Dąbrówka	7,4	17
PLRW200017552	Kamienica	8,6	17
PLRW20001855369	Grabianka	11	18
PLRW200018554	Stradanka	11,5	18
PLRW2000175569	Narusa	26,9	17
PLRW2000175592	Kanał Różański	3,7	17

Lakes

In Poland the abiotic lake typology according to the system B criteria was applied.
13 types were defined using this typology. The main criteria were:

- ecoregion,
- size of the lake and size of the catchment ratio,
- stratification.

According to these criteria 1038 lake water bodies were identified in Poland.
There are no lake water bodies in the Bauda catchment.

Transitional waters

In Poland the abiotic transitional waters typology according to the system B criteria was applied. 5 types were defined using this typology. The main criteria were:

- salinity,
- tide,
- additional: depth, morphology, geology etc.

According to these criteria 9 transitional water bodies were identified in Poland.
There is one adjacent transitional water body in the pilot area – Vistula Lagoon.

Coastal waters

In Poland the abiotic transitional waters typology according to the system B criteria was applied. 3 types were defined using this typology. The main criteria were:

- salinity,
- tide,
- additional: depth, morphology, geology etc.

According to these criteria 11 coastal water bodies were identified in Poland.
There are no adjacent transitional water bodies in the pilot area.

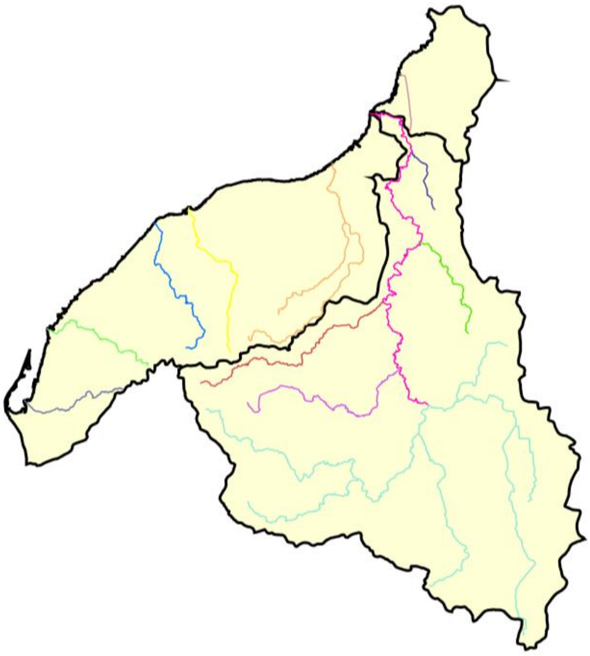
Water bodies consolidation

Individual bodies of inland waters are quite small and it would be hard and inconvenient or in most cases impossible to apply separate measures to each one of them. Most of the measures affect all the waters in the catchment as well as the groundwaters. Therefore it was decided to consolidate them for planning purposes. The consolidated water bodies are catchment areas comprising bodies of rivers and lakes. Ground waters, transitional waters and coastal waters were not consolidated.
The main consolidation criteria were:

- land use,
- protected areas,
- morphology,
- water regulation and dams.

This was to assure that the measures applied in a certain consolidated water body would influence and improve the status of all or almost all water bodies in this area.
The consolidation did not base on typology or ecological status.

Water bodies and consolidated water bodies in Bauda catchment are shown on the map below.



Map. Bodies of rivers and consolidated water bodies in Bauda catchment.

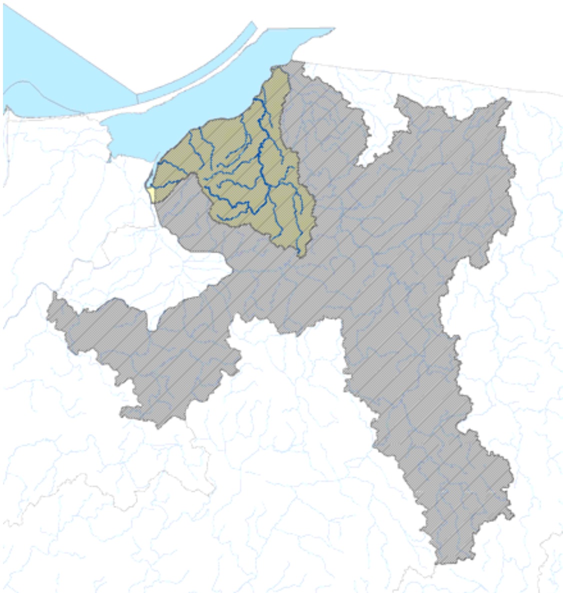
Ground waters

The main criteria which were used during ground water bodies designation were:

- hydrological catchments,
- geological structure,
- hydrogeological conditions,
- ground waters monitoring,
- protected areas.

161 bodies of groundwater were identified in Poland. However after further analysis it changed and now we have 172 bodies of groundwater – this classification will be used in the present planning cycle.

The MOMENT pilot area lies within one body of groundwater no PL_GB_2400_019. It is presented on the map below.



Bodies of ground water and Bauda catchment

HMWB designation in Poland

HMWB designation focused on bodies of rivers as most of the hydromorphological changes affect rivers. In the whole country 1435 bodies of rivers were designated as HMWB, which is about 31% of all bodies of rivers. The number of heavily modified lakes, transitional waters and coastal waters is much smaller - 27 HMWB of lakes (about 2,5%), 3 transitional HMWB (3%) and 3 coastal HMWB (about 27%).

The main water uses which justified HMWB designation in Poland were:

- Water regulation - 767
- Flood protection - 530
- Storage for irrigation - 315
- Storage for power generation - 198
- Pond farms, fish farms, storage for fish farming – 135
- Recreation - 134

However all the water uses stated in art. 4 (3)(a) appeared at least once in HMWB justification.

Rivers

Heavily modified water bodies (HMWB) qualification in Poland was carried out in two stages - it was based on calculated indexes and finally on expert assessment. In the first stage the morphological and hydrological indexes were counted to assess the scale of the physical changes. In the second stage the general economic and social analysis were performed to confirm (or not) the results obtained in the first stage.

There were two groups of indexes used in the first stage: morphological and hydrological.

Morphological indexes:

- Total length of important rivers' embankment with reference to total length of important rivers' banks (doubled river length),
- Total height of inventoried impoundment edifices with reference to total decrease in river slope of important rivers in river body's catchment,
- Total length of a river body severed by impoundment edifices with definite decrease in river slope with reference to length of important rivers,
- Total length of regulated rivers with relation to length of important rivers.

Hydrological indexes:

Total capacity of detention reservoirs with reference to long-term medium outflow in section that is closing the catchment,

Total amount of non-returnable intake with reference to long-term medium low flow in section that is closing the catchment,

Index of disturbance of hydrological regime caused by important changes in catchment management,

Index of preserving inviolable flow.

Water bodies which indexes were significant had been analysed in the second stage. The expert assessment was to verify whether the conditions of WFD art. 4 (3) are accomplished.

The expert assessment considered the main water uses and environmental impact. The social and economic analysis was carried, which has taken into account the social, environmental and financial results of reducing hydromorphological changes.

Lakes, coastal waters and transitional waters.

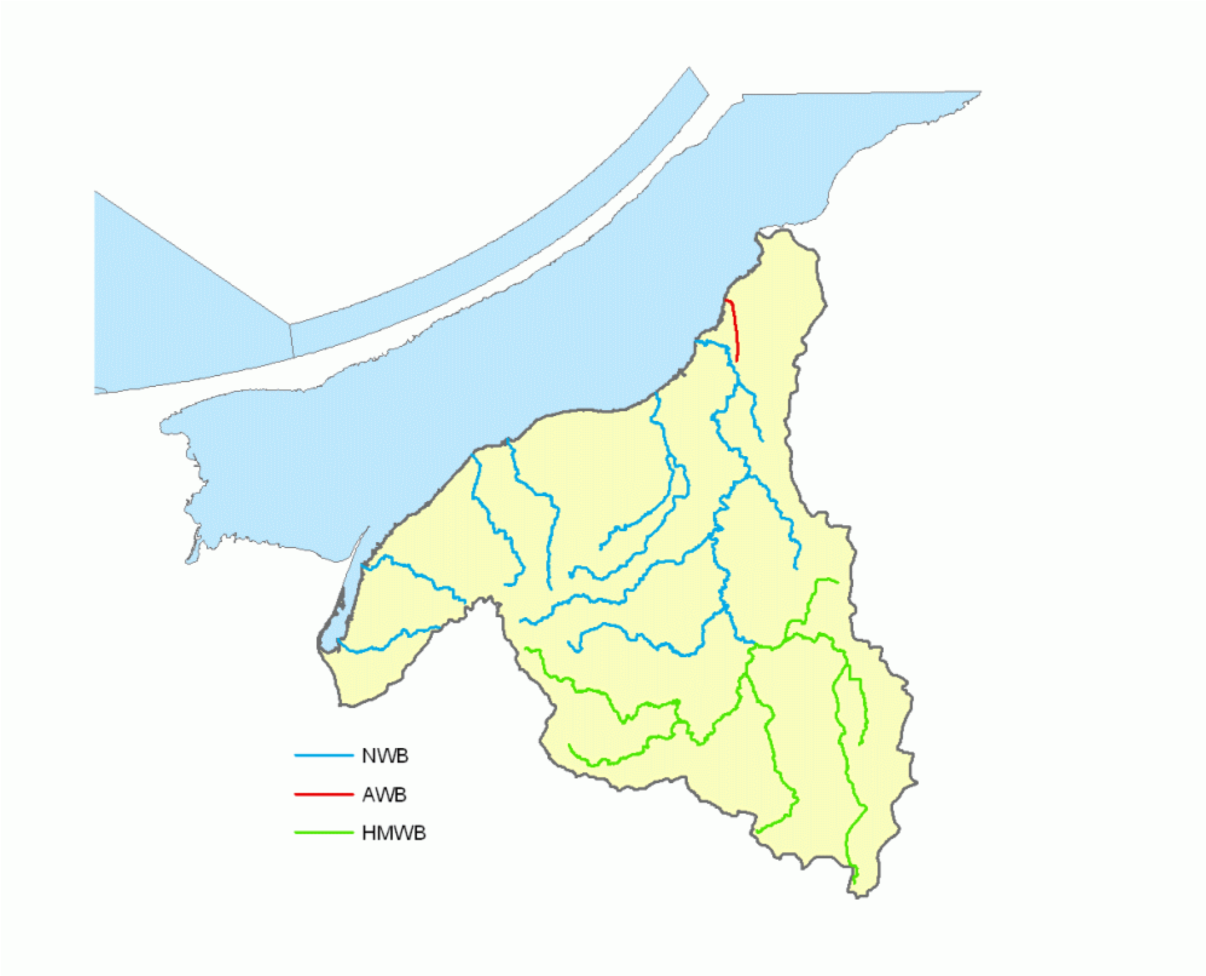
Only expert assessment was used to identify the HMWB in these categories. The considered issues were: the scale of hydromorphological changes and the social and economic significance. The analysis was similar to the second stage of HMWB of rivers designation.

HMWB and AWB in Bauda catchment.

Artificial and heavily modified water bodies in Bauda catchment are presented on the map.

1 artificial water body: Kanal Rozanski (Rozanski Canal) – it is an artificial ditch.

1 heavily modified water body was designated in the pilot area: Bauda od zrodel do Dzikowki (Bauda from the source to Dzikowka tributary).
The reason for designating is: 3 dams and water regulation. Main purposes of these morphological changes are agriculture and erosion prevention.
It is quite possible that after further analysis it will be decided that achieving good ecological status is possible and qualification will be changed in the present planning cycle.



Natural, artificial and heavily modified water bodies in Bauda catchment.

Sweden

Sweden used system B (Attachment 2 in WFD) due to its larger flexibility. Lakes with a size > 1 km2, and river sections with length > 15 km were designated as water bodies. In addition, a water body of smaller size might be designated under following circumstances;
a) it has an impact on area protected according to WFD;
b) it has high ecological values that can not be protected in other ways, or
c) it has significant impact on a designated water body.
The delineation of water bodies were performed at a map scale of 1:250 000. Water bodies with significant differences in status between sections should be divided into smaller water bodies.

Number of water bodies within the Swedish Southern Baltic RBD
968 rivers
478 lakes
177 coastal waters
8 larger Baltic sea water bodies (1-12 nautical miles outside national baseline)

The reason to characterise WB's by topology is to enable comparisons of assessed ecological status regardless of their types. According to the WFD, all countries should assess "reference conditions" (conditions principally unaffected by human impact) for ecological status-parameters for the various water body types. Sweden has not fully adapted to this during status classification for the 1:st water management cycle of 2009-2015. For several parameters Sweden have developed schemes to determine individual conditions for each water body.

Heavily Modified Water Bodies (HMWB) and Artificial Water Bodies (AWB)
A water body may be designated as artificial or heavily modified, allowing lower requirements for ecological conditions, expressed as "ecological potential". This implies that the water shall reach as good status as possible without too large negative impact on the activity that have caused the declaration of HMWB or AWB.

Designation of Heavily Modified water bodies and Artificial water bodies
Identification of HMWB is performed stepwise based on the physical alteration of the water bodies according to the following premises.
1. Assessed ecological status < Good.
2. The physical alteration is important for the problematic status.
3. The physical alteration causes significant changes of the character of the WB.

4. Assessed costs for measures required to achieve good ecological status (disproportionate costs?).
5. The required measures have significant adverse effect on the wider environment or the underlying activity that is reason for the designation of the HMWB (technical feasibility?).
6. The benefit achieved through the physical alteration can not be attained in other ways, for reasons of technical feasibility or disproportionate costs.

A simplified procedure was applied for designation of HMWB for the management cycle 2009-2015. This was mainly due to reasons related to missing adequate data so assess the measures required. The simplified procedure includes only steps 1-3 above, and is used to assess water bodies that are labelled preliminary HMWB (pHMWB). In Southern Baltic RBD there are a total of 15 WB designated as pHMWB, according to following reasons;
3 WBs: hydro power plants with effect ≥10 MW
9 WBs: port facilities of national interest
3 WBs: waters used for abstraction of drinking water
The rest of the pHMWB are subjected to further investigations during next cycle.

Comparative remarks

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-compounds, and alkalinity.

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 obtaining 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), expressed as percentages of total number of water bodies		
	Lithuania Nemunas RBD	Poland -entire country	Sweden* Southern Baltic RBD
Rivers and canals	9	31	0.9
Lakes and ponds	15	3	0.2
Transitional waters		3	
Coastal waters		27	5

* Sweden made a preliminary determination of HMWB

The criteria for designation of heavily modified water bodies differ between the three 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 compared to Nemunas River Basin District in Lithuania and the entire country of Poland. More detailed studies are needed to determine if the different criteria applied by the three countries yield results comparable.

IDENTIFICATION OF PRESSURES AND IMPACT

Lithuania

After the identification of the surface water types, assessment of pressures from human economic activities, and evaluation of the status of water bodies, the smallest administrative units were identified for the water management purposes – bodies of water.
For the purpose of identifying water bodies suffering from the most significant pressures in the Nemunas RBD, all most important sources of pollution were identified

- diffuse pollution loads from agriculture;
- point pollution loads from dischargers of WWTP, surface runoff and industrial wastewater in towns and settlements;
- transboundary pollution, which consists of pollution loads coming from the neighbouring countries-Russia, Belarus),

and their pollution loads quantified.

Diffuse pollution and point pollution

MIKE BASIN model was used to assess impacts of point and diffuse pollution sources on rivers in the Nemunas RBD, as well as to calculate pollutant concentrations in the main rivers and identify the input of individual pollution sources into the pollution of the rivers. The assessment of the quality of lakes and ponds and of impacts thereon by different pollution sources was carried out on the basis of the mathematical modelling results using an empirical GIS spreadsheet. The MIKE BASIN modelling results were also used for assessing pollution loads transported by rivers into the Curonian Lagoon.

Diffuse agricultural pollution consists of loads of organic matter, nitrogen and phosphorus compounds which enter soil with manure and mineral fertilisers. Agricultural pollution is one of the major sources of pollution with nitrate nitrogen. Such pollution in basins and sub-basins of the Nemunas RBD may account for 45-80 % of the total loads of nitrate nitrogen entering the water bodies.

During the last years, problems of the quality of water bodies as a result of point pollution have been significantly decreasing due to construction of new and continuously improved operation of wastewater treatment plants (WWTP). Studies of impacts of wastewater discharges on the ecological status of water bodies revealed that often problems related to point pollution are due to insufficient dilution of pollution when treated wastewater is

discharged in the upper reaches of rivers. In a number of cases significant impact on the main rivers is usually exerted by WWTP of lager cities.
The second largest group of polluters is outlets of surface (storm water) runoff, which account for about 22 % of the total load of BOD7 coming from point pollution sources, 23 % of total phosphorus and 16 % of total nitrogen.
The most acute problem related to point pollution is pollution with total phosphorus and ammonium nitrogen.

Transboundary pollution

The Curonian Lagoon is a lagoon in the southwest of the Baltic Sea, with the area of 1 584 km2. The lagoon is separated from the Baltic Sea by the Curonian Spit. Only the northern part of the Curonian Lagoon (402.03 km2) belongs to Lithuania, meanwhile the southern part lies in Kaliningrad Region. The Curonian Lagoon is a shallow body of water, with the largest natural depth of only 5.8 m and the average depth – 3.8 m. However, the prevailing depth of the Lithuanian part of the lagoon is 1.8 – 2.6 m. The water volume of the lagoon is 6 km3. At its northern end, the Curonian Lagoon is connected to the Baltic Sea by Klaipėda Strait (the narrowest place between piers is 390 m).

Impacts of transboundary pollution within the Nemunas RBD are significant in respect of the ecological status of both rivers (Neris, Nemunas and Šešupė) and the Curonian Lagoon. The ecological status of rivers is determined by pollution from pollution sources, meanwhile the Curonian Lagoon suffers from both pressures from pollution sources and pollutants transported by rivers. Transboundary pollution loads consist of pollutants entering rivers of the Nemunas RBD in Belarus and in Kaliningrad Region of the Russian Federation.

Although pollutant concentrations in the water of the Neris and the Nemunas coming from Belarus have decreased during the last couple of years, the latest water quality monitoring data (2008) shows that BOD7 concentrations in the Nemunas and in the Neris at the border with the neighbouring country still fail to conform to the good ecological status requirements (that is, exceed 3.3 mgO_2/l). When these rivers start flowing over the territory of Lithuania, concentrations of BOD7 actually remain the same, that is, continue failing the good ecological status requirements and hence both the Neris and the Nemunas were identified as water bodies at risk due to transboundary pollution.

Wastewater from Sovetsk and Neman situated in Kaliningrad Region are discharged into the Nemunas. Since there is no data on pollutant dischargers from these cities, estimations can be made only on the basis of modelling results and monitoring data for Lithuania and Kaliningrad. The said data indicates that concentrations of BOD7 in the Nemunas increase by 15 % as a result of pollution in the above-mentioned cities.

Calculations show that pollution coming to the Curonian Lagoon from Belarus, Sovetsk and Neman in Russia may be accounting for about 42 % of the total amount of ammonium nitrogen, 28 % of nitrate nitrogen and about 51 % of total phosphorus transported by the rivers. It is difficult to assess the transboundary share of BOD7 loads in the Curonian Lagoon because the results of water quality analysis conducted in Lithuania may reflect not only anthropogenic pollution generated in Belarus but also naturally occurring BOD7 loads. It is estimated that the input of transboundary pollution in the BOD7 loads in the Curonian Lagoon may total up to 60 %.

Impact of morphological changes

In addition to the impacts of pollution loads, morphological changes of water bodies were analyzed.

The most typical impact of hydropower plants constructed on the river beds are frequent fluctuations of the water level in the river stretches below the HPP. Barriers and dams interrupting river continuity and resulting changed hydromorphological characteristics of river above the barrier result either in complete disappearance of migratory fish upstream of the barrier (fish which migrate from the sea to rivers) or significant decrease in resources of certain fish species (fish which migrate within a river basin).

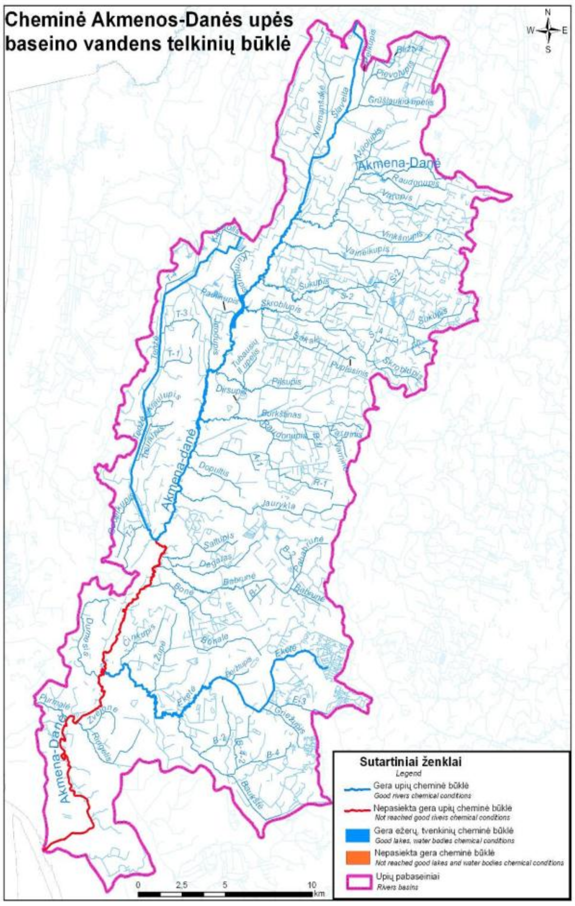
The largest impact on the ecological status of rivers is exerted by the straightening of their beds because specific habitats of water organisms are destroyed thus resulting in decrease in the type variety and abundance of water organisms themselves.

Akmena-Danė catchment area

The main identified sources of impacts in the Lithuanian Coastal Rivers Basin are municipal and industrial wastewater, and surface runoff.

The most important source of point pollution in the Akmena-Dane River Basin is Kretinga WWTP, which discharges effluents into the Tenžė River. In addition, the quality of the Tenžė may also be affected by the outlet of the game company UAB Kretingos žvėrininkystės ūkis. As a result, concentrations of BOD7, ammonium nitrogen and total phosphorus in the Tenžė fail to conform to the good ecological status requirements. The pollution of the tributary Tenžė determines exceeded concentrations of ammonium nitrogen and total phosphorus in the Akmena-Danė, thus failing to meet good ecological status. The impact of the Tenžė is felt up to the very mouth of the Akmena-Danė, where more than 20 dischargers of surface runoff of Klaipėda town are situated, thus significantly contributing to the pollution of this river. Consequently, by ammonium nitrogen the ecological status of water at the mouth of the Akmena-Danė fails to conform to the good status requirements, meanwhile by BOD7 and total phosphorus the ecological status balances on the border between the good and moderate status classes.

Pollution with hazardous substances was examined on the basis of the data of water quality monitoring performed during 2005-2008 and taking into account the outputs of the study Identification of substances hazardous for the aquatic environment in Lithuania carried out in 2006. The analysis of the data of concentrations of hazardous and priority hazardous substances indicate that some rivers within Nemunas RBD, including Akmena-Danė are suffering from significant pollution with hazardous substances. Both the monitoring data and the project outputs show that allowable concentrations of hazardous or priority hazardous substances are exceeded in these rivers. The amounts of diethylhexyl phthalate in the water at the estuary of the Akmena-Danė exceeded the Lithuanian standards, and that of tributyltin compounds – the EU EQS. The amounts of monobutyltin, dibutyltin, tetrabutyltin compounds and diisononylphthalate were disturbing. No exceedance was detected in the amounts of polycyclic aromatic hydrocarbons. No pollution sources have been identified yet.



Chemical status of water bodies in Akmena-Dane River Basin

Following monitoring and modelling data, supplementary measures due to excessive amounts of nitrogen and phosphorus are required in Kretinga WWTP. Supplementary measures may also be required to reduce discharges of surface runoff. However, the actual loads are not known yet and hence supplementary measures to address these loads have not been included in the present Plan.

There are no hydropower plants in Akmena-Dane river basin. The basin requires further reduction of pollution by households, industry, and surface runoff.

Poland

Identification of pressures and impact.

The WFD art. 5 obliges member states to prepare the characteristic of each river basin district. The extremely important part of this characteristic is identification of anthropogenic pressures and assessment of their impact on the waters. The basic recommendations on these analyses are stated in annex 2 while the more detailed instructions – in CIS "Guidance for the analysis of Pressures and Impacts in accordance with Water Framework Directive".

According to the CIS guidelines first driving forces were identified. In Poland they were identified basing on the statistic data, like:

- number of inhabitants, tourists etc.
- number of the inhabitants in the sewered and unsewered areas
- water intake, sewage discharge
- amount of waste
- area of the arable land
- animal units (AU)

This analysis showed a general picture, where we should expect problems.

Then the detailed pressure analysis was made. It was based mostly on the water law permissions. Additional source of data was the information about environmental payments and inspection data.
A data base and GIS layers were created which presented as well the antropogenic pressures, monitoring data and information about water status to show the correlation between them. Certainly also additional data as water bodies, protected areas, administrative borders etc. were included as reference objects.
.
The main considered pressures were:

- sewage discharges
- water intakes
- dams, reservoirs and water power plants
- dikes

Also the use of fertilizers and sewage from scattered dwellings were taken into account, although the only available data was statistic information.

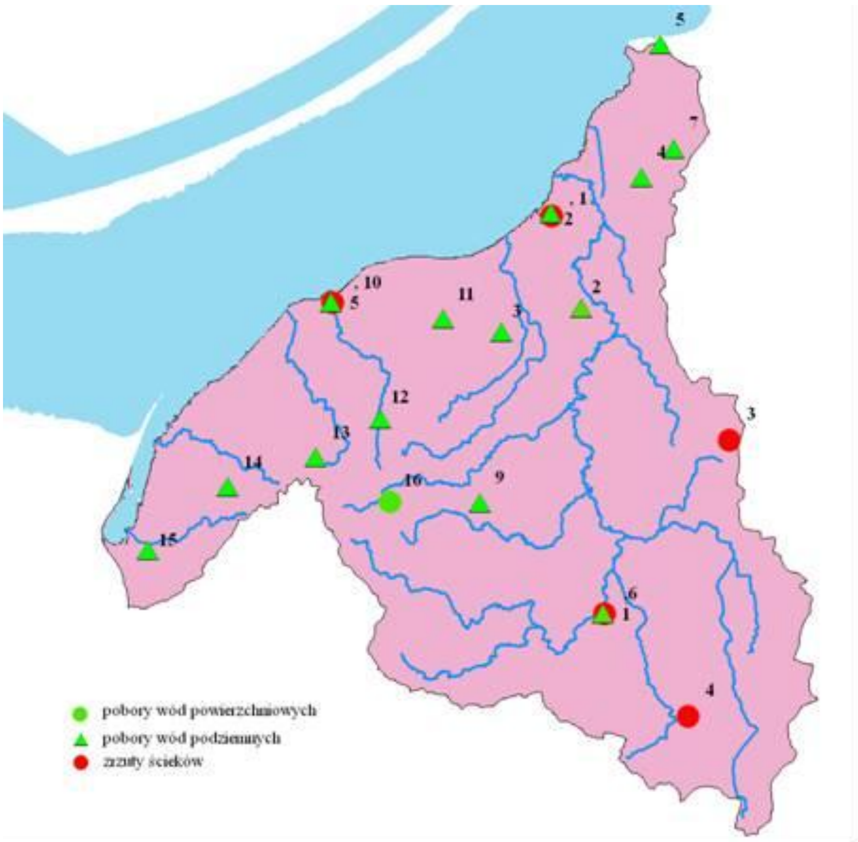
Additional data was:

- landfills
- meliorated areas
- harbors and other navigation device
- gravel output

The monitoring data include water quality information and average flow in the aggregated water bodies.

Anthropogenic pressures in Bauda catchment.

The main anthropogenic pressures in the pilot area are related to sewage discharges.



Water intakes and sewage discharges in Bauda catchment.

There are 5 municipal wastewater treatment plants in the area, presented in the table below. However the serious problem is also the lack of the sewage system on the quite large area. The scattered dwellings are obliged to have an individual sewage treatment plant or a septic tank. As the Bauda catchment is a poor area with a high unemployment rate and low level of inhabitants education this obligation is not always executed.

No	Sewage treatment plant	Discharge	Receiver
1	sewage treatment plant in Tolkmicko	$1500m^3/d$	Grabianka river
2	sewage treatment plant in Frombork	$1200m^3/d$	Vistula Lagoon
3	sewage treatment plant in Chruściel	$162m^3/d$	ditch
4	sewage treatment plant in Słobity	$11,23m^3/d$	ditch
5	sewage treatment plant in Młynary	$500m^3/d$	Gardyna river (Bauda tributary)

The main source of drinking water and water for industry are groundwaters. There are quite a lot ground water intakes in Bauda catchment. However the total intake is quite small and their impact on the waters status is insignificant.
There is only one surface water intake in the pilot area – used for the fish pond.
The water intakes in Bauda catchment are shown on the map abave, and in the table below.

Water intakes in Bauda catchment.

No	Intake [m³/d]	intake location
Ground water		
1	40	Podgórze
2	600	Młynary
3	400	Rubno wielkie
4	2160	Krasny Las
5	17	Karszewo
6	1260	Pagórki
7	189	Chruściel
8	17	Przybyłowo
9	18,9	Chojnowo
10	1100	Tolkmicko
11	750	Frombork
12	8,5	Cielętnik
13	3,5	Chojnowo
14	5,6	Kamionek Wielki
15	275	Młynary
surface water		
16	0,04 m³/s In spring	ditch in Zajączkowo village

There are 3 waste landfills in Bauda catchment. Two of them are closed and do not receive any waste. The problem is they are very old and they are not properly insulated so that the effluent can leak to the ground.
The landfill in Frombork is quite modern and is currently used.

The next step was to carry out a baseline scenario to predict economic and social trends which might affect the environmental status of water bodies. The baseline scenario was prepared basing on the macroeconomic prognosis and demographic trends. Upon these the changes of the driving forces were assessed. Based on the status assessment (2005), pressures and impact analysis and baseline scenario it was possible to assess the risk of not achieving the environmental objectives by certain water bodies. For each water body at risk the reason was indicated. The third category – water bodies potentially at risk – was introduced, because for some water bodies there was no enough data to assess the risk. However, in the 1st planning cycle the main criteria were the present status of the water bodies. The baseline scenario and predicted changes of the driving forces were only the additional information for the expert assessment. In general – all the lakes and ground waters which status was below good were considered at risk. The reason is the natural conditions would not allow to improve the status in such a short time to achieve the environmental objectives. The rivers which status was below good were brought up for the further analysis. The information which decided whether to consider the water body at risk or not were i.e. how far from the good was the status and what was the trend, whether it was possible to reduce pressures in a short time, whether the new pressures were likely to appear etc.

Almost all the water bodies which status was at least good were qualified not at risk.

In Bauda catchment one river water body was considered at risk: Bauda od źrodel do Dzikowki. The reason was hydromorphological changes. The analysis, the legal and investment process would be too long to finish before 2015. Also the transitional water body – Vistula Lagoon was regarded at risk. The reason is that it's a shallow eutrophicated lagoon and its natural conditions wouldn't let it achieve good status in such a short time even if all the pollution sources were eliminated. The ground water body PL_GB_2400_019 the pilot area lies within, is not at risk.

Sweden

During the first management cycle, the important pressures were reviewed in general terms, and a complete analysis of significant sources for human pressures is still missing. The analysis will be refined during next cycle.

Compilation of potential pressures

The County Administrative Boards collected information on potential significant pressures. Examples of sources of information are listed below;

- Pollution Load Compilation for the Baltic (PLC5) reported to HELCOM 2006.
- Coordinated monitoring of impact from environmentally hazardous activities, organised by operators.
- Swedish Water Archive (Swedish Meteorological and Hydrological Institute)
- National data base on pollution from point sources (licensed environmentally hazardous activities)
- National data base on manure of pollution damaged areas
- Cartographic data on land cover and Real Estates

- Data on wastewater from single houses, Real Estates and municipality inspections
- Register of larger hydropower dams
- National data base on forestry

There has often been lack of adequate data for status classification and assessment of human pressures and impact. Therefore, modelling and GIS-analyses have been important complements in the work. Three important models/methods are described below.

Potential pressures on ground water - national GIS-analysis

The GIS-analysis is based on cartographic information with national coverage. Different groups of potential pollution sources were identified. Following sources were identified;

- Environmentally hazardous activities)
- Roads
- Railway
- Churches and chapels -grave yards
- Pollution damaged areas
- Wastewater from single houses
- Agriculture, forestry
- Diffuse sources
- Point sources
- Surface covering data on land cover
- Data for various point- and line sources

The pollution source groups were divided into various classes of importance as potential pollution source to ground water. Each class was rated based on estimation of the mobility and degradation of pollution, way of emission (above/below ground surface), probability and duration of emission, and the amount/concentration of pollution that yields negative effect. The areal coverage of individual pollution source-classes was computed delineated ground water bodies with a 200 m buffer zone. Thereafter, the total risk for addressed pollution sources was summarized. Based on the frequency distribution of summarized risks for all Swedish ground bodies, the water bodies were divided into four categories of potential pollution load.

- Low potential pollution load < 20 points
- Moderate potential pollution load 20-25 points
- High potential pollution load 25-40 points
- Very high potential pollution load > 40 points

Ground water bodies within the category “very high potential pollution” were considered at risk of not achieving good status in2015.

Assessment of nutrient load to surface water - PLC5

The pressures of nutrient load were assessed using previously performed compilations developed for reporting to HELCOM on pollution load to the Baltic. Compilations were performed at a sub-basin level for individual water bodies, and they include data on

Emissions from
- waste water plants
- industry
- waste water from single houses

Estimated leakage (type values) for
- agricultural land
- forests
- clear cuts
- storm water
- open ground
- mires
- areal deposition on lakes

Point sources were represented by data on emissions for year 2006 (if not available from 2006, emission data from previous year was applied). Amounts for diffuse sources were estimated based on discharge data that were normalised for 20 years (1985-2004).

Impact of hazardous substances on surface water - indicative model

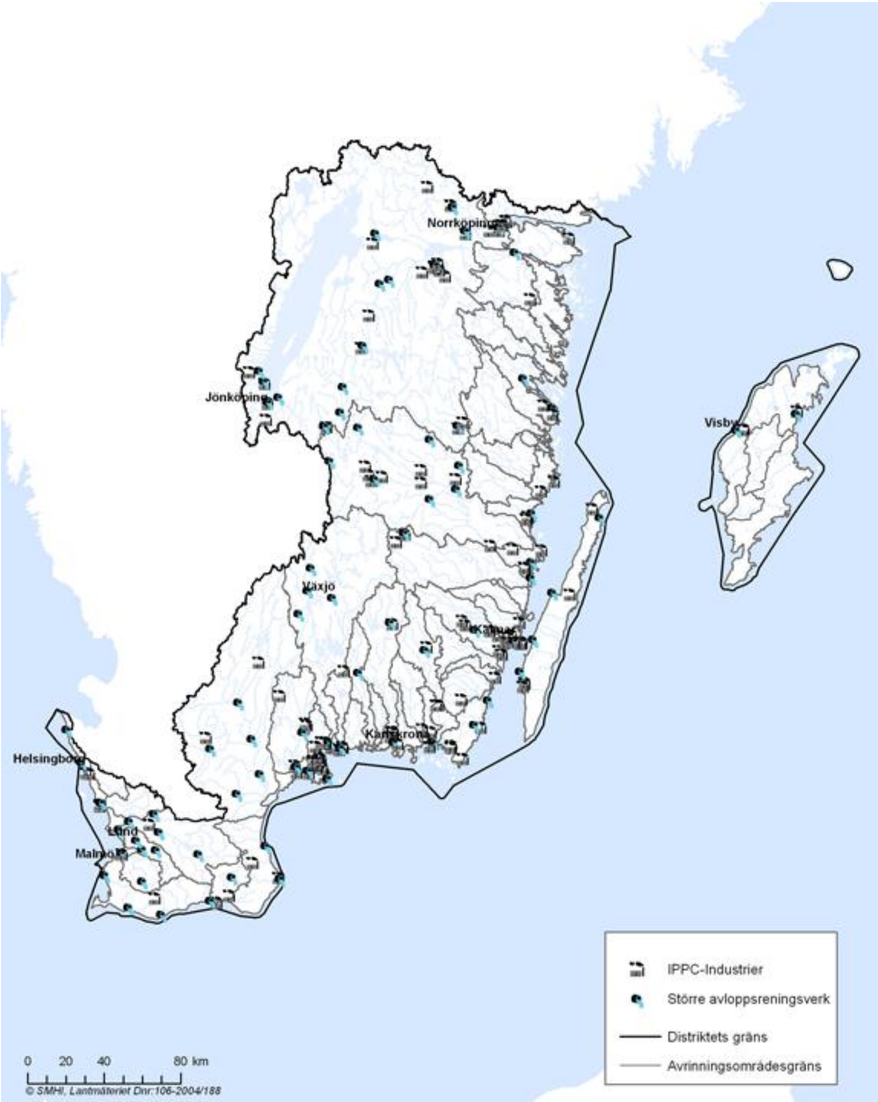
Monitoring of hazardous substances is performed in very few water bodies. To assess the pressure and impact of hazardous substances an indicative model was applied, resembling the methodology used for ground water but less comprehensive. The analysis was performed on a sub-basin level for each water body.

For analysis of impact on surface water, six groups of pollution sources were addressed;
- agriculture
- hard surfaces (asphalt, urban areas)
- roads and railways
- environmentally hazardous activities
- pollution damaged areas
- waste water from single houses

The pollution sources were divided into classes that were rated based on the toxicity of pollutions, types and total number of hazardous activities within the sub-basin, total length of road of various road classes, type of cultivated crop/ fruit, type of land use. The impact of the identified pollution sources was rated and normalised for their respective areal coverage within the sub-basin. The risks from identified pollution sources were then summarized. Water bodies were considered at risk when the summarized risk-point exceeded a threshold value, and also if there was a high risk determined for an individual class of pollution source. Some counties applied “expert assessment” of the risk after evaluating the analysis.

Preliminary identification of point sources with significant impact

A first step of identification of point sources with significant impact was performed during preparation of the first Management Plan 2009-2015.



Map of preliminary identified point sources with significant impact, Southern Baltic Sea RBD. (Online source)

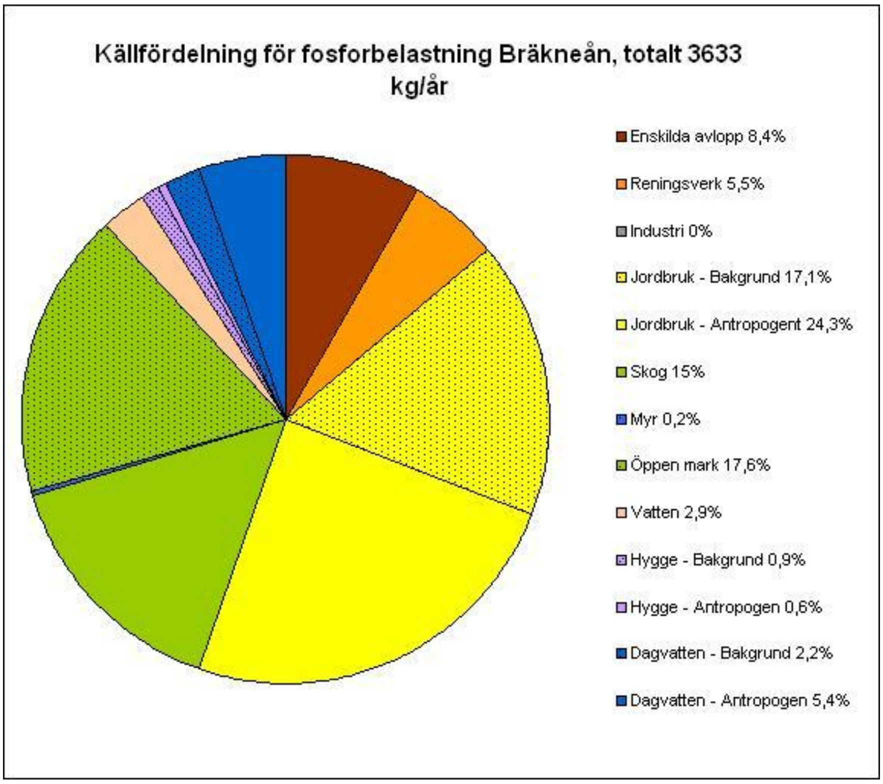
The preliminary identification includes

- Industries and farms subjected to the IPCC-directive (Integrated Pollution Prevention and Control) (in map above indicated by industry-symbol)
- Waste water treatment plant subject to UWWT (Urban Waste Water Treatment). (in map above indicated by bucket with blue sewagewater)

In next step it's important to take account for the size and amount of emissions from the point source, type of emission, size and sensitivity of recipient etc.

Human pressures and impact in the Bräkneån River Basin

According to the PLC5-compilations, the most important anthropogenic sources of nutrients within the Bräkneån River Basin are agriculture, forestry and sewage water. The sources for phosphorus and nitrogen are distributed as follows;
Phosphorus: agriculture ~24%, forestry ~15%, sewagewater from single houses ~8%.
Nitrogen: agriculture ~25%, forestry ~19%, areal deposition on lakes and municipal sewage water plants ~12% respectively,



Phosphorous load to the Baltic Sea from sources within the Bräkneån drainage basin

Yellow – agriculture (dotted: non-anthropogenic background level)
Green – forestry (dotted: non-anthropogenic background level)

Brown – wastewater from single houses
Orange – municipal wastewater plant

In the preliminary identification of significant point sources, there was only one waste water treatment plant appointed within the Bäkneån River Basin (plant subjected to the Waste Water Treatment Directive).

Comparative remarks

In the preparation of the Water Management Plans and Programmes of Measures, EU-member states have to prepare the characteristic of each river basin district, including identification of anthropogenic pressures and assessment of 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.
The recipient for Akmena Dane River is the Curonian Lagoon. The Curonian Lagoon, connected to the Baltic Sea in the North by Klaipeda Strait, is affected by transboundary pollution. The impact of transboundary pollution of the Curionian Lagoon is significant (estimated to 42% of the nitrogen load, 28% of the nitrate-nitrogen load, and 51% of the total phosphorus load).

Poland

A general picture of driving forces was obtained through analyses of statistical data on various pressure types, such as number of inhabitants and tourists, number 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 detailed pressure analyses were performed for selected areas. The detailed pressure analyses is based mainly on water law permissions registered in a GIS-data base, complemented with statistical data 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 waste water sewage plants, areas with lack of sewage systems, and two old land fills with leakage.

Sweden

The important pressures were reviewed in general terms. For estimations of nutrient loads on individual water bodies, the Pollution Load Control 5 (PLC5) was utilised. The PLC5-results were produced previously (in 2007) for reporting on nutrient loads to the Baltic Sea to the HELCOM-commission. To estimate potential pollution loads on ground water bodies, a national GIS analysis was performed. Pollution sources addressed were environmentally hazardous activities; roads; railway; grave yards; pollution damaged areas; waste water from single houses; agriculture; forestry etc. A similar GIS-analysis was performed to address hazardous substances but this analysis was less comprehensive.
Sweden only performed a preliminary identification of significant point sources, which means simply reporting plants/activities that are subjected to the IPPC-directive (Integrated Pollution and Prevention) and the WWT-directive (Waste Water Treatment).
For Bräkneån river basin the primary anthropogenic sources of nutrients is diffuse pollution from agriculture and forestry.
Within Bäkneån River Basin there is only one waste water plant appointed as significant point source.

MONITORING

Monitoring in Akmena-Dane River Basin

Monitoring of surface water bodies

As from 2005, monitoring of rivers and lakes has been carried out in accordance with a new National Environmental Monitoring Programme which was developed in accordance with Water Framework Directive 2000/60/EC as well as observing the requirements of other directives, international conventions and national legislation. Analyses conducted under the earlier monitoring programme were mainly intended to assess impacts of transboundary pollution and towns on the quality of river water. The status of smaller rivers, however, practically was not addressed. Also, the main indicators were chemical parameters of water status. Under the new approach to assessment of status of water bodies and management of water quality, the most important indicators are biological parameters which reflect conditions in which aquatic fauna and flora exist.

Monitoring and status assessment is performed at three levels: state, municipal and self monitoring:

- 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.

Monitoring of three types has been conducted in rivers and lakes since 2005:
Surveillance monitoring is carried out in order to obtain information about the overall status of water bodies in the country and its long-term changes. This information is required for designing key measures intended to ensure protection of water bodies in future, supplementing and ensuring the differentiation of water bodies into types, establishing reference conditions for water body types. Surveillance monitoring is further subdivided into two types: intensive monitoring (some quality elements conducted 12 times a year – every month) and extensive monitoring (some quality elements conducted twice during the implementation of the Programme of Measures in a RBD for water bodies which are indicative of the overall status of water bodies, i.e. in water bodies the ecological status of which currently meets the requirements set for high and good ecological status).

Operational monitoring is undertaken in water bodies the current ecological status or ecological potential (in case of HMWB) of which is lower than good. The purpose of operational monitoring is to establish the status of surface water bodies identified as being at risk of failing to meet their water protection objectives, and to assess any changes in the status resulting from the Programmes of Measures for the achievement of the water protection objectives. This monitoring allows assessing the impact of sources of pollution on the receiving water body.

Investigative monitoring is undertaken in cases when the reason of failure of a parameter indicative of a quality element to conform to the good status requirements has not been identified, or when the extent or impact of accidental pollution needs to be identified. An investigative monitoring programme is developed specifically for each individual case.

Elements subject to monitoring are biological, hydro-morphological and physico-chemical water quality elements which are the most indicative of status in water bodies. Different chemical parameters are measured in points of different monitoring types.

The ecological status is identified on the basis of the quality element which indicates the poorest status and the general status of a water body is determined by the poorer of its ecological status or chemical status.

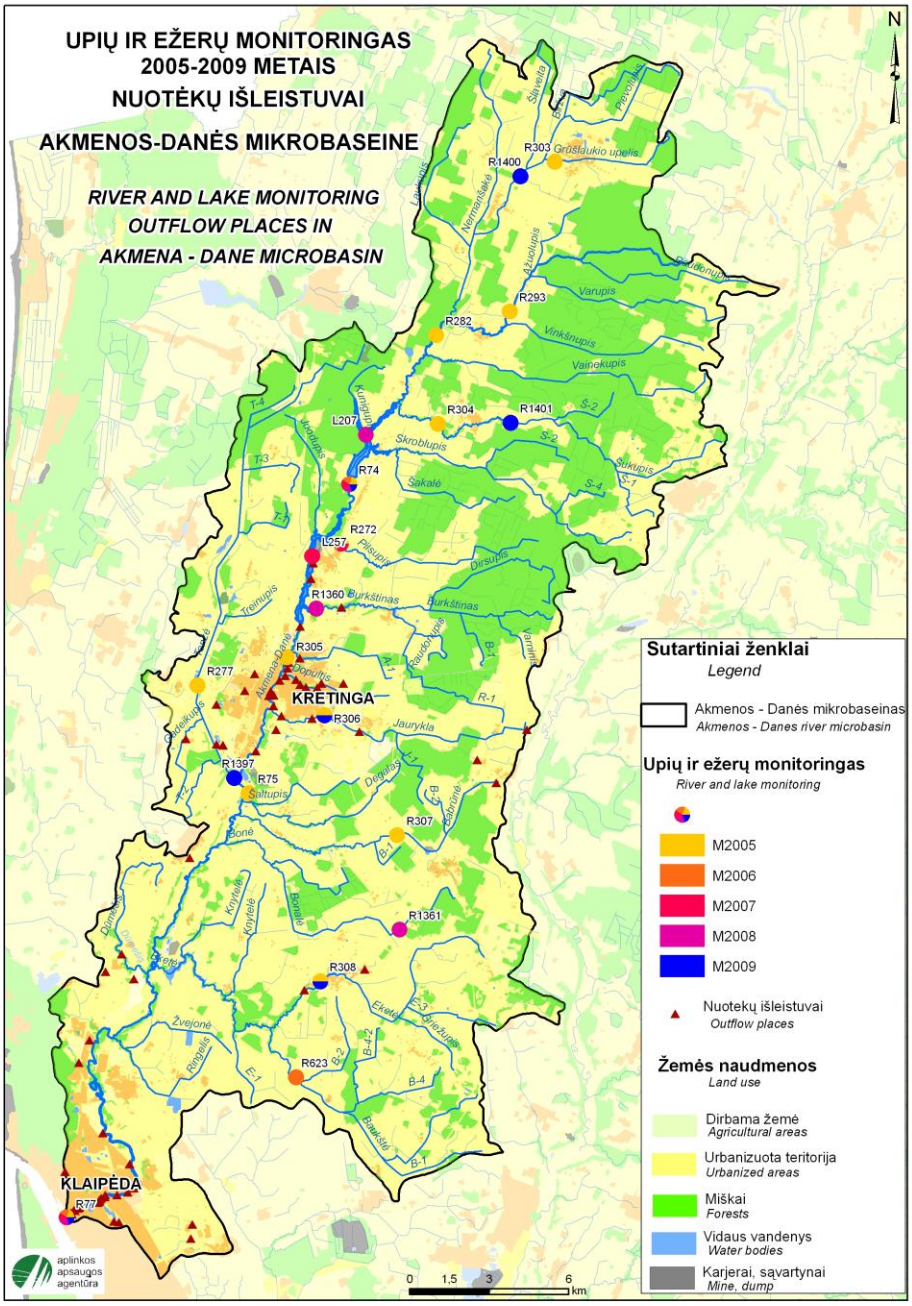
Akmena-Dane River Basin

Water quality monitoring in Akmena-Dane River Basin under the national environmental monitoring programme is carried out since 2005. The general parameters are examined in the water (temperature, oxygen, nutrients, etc.), heavy metals, organic pollutants, pesticides, macrozoobenthos, phytobenthos, fish fauna. During 2005-2009 water quality in seventeen river basin points was examined, of whom two ponds. In the two monitoring points (Akmena-Dane in the midstream and at the estuaries) intensive surveillance monitoring was carried out, during which the samples were taken every year, every month. In the seven river basin monitoring points water quality was investigated once within 2007-2009 period. In the remaining points water samples were taken once (May 2005).

In addition, from 2007 the Akmena-Dane River before Klaipeda is the subject of water quality monitoring under the Klaipeda city municipality environmental monitoring programme. 9 times per year main physico-chemical quality elements PO_4, Pt NO_2, NO_3, NH_4, N_t O_2, pH, chlorophyll a, bacterioplankton, phytoplankton and zooplankton are investigated. Once during the period covered by the monitoring, fish fauna, bottom fauna, vegetation and heavy metals in bottom sediments were investigated.

Self monitoring is carried out mostly by 20 economic entities listed under the IPPC directive.

Hazardous substances were surveyed in the study: Identification of substances dangerous for the water environment in Lithuania (2006) for selected 9 dangerous substances groups and some other substances.



Monitoring points in Akmena Dane River Basin. See text for explanation.

Monitoring in Bauda River Basin

Monitoring according to WFD in Poland and MOMENT pilot area.

According to WFD requirements there are 3 networks of the surface waters monitoring in Poland:

- surveillance monitoring
- operational monitoring
- investigative monitoring

The monitoring network has been designed in a way that enables the coherent and holistic assessment of the ecological and chemical status of each water body. As it is impossible to situate the monitoring point in each water body a set of criteria had been used to choose water bodies for monitoring.

Surveillance monitoring:

- size of the catchment
- lakes over 50 ha in the catchment
- transboundary water bodies
- protected areas
- reference water bodies
- water bodies in the intercalibration network
- significant flow changes

Operational monitoring:

- water bodies at risk
- water bodies where priority substances are discharged
- presence of the hazardous substances according to the regulation no 166/2006 of the EU Parliament and of the council concerning the establishment of a European Pollutant Release and Transfer Register and amending Council Directives 91/689/EEC and 96/61/EC
- waters on agriculture nitrate vulnerable areas
- protected areas
- recommendation in other plans and programs

The criteria were used only for rivers and lakes, because there are monitoring points all transitional and coastal water bodies.

There are 2540 surveillance monitoring sites and 1670 operational monitoring sites in Poland. About 620 sites are in both networks.

The aim of the surveillance monitoring is to assess the scale of anthropogenic pressures on the water bodies, assess the status changes long term trends both in natural conditions and under anthropogenic pressures.

The aim of the investigative monitoring is to provide data and information to:

- investigate the reasons for not complying with the limits for certain parameters and reasons for not achieving environmental objectives while it's not possible basing on the surveillance and operational monitoring results,
- assess the impact of the industrial accidents.

Monitoring in the MOMENT pilot area.

In the MOMENT pilot area there are monitoring sites in all the water bodies discharging to the Vistula Lagoon, except Canal Rozanski which is artificial water body. There are also 2 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.

Monitoring in Bauda River Basin. Figures represent the annual frequency of monitoring of individual parameters.

Name of monitoring site	Bauda - Frombork	Dąbrówka - Rubno	Grabianka - Janówek	Kamienica (Kamionka) - Kamionek Wielki	Narusa - Frombork	Stradanka - Tolkmicko
River	Bauda	Dąbrówka	Grabianka	Kamienica (Kamionka)	Narusa	Stradanka
Biological elements						
Phytobentos	-	1	1	1	1	1
Macrophytes	1	-	-	-	-	-
Chemical and physico-chemical elements supporting the biological elements						
Temperature	12	4	4	4	12	4
Suspended matter	12	-	-	-	12	-
Oxygenation conditions and organic pollution						
Dissolved oxygen	12	4	4	4	12	4
BOD5	12	4	4	4	12	4
Total organic carbon	4	4	4	4	4	4
Oxygen saturation	4	4	4	4	4	4
Salinity						
Conductance in 20 °C	4	4	4	4	4	4
Dissolved matter	4	4	4	4	4	4
WAter hardness	12	4	4	4	12	4
Acidification parameters						
pH	12	4	4	4	12	4
Biogenic substances						
Ammonium nitrogen	12	4	4	4	12	4
Kiejdahl nitrogen	4	4	4	4	4	4
Nitrate nitrogen	4	4	4	4	4	4
Nitrite nitrogen	4	4	4	4	12	4
Total nitrogen	4	4	4	4	4	4
Phosphates	4	4	4	4	4	4
Total phopsphorus	12	4	4	4	12	4
Silica	-	1	1	1	1	1
Specific synthetic and non-synthetic pollutants						
Copper	12				12	-
Microbiological parameters						
Total Coli bacteria	4	4	4	4	4	4
Fecal coli bacteria	4	4	4	4	4	4
Other substances						
Non-ionic ammonium	12	-	-	-	12	-
Total zinc	12	-	-	-	12	-
Dissolved organic carbon	-	1	1	1	1	1
Petroleum hydrocarbons visually	12	-	-	-	12	-

Monitoring in Bräkneån River Basin

There are three active monitoring programmes within Bräkenån RB;

- Monitoring program of liming effects,
- Coordinated monitoring of impact from environmentally hazardous activities, and
- Monitoring program of ground water quality for drinking water production.

In the adjacent coastal area, there is a coordinated monitoring of impact from environmentally hazardous activities.

In total there are about 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 WB. At the river mouth, the monitoring frequency is generally 12 times a year, except for biological parameters that are surveyed at maximum once every year. On other monitoring sites, the monitoring frequency rarely reaches the frequencies prescribed in the water frame directive. At least one biological quality element is surveyed in 3 out of 4 lakes and in all rivers/streams. At least one physico-chemical quality element is surveyed in all water bodies.

Chemical ground water parameters

(Number of WB with monitoring/total number of WB)

Nitrate, pesticides: (1/2 WB)

Chloride, sulphate, ammonium and arsenic: (1/2 WB)

Biological parameters

Monitoring frequency range: once a year – once every 3: rd year.

(Number of WB with monitoring/total number of WB)

Plankton (lakes: 2/4)

Macro invertebrates (rivers: 3/7, lakes: 2/4)

Fish -gill net fishing (lakes: 3/4)

Fish -electro fishing (rivers: 7/7)

Physico-chemical parameters

Monitoring frequency at river mouth: 12 times a year.

Monitoring frequency at other sites, range: 6 times/year – once per 6-year interval.

(number of WB with monitoring/total number of WB)

Alkalinity, pH (rivers: 7/7, lakes: 4/4)

Conductivity (rivers: 7/7 river, lakes: 4/4)

Oxygen, absorbance, colour (rivers: 7/7, lakes: 2/4)

Total phosphorus, total nitrogen, nitrate, TOC (rivers: 7/7 river, lakes: 4/4)

Other pollutants (rivers: 6/7, lakes 4/4)

chromium (Cr), sink (Zn), copper (Cu), arsenic (As), cobolt (Co), total aluminium (Al)

Hazardous substances

Monitoring frequency at river mouth: 12 times a year.

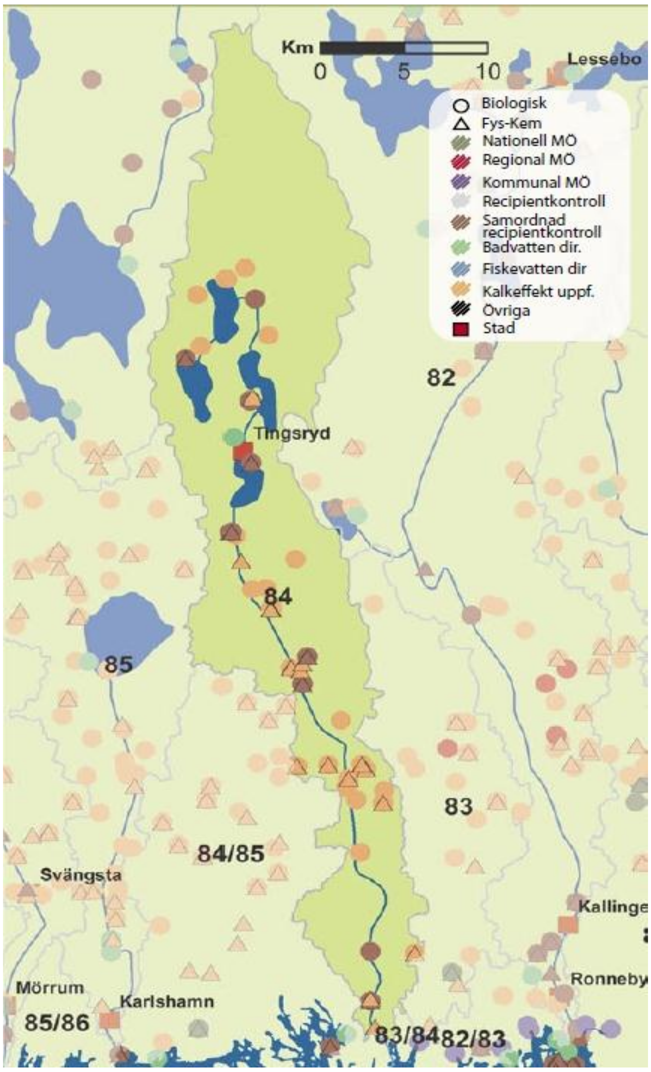
Monitoring frequency at other sites, range: 6 times/year – once per 6-year interval.

(number of WB with monitoring/total number of WB)

Cadmium- (Cd) , mercury- (Hg) , lead- (Pb), nickel- (Ni) and their compounds

(rivers: 4/7, lakes: 4/4)

Water discharge is monitored at a hydrological station located close to the river mouth by the Swedish Meteorological and Hydrological Institute. Annual average discharge is 2,85 m3/s (average over 10 years).



Monitoring sites in Bräkneån River Basin.

O biological quality elements, Δ physico chemical quality elements

Monitoring programme of liming effects

The national liming programme aims to counteract the acidification of lakes and rivers, mainly caused by combustion processes. The liming monitoring programme surveys chemical and biological effects of the liming on water.
Monitoring in Bräkneån RB was initiated in 1972.
Financed by state budget and arranged by county administrative boards.
Physico-chemical parameters: alkalinity, pH, conductivity, absorbance, water colour, oxygen.
Biological parameters: phytoplankton, macro invertebrates, gill-net fishing in lakes, electro fishing in rivers/streams.

Coordinated monitoring of impact from environmentally hazardous activities

Operators performing environmental hazardous activities are obliged to monitor their environmental impact (self monitoring). For Bräkneån RB, like for many other Rib's, the individual operators within the catchment collaborate in a common monitoring programme. The county administration boards inspect that the programme fulfils the requirements.
Monitoring in Bräkneån RB was initiated in 1987.
Financed by the operators performing environmentally hazardous activities, in this case only two municipalities (sewage systems, storm water) and a fish farm.
Physico-chemical parameters: alkalinity, pH, conductivity, absorbance, water colour, oxygen, total phosphorus (P_{tot}), total nitrogen (N_{tot}), nitrate (NO_3), TOC, Other pollutants. All parameters are not surveyed at every monitoring site.
Hazardous substances: Cadmium (Cd -, mercury (Hg)-, lead (Pb)-, nickel (Ni)- and their compounds.
Biological parameters: macro invertebrates, gill-net fishing in lakes, electro fishing in rivers/streams.

Monitoring programme of ground water quality for production of drinking water

One of the two ground water bodies is used for abstraction of public drinking water. The operator performs monitoring of the ground water for 6 of the 16 parameters relevant for chemical groundwater status.
Monitoring was initiated around 2000.
Financed by the operators producing drinking water.
Chemical parameters: nitrate, pesticides, chloride, sulphate, ammonium and arsenic.

Comparative remarks

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 adapted 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.

- A national monitoring programme was initiated in 2005. 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 20 economic entities listed under the IPPC directive. 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 Canal 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 since 20-30 years, and they have other primary aims than to produce data for status assessment of water bodies.
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. At the river mouth, the monitoring frequency is generally 12 times a year, except for biological parameters that are surveyed at maximum once every year. On other monitoring sites, the monitoring frequency rarely reaches the frequencies prescribed in the water frame directive.

STATUS ASSESSMENT – PROCEDURES AND LIMITS

For surface waters (rivers/streams, lakes, transitional waters, coastal waters) the ecological and chemical status is assessed. For artificial and heavily modified water bodies the ecological potential is assessed instead of ecological status. Groundwater is classified with respect to chemical and quantitative status.
There is general normative definition of Good ecological status in the WFD (Annex V):
The values of the quality elements for the surface water body type show low levels of distortion resulting from human activity, but deviate only slightly from those normally associated with the surface water body type under undisturbed conditions.

On a national level, reference conditions are established for the ecological quality elements for the water body types (see Topology). The reference conditions are equal to conditions with principally no anthropogenic impact. The basic idea of using water body types is to make it possible to compare water with similar natural conditions. The type is defined by any factors that govern the conditions for plant and animal life in the water. The aim is to obtain a system which makes the assessed ecological status comparable between different water types.
Parameters included in national classification systems. A previously used assessment criteria in Sweden is indicated by (prev) in the table.

Criteria for ecological status of river types in Lithuania.

	Lt	**Pl**	**Sw**
Total phosphorus (P_{tot})	X	X	X
Phosphate-phosphorous (PO_4-P)	X	X	
Total nitrogen (N_{tot})	X	X	(prev)
Ammonium nitrogen (NH_4-N)	X	X	
Nitrate nitrogen (NO_3-N)	X	X	
Biochemical oxygen demand (BOD7)	X	X	
Oxygen (0_2)	X	X	X

Lithuania

EQS for ecological status includes the quality elements and classification procedure described in WFD 2000/60/EC, Annex V. The classification procedure has been developed by the Lithuanian Environmental Protection Agency.

Criteria for assessing the ecological status of rivers

The ecological status of rivers is assessed on the basis of physico-chemical quality elements, hydromorphological quality elements (hydrological regime, river continuity, degree of naturalness of the shore zone, structure of the river bed, and length and width of the natural riparian vegetation zone) and biological quality elements (taxonomic composition, abundance, age structure of fish fauna and taxonomic composition, abundance of zoobenthos). Physico-chemical quality elements are parameters which characterise general conditions (nutrients, organic matter, and oxygenation): nitrate nitrogen (NO_3-N), ammonium nitrogen (NH_4-N), total nitrogen (N_t), phosphate-phosphorus (PO_4-P), total phosphorus (P_t), biochemical oxygen demand in seven days (BOD7), and the amount of dissolved oxygen in water (O_2). Water bodies are assigned to one of five ecological status classes (high, good, moderate, poor or bad) on the basis of the average annual values of each parameter.
EQS for surface water bodies was approved by the Order of the Minister of the Environment (MoE) No D1-178 of 4 March 2010.

Ecological status classes of rivers according to parameters indicative of physico-chemical quality elements. For the establishment of good water status for nutrients, criteria were set according to reference conditions, carried out studies, statistical evaluations.

No.	Quality element		Parameter	River type	Parameter value for reference conditions	Criteria for ecological status classes of rivers				
						High	Good	Moderate	Poor	Bad
1	General data	Nutrients	NO_3-N, mg/l	1-5	0.90	<1.30	1.30-2.30	2.31-4.50	4.51 - 10.00	>10.00
2			NH_4-N, mg/l	1-5	0.06	<0.10	0.10-0.20	0.21-0.60	0.61-1.50	>1.50
3			N_t, mg/l	1-5	1.40	<2.00	2.00-3.00	3.01-6.00	6.01-12.00	>12.00
4			PO_4-P, mg/l	1-5	0.03	<0.050	0.050-0.090	0.091-0.180	0.181-0.400	>0.400
5			P_t, mg/l	1-5	0.06	<0.100	0.100-0.140	0.141-0.230	0.231-0.470	>0.470
6		Organic matter	BOD_7, mg/l	1-5	1.80	<2.30	2.30-3.30	3.31-5.00	5.01-7.00	>7.00
7		Oxygenation	O_2, mg/l	1, 3, 4, 5	9.50	>8.50	8.50-7.50	7.49-6.00	5.99-3.00	<3.00
8			O_2, mg/l	2	8.50	>7.50	7.50-6.50	6.49-5.00	4.99-2.00	<2.00

When all parameters indicative of the hydromorphological quality elements are consistent with the characterisation of high ecological status, such water body is deemed to be at high ecological status according to the hydromorphological quality elements. When at least one parameter for the hydromorphological quality elements fails the characterisation of high ecological status, such water body is considered to be failing high ecological status according to the hydromorphological quality elements.

Characterisation of high ecological status of rivers according to parameters indicative of hydromorphological quality elements

No.	Quality element		Parameter	Spatial assessment scale	Characterisation of high status of rivers according to parameters indicative of hydromorphological quality elements
1	Hydrological regime	Quantity and dynamics of water flow	Flow rate	monitoring site	There are no alterations in the quantity of the natural flow due to human activities (water intake, operation of a HPP, water discharge from ponds, or an impact of the head), or fluctuation is insignificant (□10 % of the average flow during a period in question). However, the flow quantity may not be less than the minimum natural flow during the dry period (average of 30 days).
2	River continuity		River continuity	stretch *	There are no artificial barriers for fish migration.
3	Morphological conditions	Shore structure	Structure of the river bed	stretch *	The bed is natural (not straightened, no shore embankments).
4			Length and width of the natural riparian vegetation zone	stretch *	The zone of natural riparian vegetation (forests) covers at least 70 % of the length of the bed shore. The width of the forest zone must be at least 50 m.

* the length of the river stretches where the parameters for hydromorphological quality elements are assessed: rivers with the catchment area < 100 km2 – 0.5 km upstream and 0.5 km downstream of the monitoring site; rivers with the catchment area from 100 to 1000 km2 – 2.5 km upstream and 2.5 km downstream of the monitoring site, and rivers with the catchment area >1000 km2 – 5 km upstream and 5 km downstream of the monitoring site.

The indicator used to assess the ecological status of rivers by the taxonomic composition, abundance, age structure of fish fauna is the Lithuanian Fish Index (LFI). Observing the average annual value of LFI, water bodies are assigned to one of five ecological status classes.

Ecological status classes of rivers according to the taxonomic composition, abundance and age structure of fish fauna

Quality element	Indicator	River type	Criteria for ecological status classes of rivers according to parameter values for fish fauna				
			High	Good	Moderate	Poor	Bad
Taxonomic composition, abundance and age structure of fish fauna	LFI	1-5	>0.93	0.93-0.71	0.70-0.40	0.39-0.11	<0.11

The indicator used to assess the ecological status of rivers according to the taxonomic composition and abundance of zoobenthos is the Danish Stream Fauna Index (DSFI). Observing the average annual value of the ecological quality ratio (EQR) of DSFI, water bodies are assigned to one of five ecological status classes.

Ecological status classes of rivers according to the taxonomic composition and abundance of zoobenthos

Quality element	Indicator	River type	Criteria for ecological status classes of rivers according to the EQR of parameter values for zoobenthos				
			High	Good	Moderate	Poor	Bad
Taxonomic composition and abundance of zoobenthos	DSFI	1-5	≥ 0.78	0.77-0.64	0.63-0.50	0.49-0.35	<0.35

Criteria for assessing the ecological status of lakes

The ecological status of lakes is assessed on the basis of physico-chemical, hydromorphological and biological quality elements. The parameters characterising general conditions (nutrients), which is a physico-chemical element, are as follows: total nitrogen (Nt) and total phosphorus (Pt). Water bodies are assigned to one of five ecological status classes on the basis of the average annual values of each parameter measured in samples of the surface water layer.

Ecological status classes of lakes according to parameters indicative of physico-chemical quality elements

No.	Quality element		Parameter	Lake type	Parameter value for reference conditions	Criteria for ecological status classes of lakes according to parameter values for the physico-chemical quality element				
						High	Good	Moderate	Poor	Bad
1	General conditions	Nutrients	N_t, mg/l	1, 2	1.00	<1.30	1.30-1.80	1.81-2.30	2.31-3.00	□3.00
2			N_t, mg/l	3	0.75	<0.90	0.90-1.20	1.21-1.60	1.61-2.00	□2.00
3			P_t, mg/l	1, 2	0.020	<0.040	0.040-0.060	0.061-0.090	0.091-0.140	□0.140
4			P_b, mg/l	3	0.015	<0.030	0.030-0.050	0.051-0.070	0.071-0.100	□0.100

The ecological status of lakes is assessed on the basis of the following parameters indicative of hydromorphological quality elements, such as hydrological regime (quantity and dynamics of water flow) and morphological conditions (structure of the lake shore): changes in the water level, alterations of the shoreline, the length of the natural riparian vegetation zone. When all parameters for the hydromorphological quality elements are consistent with the characterisation of high ecological status, such water body is deemed to be of high ecological status according to hydromorphological quality elements. When at least one parameter for the hydromorphological quality elements fails the characterisation of high ecological status, such water body is considered to be failing high ecological status according to hydromorphological quality elements.

Characterisation of high status of lakes according to parameters indicative of quality hydromorphological elements

No.	Quality element		Parameter	Characterisation of high status of lakes according to parameters for hydromorphological quality elements
1	Hydrological regime	Quantity and dynamics of water flow	Changes in the water level	There is no unnatural decrease in the water level (the level has not been lowered, there is no intake of water), or changes are insignificant (the level is not lower than the natural minimum average annual water level), or there is no anthropogenic impact which would determine the said alteration of the water level. There is no unnatural fluctuation of the water level (fluctuation conditioned by operation of a HPP constructed on an effluent or tributary of the lake), or such fluctuation is within the limits of the minimum and maximum natural average annual water level.
2	Morphological conditions	Shore structure of the lake	Changes in the shoreline	The shoreline is natural (not straightened, there are no shore embankments), or changes are insignificant (≤ 5 % of the lake shoreline).
3			Length of the natural riparian vegetation zone	The zone of natural riparian vegetation (forests) covers at least 70 % of the length of the lake shoreline.

The ecological status of lakes is assessed on the basis of the following parameter indicative of biological quality elements, such as the taxonomic composition, abundance and biomass of phytoplankton: average annual and maximum value of chlorophyll a. Observing the mean of the EQR of the annual average value and of the EQR of the maximum value of the parameter, water bodies are assigned to one of five ecological status classes.

Ecological status classes of lakes according to the taxonomic composition, abundance and biomass of phytoplankton

Quality element	Parameter	Lake type	Criteria for ecological status classes of lakes according to the EQR of parameter values for phytoplankton				
			High	Good	Moderate	Poor	Bad
Taxonomic composition, abundance and biomass of phytoplankton	Chlorophyll a (the mean of the EQR of the annual average value and of the EQR of the maximum value)	1-3	>0.67	0.67-0.33	0.32-0.14	0.13-0.07	<0.07

Chemical status

Good chemical status of a surface water body is the chemical status achieved by the body of water in which concentrations of pollutions do not exceed the environmental quality standards. If the EQS are exceeded, such body of water is classified as failing good chemical status. The maximum allowable concentrations (MAC) for chemical substances – hazardous and priority hazardous substances as well as other specific polluting substances – in bodies of water have been set by MoE Order No. D1-236 of 17 May 2006 (as amended in 2009 and 2010).
EQS for chemical surface water status follows concentrations given in the directive on environmental quality standards (2008/105/EC) without exceptions.

Poland

EQS for ecological status includes the quality elements and classification procedure described in WFD 2000/60/EC, Annex V. The classification procedure has been developed by the National Environmental Inspectorate and is stated in Minister of Environment regulation on the way of surface water status classification. It defines the limits for high, good, moderate, poor and bad ecological and chemical status.
The ecological status of surface water bodies is assessed basing on the biological elements together with the physicochemical and hydromorphological ones. Although the physicochemical and hydromorphological elements are regarded as additional ones, the present status assessment in most of the cases is based on the physicochemical elements because the biological elements were monitored only in very few water bodies. Now the

monitoring is performed according to WFD guidelines so the water status assessment will be verified.
The assessment of the chemical status of surface water bodies is based on the maximum concentrations of the substances listed in the mentioned regulation.

The chemical and quantitive status of the groundwater bodies is assessed basing on the criteria stated in the Minister of Environment regulation on the criteria and way of groundwater status assessment.

The ecological status of surface water bodies is assessed basing on the biological elements together with the physicochemical and hydromorphological ones. Although the physicochemical and hydromorphological elements are regarded the additional ones, the present status assessment in most of the cases is based on the physicochemical elements because the biological elements were monitored only in very few water bodies. Now the monitoring is performed according to WFD guidelines so the water status assessment will be verified.

Ecological status classification is performed according to the table below- the classes correspond to the status value.

Class according to the limit value	Ecological status
I	Very good
II	Good
III	Moderate
IV	Poor
V	Bad

If there is one monitoring point in a water body – the status assessment is based on the monitoring results in this point. If there are more – the assessment is based on the representative results (rivers and streams) or on the mean values (lakes and reservoirs).If there are no monitoring points in a water body the assessment is based on the results in a similar water body (category, type) under similar pressures. Hydromorphological elements are assessed in the whole water body.
In the biological parameters classification the parameter which is the worst determines the assessment. The hydromorphological and physicochemical parameters are only supporting the biological ones.
Ecological potential assessment is based on the similar rules as the ecological status – the difference is that it refers to the heavily modified and artificial water bodies which means that there are always hydromorphological changes affecting the water body.

The tables below are translated tables from the Minister of Environment regulation on the way of surface water status classification.

Numer wskaźnika jakości wód	parameter	Unit	Limit value				
			I	II	III	IV	V
1	**Biological elements**						
1.1	Phytoplankton						
1.1.1	Chlorophyll „a" 1)	µg/l	<20	35	50	65	>65
	Chlorophyll „a" 2)	µg/l	<25	60	95	130	>130
1.2	Phytobenthos						
1.2.1	Diatom index 3)	-	>0,75	0,55	0,35	0,15	<0,15
	Diatom index 4)	-	>0,70	0,50	0,30	0,15	<0,15
	Diatom index 5)	-	>0,70	0,50	0,30	0,10	<0,10
	Diatom index 6)	-	>0,65	0,45	0,25	0,10	<0,10
1.3	Macrophytes						
1.3.1	macrophyte index 7)	-	≥44,5	35	25,4	15,8	<15,8
	macrophyte index 8)	-	≥47,1	36,8	26,5	16,2	<16,2
	macrophyte index 2)	-	≥37,9	35	32,1	29,2	<29,2
1.4	Benthic invertebrate fauna	not included – reference conditions are being established					
1.5	Fish fauna	not included – reference conditions are being established					

2	Hydromorphological elements supporting the biological elements	
2.1	**Hydrological regime**	
2.1.1.a	quantity and dynamics of water flow	The quantity and dynamics of flow, and the resultant connection to groundwaters, reflect totally, or nearly totally, undisturbed conditions. Limit values will be set in future. .
2.1.2	connection to groundwater bodies	
2.2	**River continuity**	
2.2.1	Number and kind of barriers	The quantity and dynamics of flow, and the resultant connection to groundwaters, reflect totally, or nearly totally, undisturbed conditions. Limit values will be set in future.
2.2.2	migration of aquatic organisms and sediment transport	
2.3	**Morphological conditions**	
2.3.1.a	river depth and width variation	The quantity and dynamics of flow, and the resultant connection to groundwaters, reflect totally, or nearly totally, undisturbed conditions. Limit values will be set in future.
2.3.2.a	structure and substrate of the river bed	
2.3.3.a	structure of the riparian zone	
2.3.4.a	stream velocity	
3.	**Chemical and physico-chemical elements supporting the biological elements**	

3.1	*General parameters*				
3.1.1	Temperature	°C	≤ 22	24	no limit values
3.1.4	Suspended matter	mg/l	≤ 25	50	
3.2	**Oxygenation conditions and organic pollution**				
3.2.1	Dissolved oxygen	mg O_2/l	≥ 7	5	no limit values
3.2.2	BOD_5	mg O_2/l	≤ 3	6	
3.2.3	$ChOD_{Mn}$	mg O_2/l	≤ 6	12	
3.2.4	TOC	mg C/l	≤ 10	15	
3.2.6	$CHOD_{Cr}$	mg O_2/l	≤10	≤20	
3.3	**Salinity parameters**				
3.3.2	conductance	µS/cm	≤ 1000	1500	no limit values
3.3.3	dissolved matter	mg/l	≤ 500	800	
3.3.4	sulphates	mg SO_4/l	≤ 150	250	
3.3.5	chlorides	mg Cl/l	≤ 200	300	
3.3.6	calcium	mg Ca/l	≤ 100 9)	200 9)	
3.3.7	magnesium	mg Mg/l	≤ 50 9)	100 9)	
3.4	**Acidification parameters**				
3.4.1	pH	pH	6-8,5	6-9	no limit values
3.5	**Biogenic substances**				
3.5.1	ammonium nitrogen	mg N_{NH4}/l	≤ 0,78	1,56	no limit values
3.5.2	Kiejdahl nitrogen	mg N/l	≤ 1	2	
3.5.3	nitrate nitrogen	mg N_{NO3}/l	≤ 2,2	5	
3.5.4	total nitrogen	mg N/l	≤ 5	10	

3.5.7	total phosphorus	mg P/l	≤ 0,2	0,4	

1) Lowland rivers with sand and clay, gravel substrate and catchment >5000km2, small and medium rivers with peat substrate and rivers between lakes.

2) Big lowland rivers..

3) Tatra streams with silicate and carbonate substrate and Sudety streams.

4) Upland streams with silicate substrate, upland streams with carbonate substrate, small upland rivers with silicate substrate, small upland rivers with carbonate substrate, medium upland rivers.

5) Lowland streams with loess, clay, sand, gravel or organic substrate.

6) Lowland rivers with clay aand sand or gravel substrate, small and medium rivers with peat substrate and rivers between the lakes – with catchment< 5000 km2.

7) Lowland streams with loess, clay or sand substrate, lowland rivers with sand and clay substrate, river sections close to the mouth influented by salt waters, organic streams, rivers in the peat valleys, rivers between the lakes

8) Lowland streams and rivers with gravel substrate.

9) Dissolved.

Limit values for lakes and reservoirs

Parameter no.	Parameter	Unit	Limit value					Remarks
			I	II	III	IV	V	
1.	Biological elements							
1.1	Phytoplancton							
1.1.1	Chlorophyll „a”							
	Schindler coefficient <2 1)	µg/l	<5	8	11	16	>16	Wartość średnia 6)
	Schindler coefficient >2 1)	µg/l	<7	13	21	33	>33	Wartość średnia 6)
	Schindler coefficient <2 2)	µg/l	<10	19	30	42	>42	Wartość średnia 6)
	Schindler coefficient >2 2)	µg/l	<10	23	40	68	>68	Wartość średnia 6)
1.2	Phytobenthos							
1.2.1	Diatom index 3)	-	>0,83	0,55	0,30	0,15	<0,15	-
1.3	**Macrophytes**							
1.3.1	macrophyte index 4)	-	1 - 0,680	0,679 0,340	0,339 – 0,170	0,169 – 0,090	<0,090	-
	macrophyte index 5)	-	1 - 0,680	0,679 - 0,270	0,269 - 0,110	0,109 - 0,050	<0,050	-
1.4	**Benthic invertebrate fauna**	**not included – reference conditions are being established**						
1.5	**Fish fauna**	not included – reference conditions are being established						
2.	Hydromorphological elements supporting the biological elements							

2.1	**Hydrological regime**				
2.1.1.a	quantity and dynamics of water flow	Conditions consistent with the achievement of the values specified above for the biological quality elements Limit values will be set in future			
2.1.2	connection to groundwater Dobies				
2.1.3	retention time				
2.3	**Morphological conditions**				
2.3.1.b	Lake depth variation	Conditions consistent with the achievement of the values specified above for the biological quality elements. Limit values will be set in future			
2.3.2.b	quantity and structure of the substrate				
2.3.3.b	the structure and condition of the lake shore zone				
3.	**Chemical and physico-chemical elements supporting the biological elements**				
3.1	General				
3.1.4	Secchi depth				
	Schindler coefficient <2 1)	m	2,5	no limit values	mean value 6)
	Schindler coefficient >2 1)	m	1,7		mean value 6)
	Schindler coefficient <2 2)	m	1,5		mean value 6)
	Schindler coefficient >2 2)	m	1		mean value 6)
3.2	Oxygenation conditions and organic pollution				
3.2.1	Dissolved oxygen 7)	mg O_2/l	≥4	no limit values	

3.2.5	mean oxygen saturation in hypolimnion	%	≥10		
3.3	Salinity parameters				
3.3.2	Conductance in 20 °C	µS/cm	≤600 7)	no limit values	mean value 6)
3.5	Biogenic substances				
3.5.5	Total nitrogen			no limit values	
	Schindler coefficient <2 1)	mg N/l	1,5		mean value 6)
	Schindler coefficient >2 1)	mg N/l	2,0		mean value 6)
	Schindler coefficient <2 2)	mg N/l	1,6		mean value 6)
	Schindler coefficient >2 2)	mg N/l	2,5		mean value 6)
3.5.7	Total phosphorus				
	Schindler coefficient <2 1)	mg P/l	0,060		mean value 6)
	Schindler coefficient >2 1)	mg P/l	0,090		mean value 6)
	Schindler coefficient <2 2)	mg P/l	0,100		mean value 6)
	Schindler coefficient >2 2)	mg P/l	0,120		mean value 6)

Objaśnienia:

1) Stratified lakes.

2) Not stratified lakes

3) All lakes except the lakes under the salt waters influence and not stratified lakes with Schindler coefficient <2 and Ca>25mg/l.

4) Dla jezior ramienicowych głębokich.

5) Dla jezior ramienicowych płytkich.
6) Arithmetic mean from one measuring point.
7)In summer above the bottom in the not stratified lakes.
8) Dissolved

Chemical status

The assessment of the chemical status of surface water bodies is based on the maximum concentrations of the substances given in the directive on environmental quality standards (2008/105/EC), complemented by substances in the table below. If any of those parameters doesn't comply with the limit values – the water body fails to achieve good chemical status. If there is one monitoring point in a water body – the status assessment is based on the monitoring results in this point. If there are more – the assessment is based on the worst results. If there are no monitoring points in a water body the assessment is based on the results in a similar water body (category, type) under similar pressures.
Tables of limiting concentrations are stated in Minister of Environment regulation on the way of surface water status classification (Substances according to Directive 2008/105/EC, see annex III).

Hazardous substances limit values

(Specific synthetic and non-synthetic pollutants)

CAS [1] number	para meter no	Parameter	Unit	Limit values		
				streams, rivers, channels	lakes and reservoirs	transitional and coastal waters
	4	**Hazardous substances**				
	4.3	**Specific synthetic and non-synthetic pollutants (metals concentrations are set for the dissolved metals)**				
7440-38-2	4.3.1	Arsenic	mg As/l	0,05		0,05
7440-39-3	4.3.2	Baron	mg Ba/l	0,5		0,5
7440-42-8	4.3.3	Borium	mg B/l	2		2
Brak	4.3.4	Chromium $+Cr_6$	mg Cr^{+6}/l	0,02		0,02
7440-47-3	4.3.5	Total chromium (+Cr3 and +Cr6)	mg Cr/l	0,05		0,05

7440-66-6	4.3.6	Zinc	mg Zn/l	1	1
7440-50-8	4.3.7	Copper	mg Cu/l	0,05	0,05
Brak	4.3.8	Volatile phenoles (phenol index)	mg/l	0,01	0,01
Brak	4.3.9	Petroleum hydrocarbons – oil index	mg/l	0,2	0,2
7429-90-5	4.3.10	Aluminium	mg Al /l	0,4	0,4
57-12-5	4.3.11	Elemental cyanides	mg CN/l	0,05	0,05
Brak	4.3.12	Fixed cyanides	mg Me $(CN)_x$/l	0,05	0,05
7439-98-7	4.3.13	Molybdenum	mg Mo/l	0,04	0,04
7782-49-2	4.3.14	Selenium	mg Se/l	0,02	0,02
7440-22-4	4.3.15	silver	mg Ag/l	0,005	0,005
15035-09-3	4.3.16	Thallium	mg Tl/l	0,002	0,002
7440-32-6	4.3.17	Titanium	mg Ti/l	0,05	0,05
14867-38-0	4.3.18	Vanadium	mg V/l	0,05	0,05
35734-21-5	4.3.19	Antimony	mg Sb/l	0,002	0,002
Brak	4.3.20	Fluorides	mg F/l	1,5	1,5
1932-52-9	4.3.21	Beryllium	mg Be/l	0,0008	0,0008
7440-48-4	4.3.22	Cobalt	mg Co/l	0,05	0,05
Brak	4.3.23	Tin [2)]	mg Sn/l	-	-

1) American organisation Chemical Abstracts Service (CAS).

2) Not included – reference conditions are being established.

The general status assessment is carried aut according to WFD and the table below:

		chemical status	
		good	below good
Ecological status/potential	very good ecological status	very good status	bad status
	good ecological status / good or above ecological potential	good status	bad status
	moderate ecological status/ecological potential	bad status	bad status
	poor ecological status/ecological potential	bad status	bad status
	bad ecological status/ecological potential	bad status	bad status

Sweden

EQS for ecological status includes the quality elements and classification procedure described in WFD 2000/60/EC, Annex V. The classification procedure has been developed by the Environmental Protection Agency (NFS 2008:1).
EQS for chemical surface water status follows concentrations (annual averages and maximum allowable) given in the directive on priority substances 2008/155/EC, with a general exception with less stringent objectives regarding mercury and mercury compounds. According to the exception, concentrations of mercury and mercury compounds in all surface water bodies should not increase until 22 December 2015, relative to conditions documented in the classification of chemical status in 2009.
EQS for chemical and quantitative ground water status follows defined criteria for assessing good ground water status (SGU-FS 2008:2), including starting points for reversing trends.

In Sweden, status assessment criteria have not been determined for all the normative descriptions set out in the WFD (Annex V). For lakes and rivers, the primary parameter to use for classification of nutrient status is total phosphorus (tot-P). According to the Swedish Environmental Protection Agency (Naturvårdsverket), assessment criteria has not been determined for total nitrogen, nitrate and/or ammonium since there were no clear correlations between concentrations of nitrogen and bio-production. In cases with clear indications that nitrogen controls production, the water authority can make an expert assessment of limit for nitrogen content as good status. Nevertheless, the motives to not develop assessment criteria for total nitrogen, nitrate and ammonium has been debated and criticised by limnologists. Prior to the implementation of the WFD, Sweden used a classification system including N_{tot}, NO_3 and NH_4, with five concentration levels that were uniform over the country. Also, there is lots of data available on total nitrogen, nitrate and ammonium from various monitoring programmes.

In the assessment of ecological status, Sweden has not fully developed reference conditions for water body types. For some parameters, a reference value is determined for each individual water body by empirical relations/models to influencing factors. The empirical relations were established using data from national monitoring programmes, from about 200 lakes and 100 rivers with very low anthropogenic impact.

The status classification was principally based on data from the 2000: ies, if possible based on average conditions over 6 years. Availability of data has in some cases been inadequate, especially in terms of biological data. Expert assessments have therefore been widely used for status classification.

Total phosphorus, P_{tot}

Reference value; value equal to conditions with principally no anthropogenic impact.

Classification is based on concentration of total phosphorus P_{tot} (sum of all P-fractions). Reference values, corresponding to conditions with principally no anthropogenic impact, are determined for each individual water body. Up to double concentration of P_{tot} relative to the reference value is accepted as good status.

Total phosphorus limits for good/moderate status (mg/l)	Bräkneån RB		Southern Baltic RBD	
	Rivers	Lakes	Rivers	Lakes
minimum	0,016	0,023	0,008	0,006
average	0,026	0,028	0,029	0,021
maximum	0,030	0,030	0,103	0,054

Status limits for phosphorus concentration for good/moderate status.
The range of limits determined for individual water bodies is presented.

Refence value for lakes P_{tot}

In optimal conditions when data is available for required parameters for the individual lake, the reference value, Pref, is computed from an empirical equation based on

- absorbance at frequency 420 nm in 5 cm cuvette
- elevation of sampling station
- average lake depth

log10 (Pref) = 1,627 + 0,246* log10 (absorbance) – 0,139 *log10 (elevation)-0,197* log10 (average lake depth)

If average lake depth is not known, a simplified equation is used;

log10 (Pref) = 1,561 + 0,295* log10 (absorbance) – 0,146 *log10 (elevation)

Refence value for rivers and streams P_{tot}
In optimal conditions when required data parameters is available for the individual river/stream (water body), the reference value is computed from an empirical equation based on

- absorbance at frequency 420 nm in 5 cm cuvette
- elevation of sampling station
- concentration of the non-marine cations of Ca and Mg (requires Cl-conc. to determine the non-marine fraction)

Simplified methodology
In the common situation of absence of required data, a simpler equation is used:
log10 (P_{ref} - P_{tot}) = 1,380 + 0,240* log10 (absorbance) – 0,0143 *sqrt(elevation)

Compensation for agricultural land
In the case of water bodies with a catchment area of more than 10% agricultural land, the computed reference value is compensated for soil conditions. The compensation accounts for soil type and soil leaching properties, resulting in that a higher concentration of P_{tot} is accepted as good status.'

Oxygen, O_2 (lakes)

Requirements for oxygen levels are based on levels of dissolved oxygen (mg O_2/l) or oxygen demand. The classification is based ondeviations from normal oxygen levels and is divided into two different types of habitats; waters with fish fauna consisting of "ordinary" warm-water species or waters with a fauna of more oxygen-demanding salmonids (such as salmon, trout, char, rainbow trout and grayling).

In the first stage status is classified based on the measured annual minimum oxygen concentration (4 samples/year), according to requirements in table below. Water samples are taken at depths that are representative for water volumes, and not only restricted to the very deepest lake sections. In the case of an oxygen level classified as moderate or worse, an individual reference value is calculated for the water body.

Status Classification of oxygen concentration for lakes (annual minimum), for two types of habitats; lakes with "ordinary" warm-water fish species, and lakes with more oxygen-demanding salmonids. In case of moderate status or worse, an individual reference value for the water body has to be determined (not described here).

Status	Temp (˚C)	Oxygen conc. (mg/l) warm-water fish	Oxygen conc. (mg/l) salmonids
High	-	≥ 8	≥ 9
Good	0 - 5	≥ 7 and < 8	≥ 8 and < 9
Good	5 - 15	≥ 6 and < 7	≥ 7 and < 8
Good	> 15	≥ 5 and < 6	≥ 6 and < 7
Moderate	-	≥ 4 and < 5	≥ 5 and < 6
Poor	-	≥ 3 and < 4	≥ 4 and < 5
Bad	-	< 3	≥ 3 and < 4

Calculation of individual O_2 reference values for water bodies

The reference value at a specific time is calculated from oxygen levels measured before the stagnation of water circulation by temperature layering/ice coverage, together with a modeled speed of oxygen demand for the individual lake, and the time elapsed between water circulation stagnation and the water sampling. Modeling speed of oxygen demand requires knowledge about lake depth (average and maximum), sampled depth profiles of oxygen concentrations, temperatures and watercolour every meter from lake surface to bottom.

Previous assessment criteria for Nitrogen (N)

Sweden has not developed status requirements regarding nitrogen concentration for lakes and rivers. However, prior to the Water Frame Directive, the Environmental protection Agency issued assessment criteria for five intervals of concentrations of total nitrogen in lakes and rivers. These intervals are constant throughout the country, and they are not consistent with the five status classes used in water management.

Previously used intervals of total nitrogen concentration (µg/l), lakes and rivers

≤ 300	Low levels
300 - 626	Moderately high levels
626 - 1250	High levels
1250 - 5000	Very high levels
> 5000	Extremely high levels

Note; the concentration of total nitrogen is variable over time; inorganic nitrogen (nitrate and ammonium) shows a marked peak in early spring, and organic nitrogen peaks during summer.

Previous assessment criteria for Chemical Oxygen Demand (CODMn)

Sweden has not developed status requirements regarding Biological Oxygen Demand (BOD7) for lakes and rivers. However, prior to the Water Frame Directive, the Environmental protection Agency issued assessment criteria for five intervals of concentrations of Chemical Oxygen Demand (CODMn) in lakes and rivers. These intervals are constant throughout the country, and they are not consistent with the five status classes used in water management.

Previously used intervals for Chemical Oxygen Demand (mg/l), lakes and rivers

≤ 4	Very low levels
4 – 8	Low levels
8 – 12	Moderately high levels
12 – 16	High levels
> 16	Very high levels

For lakes: seasonal averages for May-October, monthly monitoring.
For rivers: annual averages, monthly monitoring.

Hydrological status

Classification criteria for hydrological status are available for the quality elements continuity, hydrological regime and morphological conditions. The hydrological quality elements are supporting factors for the biological quality elements. They are relevant in cases when both the biological and physico-chemical quality elements are classified as high status. There are three hydrological quality elements; hydrological continuity, hydrological regime and morphological conditions.

The classification scheme for hydrological continuity includes parameters that obstruct water flow: presence of artificial obstacles to migration, fragmentation rate and the barrier effect. The quality factor hydrological regime includes parameters relevant to regulations of water flow: prescribed maximum- and minimum amplitude for water levels and subsequent impact on the river. Status classification of morphological conditions include parameters on the physical impact on the water body: land use in the catchment area, abundance of dead wood (number of pieces of wood), number of dikes per kilometer, degree of straightened and channelized river sections, number of intersecting roads per kilometers.

Ground water

Requirements for groundwater quality and starting points for trend reversals.

Parameter	Requirement for good status	Starting point to reverse trend
Nitrate, mg / l	50	20
Active substances in pesticides, inc. metabolites, degradation and reaction products, ug / l (total detected)	0,1	0,5
Chloride, mg / l	100	50
Conductivity, mS / m	75	55
Sulphate, mg / l	250	100
Ammonium, mg / l	1,5	0,5
Arsenic, ug / l	10	5
Cadmium, ug / l	5	2
Lead, ug / l	10	2
Mercury, ug / l	1	0,05
Trichloroethene + Tetrachloroethene, ug / l	10	2
Chloroform, ug / l (Trichloromethane)	100	20
1,2-dichloroethane, ug / l	3	0,5
Benzene, ug / l	1	0,2
Benzo (a) pyrene, nano g / l	10	2
Total 4 PAHs, nano g / l Benzo (b) fluoranthene Benzo (k) fluoranthene Benzo (ghi) perylene Indeno (1,2,3-cd) pyrene	100	20

A ground water body is considered to have poor chemical status if:

- The average of annual averages for the period 2000-2008 for all sample locations in a water body exceeds the requirement for good status for any of the listed parameters. The calculation is based on at least three sample occasions for the entire period.

A single annual average for all sample locations in a water body exceeds the requirement for any of the listed parameters. The annual average is then based on at least two sample occasions per sampling site.

- A single annual average for a sampling site in a water body exceeds the requirement for any of the listed parameters, and the annual average is based on at least two water sampling occasions.

Comparative remarks

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 type according to applied topology. Looking at the reference values that have been determined, they are frequently equal for many water 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 fewer parameters. 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 requirements for various water types, when distinguished.

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

	Lithuania	Poland	Sweden; Southern Baltic Sea RBD
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 warst value when there are less than 12 measurements. –valid for all parameters in Poland?

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 concentrations (uniform 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 monitoring data is used for the status assessment (annual maximum or average values), differences in soil, bedrock, or river type according to the topology.

All countries follow the determined maximum concentration of 33 hazardous substances according to Directive 2008/105/EC. The limiting concentrations in the Directive are given for concentrations in the water phase, which is much more complicated to use compared to other matrixes such as sediments or biota. Poland has defined maximum concentrations in water for the 33 priority hazardous substances corresponding to the concentrations sediments.

EQS FOR WATER BODIES – IMPORTANT TOOLS

The environmental quality standards EQS states the environmental objectives and time limit for achievement for individual water bodies. The conditions are defined as status level of ecological, chemical, and/or quantitative status.

Basic requirements in EQS for water bodies

- surface water: good ecological and chemical status
- ground water: good chemical and quantitative status
- time limit: year 2015, December 22.

For water bodies constituting part of protected areas (according to EC-legislation, related to water quality or habitat), the EQS also includes specific requirements following the protection type.

Under certain conditions, there is room for exceptions to the basic EQS requirements. Exceptions may apply if more time is needed to achieve good status, or if it is considered not possible to achieve good status for certain quality elements/ priority substances or ground water parameters. In the rare cases of water bodies with high ecological status by 2009, the WFD-claim on “no deteoration” implies the EQS-level high ecological status.

Sweden

EQS are important tools to reach the purposes of the directive. EQS are a type of legally binding policy instrument introduced by the Swedish Environmental Code. Individual operators performing environmentally hazardous activities must conduct their activities in such a way as not to infringe existing EQS. Athorities and municipalities, for their part, must ensure, by such means as reviewing permissions and exercising supervision, that the EQS are fulfilled. EQS must also be observed at every stage of spatial planning; town and country planning, management of land and water resources, building and housing.

EQS must be considered in the

- licensing process for operators obtain permit to perform environmentally hazardous activities (regulated by the Swedish Environmental Code)
- operative inspection and enforcement of environmentally hazardous activities, operations and installations (inspections are performed by municipalities and county administrative boards, and regulated by the Swedish Environmental Code)
- town and country planning, management of land and water resources, building and housing (regulated by the Swedish Legislation on Housing, Building and Planning)

(However, the juridical strength of the EQS for water bodies is unclear. The previously existing EQS regarding ambient air are juridical binding standards. However, the Swedish

government has suggested that EQS regarding ecological status should have weaker strength, while EQS regarding chemical status should have equivalent strength as existing EQS for ambient air.)
The Water Authority of the Southern Baltic River Basin District has issued EQS for all individual water bodies within the District (Decision December18, 2009).

Lithuania

The provisions above are applicable in Lithuania. Thus, legislation provides for certain derogations for water bodies, i.e. extending of the deadline for achieving the set objective (maximum until 2027), or setting a less stringent objective, provided that the objective cannot be achieved in time for reasons of technical feasibility, disproportionate costs or natural conditions, and when the achievement of “good” status would lead to far-reaching negative socio-economic consequences that cannot be avoided by any significantly better environmental option.

The environmental quality standards (EQS) for water bodies shall comply with national legislation, which transposes the requirements of the EU directives on water and similarly Environmental quality standards (2008/105/EC) Directive.
EQS must be considered in the

- economic entities/operators permitting process (IPPC permits, decisions regarding EIA for new economic activities, approval of technical design documentation (related to environment protection part), river basin based management of water resources
- inspections and enforcement of above issued permits. Frequency of inspections depend on extent of environmentally hazardous activities

Individual operators performing environmentally hazardous activities must conduct their activities in such a way as not to violate existing EQS. Regional Environmental Protection Departments under the Ministry of the Environment must ensure, by means of issuing/ reviewing permissions and exercising supervision, that the EQS are fulfilled. EQS must also be observed at every stage of spatial planning, design and construction.
Operators shall conduct self-monitoring of environmental impact.
The quality of effluents discharged from WWTP into surface water bodies are defined in the Wastewater Regulation and provided in table below.

Pollution norms for effluents discharged into the natural environment

Parameter	Agglomeration size (volume of wastewater/ source of pollution)	Unit of measurement	MAC of an average daily sample[1] (maximum level of treatment)[9]	Momentary MAC (maximum level of treatment)[9]	Average annual MAC (maximum level of treatment)[9]	Minimum efficiency of treatment, % [2]
Biochemical oxygen demand BOD_5/ BOD_7 [3]	< 5 m³/day	mg/l O_2	-	35/40	25/29	-
	>5 m³/day, < 2 000 p.e.,	mg/l O_2	-	30/34 (15/17)	20/23 (10/12)	-
	>5 m³/day, 2 000 – 10 000 p.e.,	mg/l O_2	25/29 (10/12)	-	set on an individual basis[6]	70–90
	>5 m³/day, > 10 000 p.e.,	mg/l O_2	15/17 (8/10)	-	set on an individual basis[6]	70–90
COD	more than 2 000 p.e.	mg/l O_2	125	-	-	75
Total phosphorus	>5 m³/day, < 10 000 p.e.	mgP/l	-	-	2 [7]	80
	>5 m³/day, 10 000 – 100 000 p.e.	mgP/l	-	-	2 (1)	
	>5 m³/day, > 100 000 p.e.	mgP/l	-	-	1 (0.5)	
Total nitrogen [4,5]	>5 m³/day, < 10 000 p.e.	mgN/l	-	-	20[8]	70–80
	>5 m³/day, 10 000 – 100 000 p.e.	mgN/l	-	-	15 (10)	
	>5 m³/day, > 100 000 p.e.	mgN/l	-	-	10 (10)	

Notes:

1 Pollutant concentration in an average daily (in proportion to the flow or time) sample.

2 Wastewater treatment efficiency = ((amount of incoming pollutants – amount of pollutants discharged) / amount of incoming pollutants)*100.
Requirements for the minimum treatment efficiency are not applied for estimations of pollution charges, i.e. pollution allowed during a reporting period and the annual average allowed concentration may not be exceeded irrespective of whether the minimum treatment efficiency has been achieved or not; however, exceedance of the concentration of an average daily sample or of a momentary allowed concentration is not deemed to be a violation provided that the minimum treatment efficiency is retained during the exceedance.
3 A permit, design conditions, etc. shall contain a normative standard by BOD7. Translation of BOD5 into BOD7 shall be conducted according to the equation: BOD7 = 1.15 x BOD5.
4 Total nitrogen is calculated by adding Kjeldahl Nitrogen (organic and ammonium nitrogen) and concentrations of nitrite-N and nitrate-N.
5 Total nitrogen can also be controlled on the basis of a daily average. In such case a daily average may not exceed 20 mg/l, when the temperature of wastewater is 12°C or higher (applicable only for evaluation of conformity of treatment facilities to the EU requirements (when reporting to the EU)).
6 The average annual concentration is determined on the basis of the actual possibilities of an object in question but it may not be higher than the MAC of an average daily sample.
7 Applicable only to municipal/domestic wastewater and only when assessment of an impact on a recipient has to be carried out according to the provisions of paragraph 11. When the calculated allowed average annual concentration of pollution of wastewater with total phosphorus which would not result in exceedance of an allowed impact on a surface water body is lower than 2 mg/l (when the calculated concentration is between 2 and 10 mg/l, the allowed concentration is determined on the basis of calculation results; when the calculated concentration is higher than 10 mg/l, no allowed concentration is determined (total P is not rationed); when the concentration is lower than or equals to 2 mg/l, the allowed concentration is 2 mg/l).
8 Applicable only to municipal/domestic wastewater and only when assessment of an impact on a recipient has to be carried out according to the provisions of paragraph 11. When the calculated allowed average annual concentration of pollution of wastewater with total nitrogen which would not result in exceedance of an allowed impact on a surface water body is lower than 20 mg/l (when the calculated concentration is between 20 and 40 mg/l, the allowed concentration is determined on the basis of calculation results; when the calculated concentration is higher than 40 mg/l, no allowed concentration is determined (total N is not rationed); when the concentration is lower than or equals to 20 mg/l, the allowed concentration is 20 mg/l).
9 The lowest possible value of the allowed concentration, i.e. the allowed concentration of domestic/municipal wastewater discharges may not be stricter than the value given in brackets.

Poland

The basic principles are the same as Lithuania and Sweden. The general requirement is: good ecological and chemical status/potential of bodies of surface water, good chemical and quantitative status of bodies of groundwater achieved until December 22nd 2015.
All the regulations regarding environmental quality standards as well as the ecological and chemical status classification are issued on the state level. Polish water law requires performing measures aiming at reducing water pollution and eliminating or decreasing the priority substances leakage into the waters.
The list of priority substances is stated in the Minister of Environment regulation on priority substances in water policy, issued in July 2010.
There are also regulations which define the discharge limits as well for the priority substances and other substances, i.e. biogenic substances. All the operators need to obtain a permit to discharge any polluting substances. The permits limit the certain substances concentrations depending on the discharge size and type: municipal sewage, rain sewage or different types of industry sewage.
The permits also determine the frequency of the sewage quality monitoring, which depends on the size of the discharge.

Protected areas

According to WFD art. 6 all member states have to establish “the register of registers of all areas lying within each river basin district which have been designated as requiring special protection under specific Community legislation for the protection of their surface water and groundwater or for the conservation of habitats and species directly depending on water”.
The protected areas that should be included are according to annex IV:

- areas designated for the abstraction of water intended for human consumption under Article 7;
- areas designated for the protection of economically significant aquatic species;
- bodies of water designated as recreational waters, including areas designated as bathing waters under Directive 76/160/EEC;
- nutrient-sensitive areas, including areas designated as vulnerable zones under Directive 91/676/EEC and areas designated as sensitive areas under Directive 91/271/EEC
- areas designated for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection, including relevant Natura 2000 sites designated under Directive 92/43/EEC (1) and Directive 79/409/EEC”

Poland

Areas designated for the abstraction of water for human consumption.

In Poland almost all the ground water bodies have been designated for the abstraction of water for human consumption. That in because ground waters are the main source if drinking water in Poland. The water body in the MOMENT pilot area has also been designated.

Surface waters are used for the abstraction of drinking water only in the south of the country and for big cities. These are the places where the ground waters resources are insufficient. There are no surface drinking water intakes in the MOMENT pilot area so no water bodies have been designated.

Areas designated for the protection of economically significant aquatic species.

No such areas were designated in Poland.

Recreational areas.

Almost all lakes, transitional waters and coastal waters and some rivers are used for recreation in Poland. However in many of them there are no organized beaches which means there is no infrastructure and no monitoring according to the Directive 2006/7/EC. The water bodies designated for recreation are those with infrastructure and monitoring. There are no river water bodies designated for recreation in the pilot area. Transitional water body Zalew Wislany is also not designated.

Nutrient-sensitive areas.

It has been decided that all the country has been designated as nutrient-sensitive under Directive 91/271/EEC.

There are no areas designated under Directive 91/676/EEC in the pilot area.

Areas designated for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection.

There are 2 Natura 2000 area designated for the protection of habitats (Directive 92/43/EEC) in the pilot area still there is one where the maintenance or improvement of the status of water is an important factor in their protection in the pilot catchment – Zalew Wislany i Mierzeja Wislana (PLH280007). There is also one Natura 2000 area designated for the protection of wild birds (Directive 79/409/EEC) where the maintenance or improvement of the status of water is an important factor in their protection in the pilot catchment – Zalew Wislany (PLB280010).

Comparative remarks

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 with in their national legislations with similar juridical application. EQS must be considered in the permitting process of 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.

ASSESSED STATUS 2009, EQS, EXCEPTIONS AND “AT RISK”

Lithuania

When drawing up the Nemunas RBD Management Plan, 584 water bodies falling within the category of rivers, 276 lakes and ponds with the surface area over 50 ha, 12 groundwater bodies, 4 coastal water bodies and 2 transitional water bodies have been identified. It has been established that at present the requirements of high or good ecological status or good ecological potential are met by 240 rivers with the total length of 4 556 km (41 % of the total length of all the water bodies in the category of rivers) 186 water bodies in the category of lakes and ponds larger than 50 ha satisfy the requirements of good ecological status or good ecological potential. 9 groundwater bodies are at good chemical and quantitative status. Other water bodies – rivers, lakes, ponds, transitional and coastal waters – are classified as worse than good status.

A number of water bodies will fail to achieve good status i.e. water bodies at risk are those which are likely to continue failing the requirements of good ecological or good chemical status or good ecological potential even after the implementation of all basic and supplementary measures by 2015. Therefore for the achievement of good status in surface water bodies (rivers, lakes and ponds) three stages are foreseen (2010–2015; 2016–2021 and 2022–2027) to reduce number of water bodies at risk to zero. Number of water bodies at risk will be reassessed at the end of each stage.
Water bodies at risk include all water bodies which will be failing good ecological or good chemical status or good ecological potential after the implementation of the basic measures covering the requirements of the Urban Waste Water Treatment Directive 91/271/EEC and the Nitrates Directive 91/676/EEC due to at least one of the following factors having a significant impact of the status of rivers:

- straightening of the river bed;
- hydropower plants;
- anthropogenic activities (that is, diffuse and/or point pollution).

No river affected by the straightening or HPP is regarded to be a water body at risk if monitoring data indicates that parameters indicative of biological quality elements meet the good ecological status criteria.

In the category of rivers, water bodies at risk are those which are likely to continue failing the requirements of good ecological or good chemical status or good ecological potential even after the implementation of all basic measures.
There are 584 water bodies in the category of rivers (including heavily modified and artificial water bodies) within the Nemunas RBD with the total length of 10 195 km, of which 320 water bodies with the total length of 5267 km are assigned to a risk group.

64 lakes and 26 ponds larger than 50 ha were designated as water bodies at risk. Water bodies in the category of lakes (lakes and ponds) are identified as water bodies at risk if the critical values of total nitrogen, total phosphorus and chlorophyll a are exceeded:
Type-1 and Type-2 lakes – N_{tot} > 1.80 mg/l, P_{tot} > 0.060 mg/l, EQR of chlorophyll a > 0.33;
Type-3 lakes – N_{tot} > 1.20 mg/l, P_{tot} > 0.050 mg/l, EQR of chlorophyll a > 0.33.

During the first stage of the implementation of the Programme of Measures (2010-2015), good status is expected to be achieved in 56 water bodies under the category of rivers and 1 body of water in the category of lakes. Thus, good status would be achieved in 17.5 % of water bodies in the category of rivers and 1.56 % – in the category of lakes identified as water bodies at risk within the first planning stage.

All water bodies in then categories of transitional and coastal waters have been identified as water bodies at risk. Only to prevent deterioration in the status of transitional and coastal water bodies foreseen in the first Programme implementation stage (2010-2015)

Water bodies at risk in the Akmena-Danė River Basin

There are four rivers with a catchment area larger than 50 km2 in the Akmena-Danė River Basin. Three of them have been identified as water bodies at risk: the Akmena-Danė, Tenžė and Eketė. Their total length is 106.7 km and stretches at risk therein extend for about 58 km, which makes up 54% of their total length. In addition, there is one pond out of 2 ponds - Tūbausių pond, which has also been identified as a water body at risk, i.e. they will not reach good ecological status by 2015.

Water bodies at risk in the Akmena-Danė River Basin; "+" marks presence of a risk factor

Water body	HMWB	Risk factors			Length of the stretch,	Notes (risk factors)
		HPP	Straightening	Water quality		
Tenžė	–	–	+	+	1.7	A 1.7 km stretch upstream of the mouth fails the requirements for good ecological status/potential because of an impact of point pollution with BOD_7, total phosphorus and ammonium nitrogen and because of the river bed straightening. Bad ecological status/ bad ecological potential.
Tenžė	–	–	+	–	18.6	Fails the requirements for good ecological status/potential because of the river bed straightening. Moderate ecological status/ moderate ecological potential.
Akmena-Danė	–	–	–	+	11.6	An 11.6 km stretch downstream of the inflow of the Tenžė up to the Ekete river mouth fails the requirements for good ecological status/potential because of an impact of point pollution with BOD_7, total phosphorus and ammonium nitrogen and because of pollution with hazardous substances. Bad ecological status/ bad ecological potential.

Water body	HMWB	Risk factors			Length of the stretch,	Notes (risk factors)
		HPP	Straightening	Water quality		
Akmena-Danė	–	–	–	+	16,9	A 16,9 km strech from Eketė river inflow up to the river fall fails the requirement for good ecological status/potential because of an impact of point pollution with ammonium nitrogen and pollution with hazardous substances. Moderate ecological status/ moderate ecological potential.
Eketė	–	–	+	–	9.3	A 9.3 km stretch in the upper reaches of the river fails the requirements for good ecological status/potential because of the river bed straightening in hilly area. Moderate ecological status/ moderate ecological potential.
Tūbausių I pond	+	–	–	+	Area: 0.83 km^2. Average depth – 2.5 m	Heavily modified water body. Concentrations of total phosphorus fail the requirements for good ecological potential because of diffuse pollution. Bad ecological status/ bad ecological potential.

Source: http://gis.gamta.lt/baseinuvaldymas/#x=492567&y=6115527&l=1

The above-said water bodies in the Akmena-Danė River Basin have been identified as being at risk because of two reasons: point pollution and regulation of the hydrological regime of the rivers (bed straightening). The first reason determines the designation of a 1.7 km stretch of the Tenžė downstream of the discharger of Kretinga WWTP and the Akmena-Danė River downstream of the inflow of the Tenžė as water bodies at risk. In addition, almost the entire Tenžė River has been identified as a water body at risk because of its bed straightening. As a result, a 9.3 km stretch of another river, the Eketė, has also been designated as a water body at risk.

The main sources of pressures in the Akmena-Danė River Basin are municipal wastewater, stormwater and industrial wastewater. According to the data of the Nemunas River Basin District Management Plan, supplementary measures due to excessive amounts of nitrogen and phosphorus in wastewater are required in Kretinga WWTP. Supplementary measures are also required to reduce pollution with stormwater. Analysis shows that dischargers of storm water runoff may be significantly contributing to pollution loads.

Untreated stormwater in Kretinga town is discharged into the Akmena-Dane River and its tributaries from 23 outlets. In addition, more than 20 stormwater outlets in Klaipėda city contribute to the pollution of the river close to the mouth. Consequently, the ecological status of water at the mouth of the Akmena-Danė fails to conform to the good status requirements by ammonium nitrogen, meanwhile by BOD7 and total phosphorus the ecological status balances on the border between the good and moderate status classes.

More accurate assessment of the impact of stormwater would require additional analysis. The key parameters measured in stormwater are BOD7, HS and oil products, meanwhile concentrations of nitrogen and phosphorus compounds are seldom monitored. Following assessment, stormwater loads are estimated to make up about 22% of the load of BOD7, 23% of total phosphorus and 16% of total nitrogen discharged from point pollution sources.

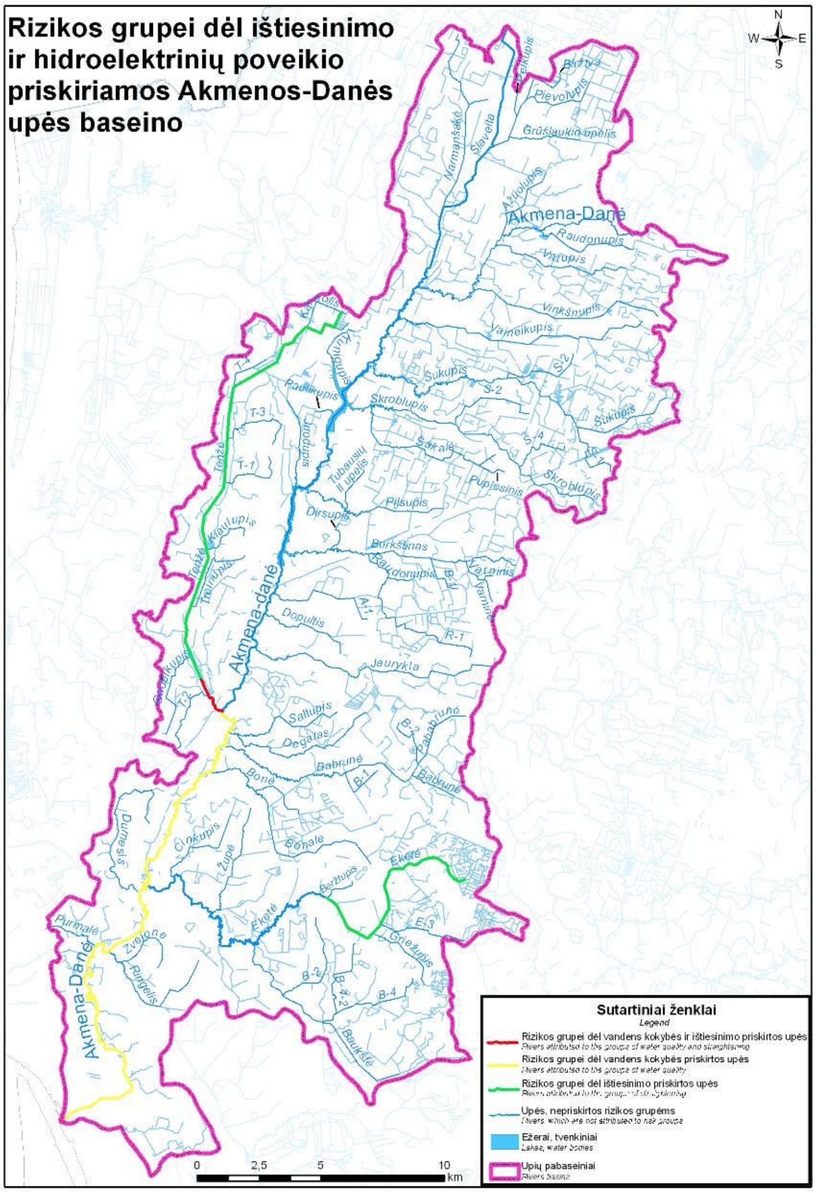
Following the data provided in the study Identification of substances dangerous for the water environment in Lithuania (2006), the Akmena-Danė suffers from significant pollution with hazardous substances because both monitoring data and project outputs indicate potential exceedance of concentrations of hazardous substance di-(2-ethylhexyl) phthalate in the river. Concentrations of diethylhexyl phthalate at the mouth of the river exceeded the Lithuanian standards, and those of tributyltin compounds – the EU EQS (EQS – environmental quality standards for inland surface waters pursuant to Directive 2008/105/EC of 16 December 2008 on environmental quality standards in the field of water policy). The amounts of monobutyltin, dibutyltin, tetrabutyltin compounds and diisononylphthalate were disturbing. No exceedance was detected in the amounts of polycyclic aromatic hydrocarbons.

Most important point pollution sources in the Akmena-Danė River Basin; "+" marks the water quality parameter with exceeded threshold values for good status

River suffering from significant pressures	Water quality parameter					Most important pollution sources
	BOD_7	NH_4-N	NO_3-N	P_t	HS	
Tenžė	+	+	–	+	–	Kretinga WWTP Game company UAB Kretingos žvėrininkystės ūkis
Akmena-Danė	–	+	–	+	+	Tributary Tenžė. HS at the mouth: di-(2-ethylhexyl)

River suffering from significant pressures	Water quality parameter					Most important pollution sources
	BOD_7	NH_4-N	NO_3-N	P_t	HS	
						phthalate (2006), chromium (VI) (2006), endrine (2006). Unidentified source of HS.

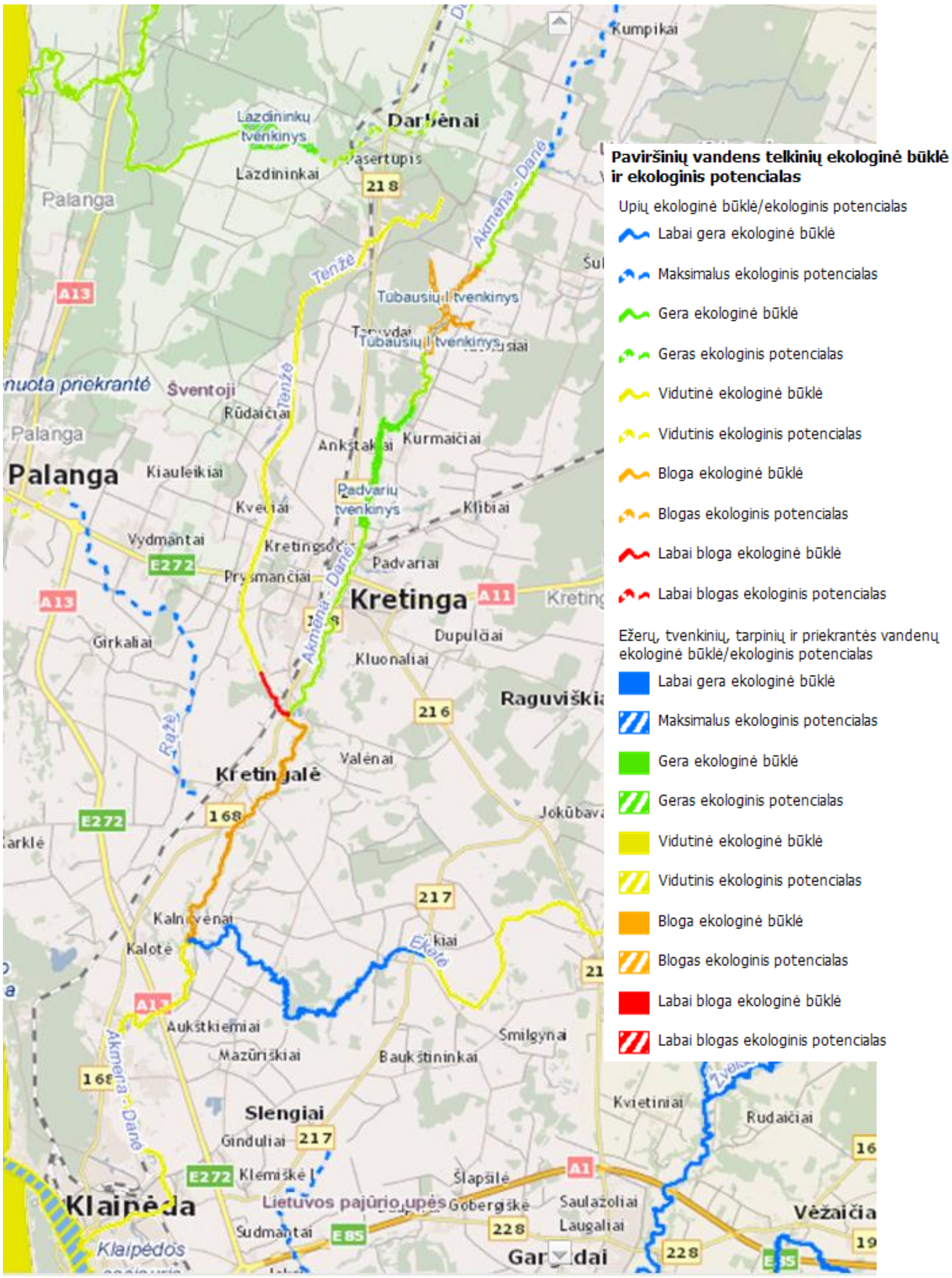
HS – hazardous substances



Water bodies at risk in the Akmena-Danė River Basin

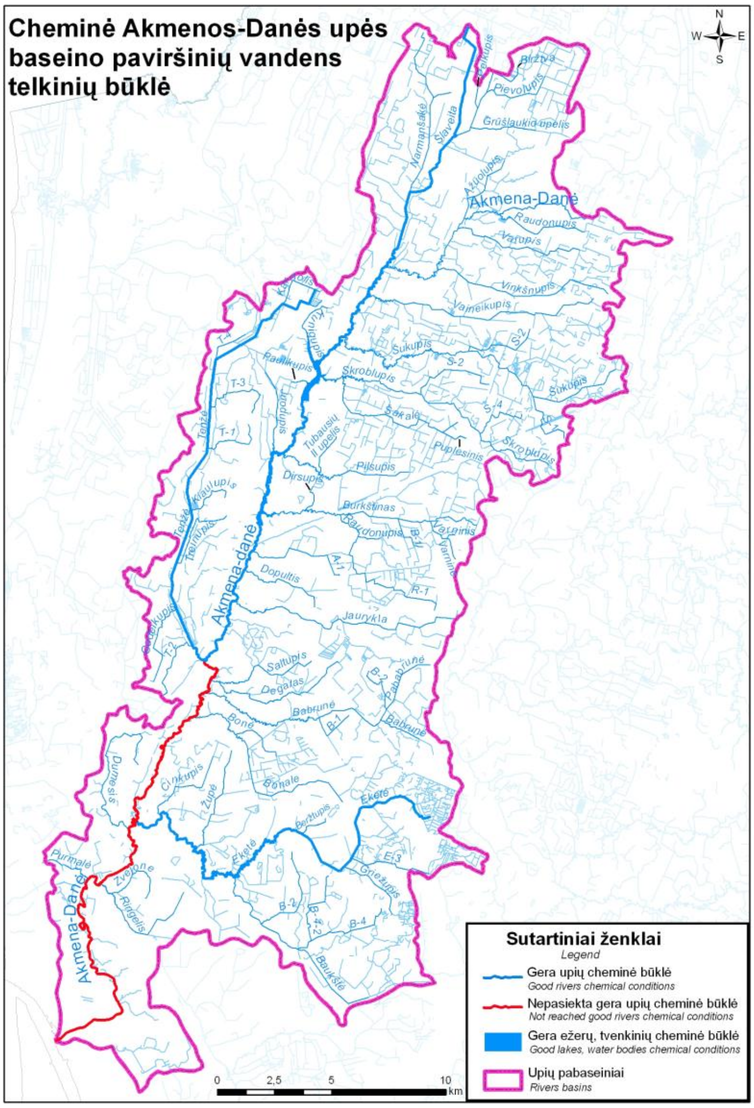
Following the data provided in the Nemunas RBD Management Plan, the livestock density in the Lithuanian Coastal Rivers Basin which the Akmena-Danė River belongs to is as low as 0.06-0.1 animal unit - AU/ha and is almost twice lower than in other sub-basins in the Nemunas RBD. Hence diffuse agricultural pollution and consumption of a larger amount of water in the Lithuanian Coastal Rivers Basin are not included among significant impacts. Having in mind that agricultural land in the Akmena-Danė River Basin occupies almost 60% of the total area of the basin, the impact of agriculture on water bodies in the basin may be larger as compared to the insignificant agricultural impact at the level of the Lithuanian Coastal Rivers Basin as a whole.

Summary information on the ecological status and chemical status of water bodies in the Akmena-Danė River Basin is provided in Figures. This data concerns only ponds larger than 0.5 km2 and rivers with a catchment area larger than 50 km2.



Ecological status and ecological potential of surface water bodies in the Akmena-Danė River Basin Blue: high status, green: Good status, Yellow: moderate status, Orange: poor status, Red: bad status."

Source: EPA data base: http://gis.gamta.lt/baseinuvaldymas/



Chemical status of surface water bodies in the Akmena-Danė River Basin

Poland - Risk of not achieving environmental objectives (EQS)

A baseline scenario was carried out to predict economic and social trends which might affect the environmental status of water bodies. The baseline scenario was prepared basing on the macroeconomic prognosis and demographic trends. Upon these the changes of the driving forces were assessed.

Basing on the status assessment (2005), pressures and impact analysis and baseline scenario it was possible to assess the risk of not achieving the environmental objectives by certain water bodies. For each water body at risk, the reason was indicated. The third category – water bodies potentially at risk – was introduced, because for some water bodies there was no enough data to assess the risk.

However in the 1st planning cycle the main criteria was the present status of the water bodies. The baseline scenario and predicted changes of the driving forces were only the additional information for the expert assessment. In general – all the lakes and ground waters which status was below good were considered at risk. The reason is the natural conditions wouldn't allow to improve the status in such a short time to achieve the environmental objectives. The rivers which status was below good were brought up for the further analysis. The information which decided whether to consider the water body at risk or not were i.a. how far from the good was the status and what was the trend, whether it was possible to reduce pressures in a short time, whether the new pressures were likely to appear etc.

There is a number of water bodies which probably will not achieve the good status. Therefore there are 2 kinds of exceptions applied. For most of water bodies at risk time exceptions will be applied which means that the deadline for achieving environmental objectives will be extended to 2021 or 2027. The most frequent justification for this kind of exception is the natural conditions which will not allow to improve it in a shorter time period. The other kind of exception, which appeared only a few times in the whole country is lowering the requirements. It was applied only when analysis showed that achieving the environmental objectives is likely to be impossible due to infeasibility or disproportionate costs.

Bauda River Basin

There are 12 surface water bodies in the Bauda pilot area. All of them are river sections, there are no lake water bodies in this area. There is also one adjacent transitional water body – Vistula Lagoon.
In 2007 the ecological status of all river water bodies has been assessed as moderate. The chemical status of 11 water bodies has been assessed as bad. The assessment was performed in the simplified way because of limited biological and hydromorphological data availability.

However only one water body – the upper part of Bauda river - has been considered at risk. The deadline for achieving good status has been prolonged because of the need of additional analysis and the long investment process.
The more detailed analysis were made using data from 2008 and the situation looks better but for time reasons it wasn't reported to the EC.
Both ecological and chemical status of Vistula Lagoon has been assessed as bad.
The pilot area lays within one groundwater body which chemical and quantitive status has been classified as good.
Almost all the water bodies which status was at least good were qualified not at risk.
In Bauda catchment one river water body was considered at risk: Bauda od źrodel do Dzikowki. The reason was hydromorphological changes. The analysis, the legal and investment process would be too long to finish before 2015. Also the transitional water body – Vistula Lagoon was regarded at risk. The reason is that it's a shallow eutrophicated lagoon and it's natural conditions wouldn't let it achieve good status in such a short time even if all the pollution sources were eliminated.
The ground water body PL_GB_2400_019 the pilot area lies within, is not at risk.

Present status and risk (2008)

Water body code	Water body name	Consolidated water body	Status	Risk assessment	Exemptions
PLRW2000175588	Dopływ spod Biedkowa	DW2108	bad	not at risk	-
PLRW2000205589	Bauda od Dzikówki do ujścia	DW2108	bad	not at risk	-
PLRW20001755849	Bauda od źródeł do Dzikówki	DW2108	bad	at risk	Art. 4(4) - 1
PLRW20001755852	Okrzejka	DW2108	bad	not at risk	-
PLRW20001755854	Lisi Parów	DW2108	bad	not at risk	-
PLRW20001755869	Wierzenka	DW2108	bad	not at risk	-
PLRW2000175514	Dąbrówka	DW2109	bad	not at risk	-
PLRW2000175569	Narusa	DW2109	bad	not at risk	-
PLRW200017552	Kamienica	DW2109	bad	not at risk	-
PLRW200018554	Stradanka	DW2109	bad	not at risk	-
PLRW20001855369	Grabianka	DW2109	bad	not at risk	-
PLRW2000175592	Kanał Różański	DW2110	bad	not at risk	-

Sweden, South Baltic RBD

Status of surface water (SW) bodies, 2009.

The ecoligical status for river water bodies within the Southern Baltiv Sea RBD was less than good for 67%, and 91% were assessed to at risk of not reaching good status by 2015. Ecoligical status for lakes was less than good for 29%, while 72% were assessed at risk. Ecological status for coastal waters was less than good for 100%, and all were assessed at risk.

Compilation of waterbodies in the Southern Baltic Sea RBD that did not reach good status in 2009, and "at risk" of not reaching good status by year 2015.

		%of Rivers	**%of Lakes**	**%of Coastal water**
Artificial		0,1	0,0	
Heavily modified water		0,9	0,2	5,1
Ecological surface water status	*< Good status 2009*	67	29	100
	At risk status 2015	91	72	100
Chemical surface water status	*< Good status 2009*	2	3	8
	At risk status 2015	13	6	68
	Eutrophication	21	14	100
	Physical modification	54	4	1
	Chemical pollution	2	3	8
Exceptions	*Chem: Hg, Hg-compounds*	*100*	*100*	*100*
Absolute number of water bodies (not %)		*968*	*478*	*177*

Extended deadlines

A large number of water bodies have EQS with extended time limit to achieve good status. (extended to year 2021/ 2027).

Eutrophications: In total there are extended deadlines for 27% of all surface water bodies (21% of the rivers & streams, 14% of the lakes, 100% of the coastal waters.) The extended time limit is motivated by "reasons of technical feasibility".

Physical alteration by human activity: In total there are extended deadlines for 33% of all surface water bodies have (54% of the rivers & streams, 4% of the lakes, 1% of the coastal waters). The problems are extensive also when excluding artificial and heavily modified waters. The extended time limit is motivated by "reasons of technical feasibility".

Hazardous substances: In total there are extended deadlines for 3% of all surface water bodies have (2% of the rivers & streams, 3% of the lakes, 8% of the coastal waters). The extended time limit is motivated by "reasons of technical feasibility".

Less stringent environmental objective

Sweden has determined a general less stringent environmental objective regarding mercury and mercury compounds, applied to all surface water bodies throughout the country.
The natural condition with high background levels is such that the achievement of these objectives would be infeasible or disproportionately expensive. In Sweden there are many areas of high natural background levels of mercury. In addition, the effects of historical pollution and the ongoing long-range air-borne pollutants. The limit for mercury in the directive is expected to be exceeded in all surface water bodies throughout the country.A special requirement for mercury and mercury compounds was introduced to counteract an increase of the current mercury levels, defined as follows
"In all surface water bodies in the district the concentrations of mercury and mercury compounds should not increase until 22 December 2015, relative to circumstances during the status classification in 2009."

Ground water bodies

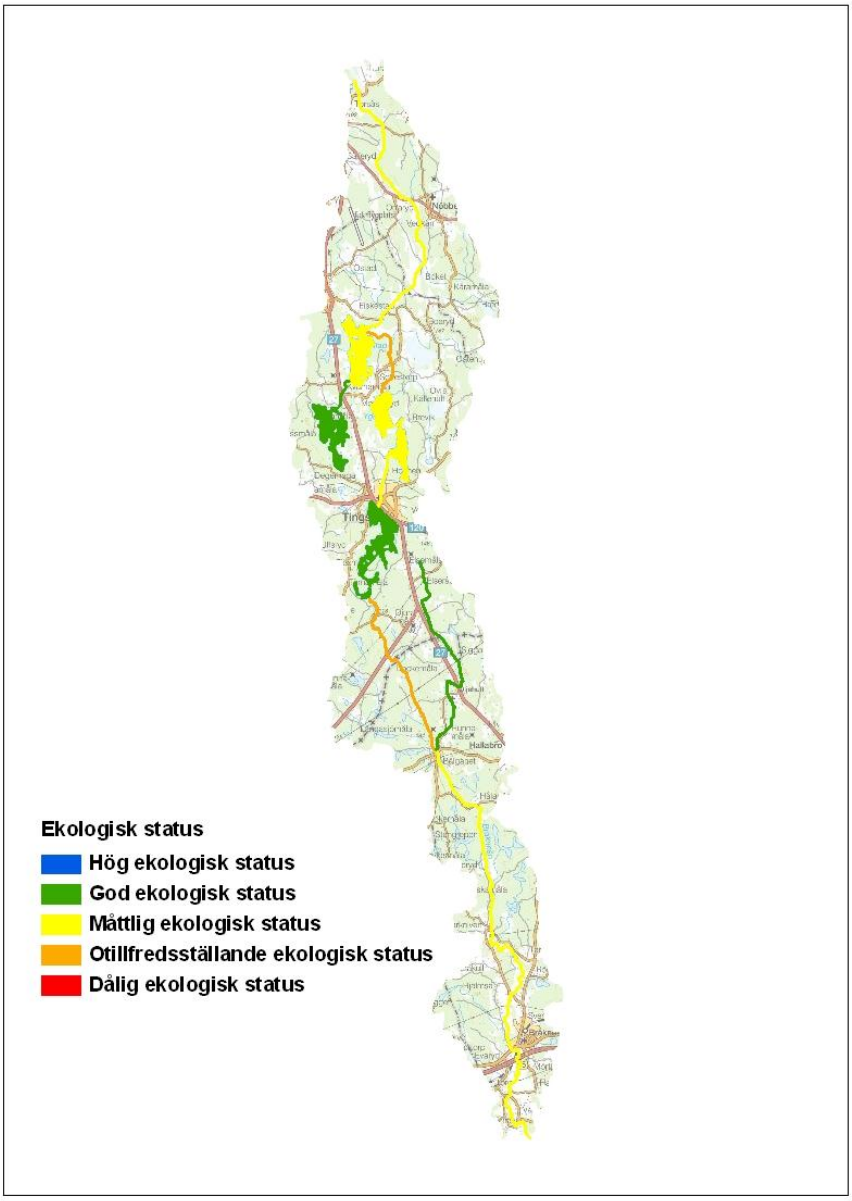
Of all ground water bodies, 3% have extended time limit for specified chemical parameter. The extended time limit is motivated by "reasons of technical feasibility".

Status and risk for ground water bodies in the Southern Baltic Sea RBD

		Ground water bodies	
		Absolute numbers	Percantages
No of water bodies		580	100
Artificial/heavily modified		0	0
Chemical ground water status	*<Good status 2009*	18	3
	At risk status 2015	178	31
Quantitative ground water status	*<Good status 2009*	4	1
	At risk status 2015	17	3
Exceptions	*Specified chemical parameter*	20	3

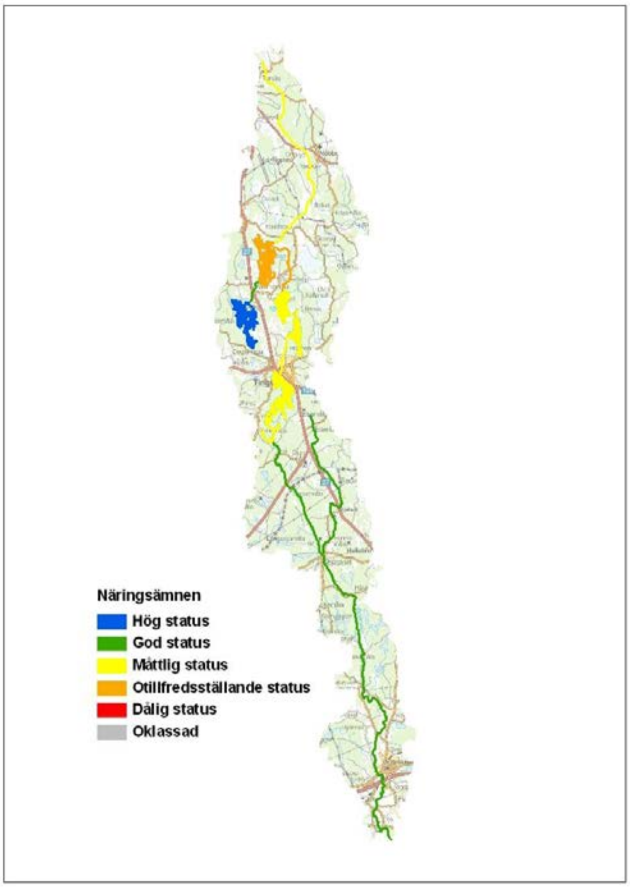
Bräkneån River Basin - Status 2009 and EQS for water bodies

There are a total of eleven surface water bodies within the river basin (4 lakes, 7 river sections). According to the classification of water body status in 2009, as much as 5 out of 7 river sections, and 2 out of 4 lakes did not reach good ecological status status. Eutrophication is the main environmental problem causing intermediate or poor ecological status. The level of EQS is set to “good ecological and chemical status” for all water bodies, and the time limit is set to 2015 for all water bodies except one (extended to 2021). The general exception for mercury and mercury compounds described above applies to all water bodies in Sweden.

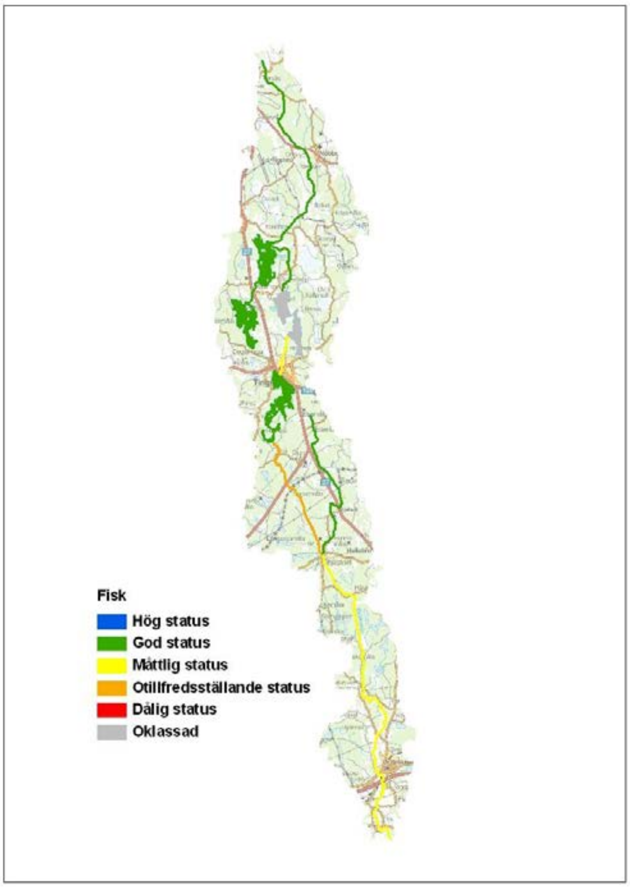


Map ecological status 2009 in Bräkneån RB. Blue: high status, green: Good status, Yellow: moderate status, Orange: poor status, Red: bad status."

The most problematic quality elements with impact on the ecological status in Bräkneån RB are nutrients and fish, see maps below.



Map status of quality element: nutrients , Bräkneån RB. Blue: high status, green: Good status, Yellow: moderate status, Orange: poor status, Red: bad status."



Map status of quality element: fish , Bräkneån RB. Blue: high status, green: Good status, Yellow: moderate status, Orange: poor status, Red: bad status."

Bräkneån river drains to the Baltic Sea in Blekinge archipelago. The outflow from Bräkneån river has a strong influence on 4 adjacent coastal water bodies. All 4 of the coastal water bodies were classified having intermediate ecological status due to eutrophication. The level of EQS is set to "good ecological status", with extended deadline until 2021. It is assumed economically unreasonable, and/or technically impossible to perform measures to achieve good ecological status by 2015.

Assessed status, environmental problems and Environmental objective (EQS) for the water bodies in Bräkneån River Basin.

Basic information		Ecological status/potential and environmental problems											Chemical status (excl. mercury)		Protected areas
			Environmental problem												
EU-CD	Water body - rivers and lakes	Status or potential 2009	Eutrophication	Physical alteration - continuity	Physical alteration - morphology	Physical alteration - discharge	Abstraction of water	Acidification	Alien species	Hazardous substances	Haz. subst. excluding mercury	Environmental objective and year	Status 2009	Environmental objective and year	Complementary requirements fpr protected areas
SE628554-145093	BRÄKNEÅN: Fiskestadsjön - Hörda mosse	Moderate status	Y					Y	N	Y	N	Good ecological status 2015	Good chemical status	Good chemical status 2015	
SE627285-144615	Lake Hyllen	Good status	N					Y	N	Y	N	Good ecological status 2015	Good chemical status	Good chemical status 2015	
SE627379-144639	Bäck mellan Fiskestadsjön - Hyllen	Good status	N					Y	N	Y	N	Good ecological status 2015	Good chemical status	Good chemical status 2015	
SE627748-144801	Lake Fiskestadsjön	Moderate status	Y					Y	N	Y	N	Good ecological status 2015	Good chemical status	Good chemical status 2015	

SE627613-144928	BRÄKNEÅN: Ygden - Fiskestadsjön	Poor status	Y					Y	N	Y	N	Good ecological status 2015	Good chemical status	Good chemical status 2015	
SE626980-144922	Lake Ygden	Moderate status	Y					Y	N	Y	N	Good ecological status 2015	Good chemical status	Good chemical status 2015	
SE626828-144886	BRÄKNEÅN: Tiken - Ygden	Moderate status	Y	Y	Y			Y	N	Y	N	Good ecological status 2021	Good chemical status	Good chemical status 2015	
SE626085-144795	Lake Tiken	Good status	N					Y	N	Y	N	Good ecological status 2015	Good chemical status	Good chemical status 2015	Directive of bathing waters
SE625659-144987	BRÄKNEÅN: Lillån - Tiken	Poor status	N					Y	N	Y	N	Good ecological status 2015	Good chemical status	Good chemical status 2015	N2000: favourable conservation status
SE625694-145344	LILLÅN: Bräkneån - Råsasjön	Good status	N					Y	N	Y	N	Good ecological status 2015	Good chemical status	Good chemical status 2015	
SE623921-145624	BRÄKNEÅN: Östersjön - Lillån	Moderate status	Y	Y				Y	N	Y	N	Good ecological status 2015	Good chemical status	Good chemical status 2015	N2000: favourable conservation status

Data on coastal water bodies strongly affected by water discharge from the Bräkneån River Basin

Basic information		Ecological status/potential and environmental problems						Chemical status (excl. mercury)		Protected areas
			Environmental problem							
EU-CD	Water body - coastal waters	Status or potential 2009	Eutrophication	Alien species	Hazardous substances	Haz. subst. excl. mercury	Environmental objective	Status 2009	Environmental objective	Complementary requirements for protected areas
SE560850-150580	Östre fjorden	Moderate ecological status	Yes		Yes	Yes	Good ecological status 2021	Good chemical status	Good chemical status 2015	N2000 Favourable conservation status
SE560900-151260	Spjälköområdet	Moderate ecological status	Yes		Yes	Yes	Good ecological status 2021	Good chemical status	Good chemical status 2015	N2000 Favourable conservation status
SE560930-150810	Vierydfjorden	Moderate ecological status	Yes		Yes	Yes	Good ecological status 2021	Good chemical status	Good chemical status 2015	N2000 Favourable conservation status
SE622011-146303	Mellersta Blekinge skärgårds-kustvatten	Moderate ecological status	Yes		Yes	Yes	Good ecological status 2021	Good chemical status	Good chemical status 2015	N2000 Favourable conservation status

Bräkneån River Basin contains 2 ground water bodies, both classified as "good chemical and quantitative status" by 2009. The EQS for both water bodies is set to "good chemical and quantitative status" with time limit 2015. However, both ground water bodies risk failing to achieve good status by 2015 due to high anthropogenic pressure. There is water quality data available for only one of the two ground water bodies, showing detection of biocides, together with nitrate concentrations exceeding the starting point fro reversing trends.

Data on ground water bodies within the Bräkneån river basin district

Basic information		Quantitative status		Chemical status of groundwaters		Protected areas
EU-ID	Ground water body	Status 2009	Environmental objective	Status 2009	Environmental objective	Complementing requirements
SE623289-145754	Bräkneåsen -Bräkne Hoby S	Good quantitative status	Good quantitative status by 2015	Good chemical status	Good chemical status by 2015	
SE623506-145739	Bräkneåsen -Bräkne Hoby	Good quantitative status	Good quantitative status by 2015	Good chemical status	Good chemical status by 2015	National regulations for drinking water

Comparative remarks

The ecological status of rivers and lakes/ponds is generally not good in the three pilot areas. There are four water bodies within the Bräkneån River Basin with good 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. 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. The risk assessment was mainly based on the 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, 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.

The differences in the table below 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 RB**	**Bauda RB**	**Bräkneån RB**
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	?	11	0
At risk of not reaching good status 2015	4	1	7

PROGRAMME OF MEASURES

Lithuania

Pursuant to the requirements of the Lithuanian water legislation, a Programme of Measures must be established for each river basin district in order to achieve water protection objectives. Each Programme of Measures comprises basic measures which are the mandatory requirements under the Lithuanian laws regulating the water sector and the key EU directives (the largest investments are required for the Urban Wastewater Treatment Directive and the Nitrates Directive). Where the assessment of the effect of the basic measures reveals that they are sufficient for achieving water protection objectives, the programme is limited to these measures. If, however, the basic measures are not sufficient for a water body to achieve water protection objectives, supplementary measures are then chosen as may be necessary in order to achieve the set water protection objectives. These measures must be inter-coordinated so as to adopt the most effective set of instruments which will enable attainment of the set objectives at the lowest cost.

The pollution reduction potential of the basic measures provided for in the Urban Waste Water Treatment Directive (UWWTD) and Nitrates Directive is rather small and hence impacts of these measures on the ecological status of water bodies will be hardly noticeable. The reason is that the basic measures simply ensure cleanup of wastewater to a certain level, but there are cases when even such treatment is not sufficient to achieve good status in the receiving waters.

The basic measures are mostly devoted to achieve waste water and drinking water standards provided for in the UWWTD and they include drinking water supply and wastewater management infrastructure development projects. These projects are planned by the Ministry of Environment and co financed by EU support funds.

The overall potential of the reduction of diffuse agricultural pollution after the implementation of the basic measures provided for in the Nitrates Directive is not big either. Although there is no actual data on the use of mineral fertilisers, an analysis of crop data and the respective required amount of fertilisers demonstrated that mineral fertilisers may account for more than 50 % of the overall loads of total phosphorus and total nitrogen generated by diffuse agricultural pollution. The amounts of mineral fertilisers and methods of their use are not likely to change after the implementation of the basic measures of the Nitrates Directive because the use of mineral fertilisers is not subject to strict regulation. Consequently, decrease in diffuse agricultural pollution can be expected only as a result of the construction of manure storages in animal husbandry farms with more than 10 LSU (livestock unit).

The implementation of the remaining directives – the Birds Directive, Environmental Impact Assessment Directive, Plant Protection Products Directive, and the Habitats Directive – is

mainly related to the establishment of relevant legal, institutional, procedural and other "soft" measures with a lower investment demand.
The table below lists the institutions responsible for the implementation of the basic measures and the investments required.

Summary of the basic measures:

Directive	Institution in charge	Costs		
		Investment, LTL	Operating, LTL/year	Annual, LTL
Bathing Waters	MoH, municipalities	0	513 020	513 020
Birds	State Service for Protected Areas (SSPA)	7 015 546	3 866 833	4 819 833
Drinking Water	State Food and Veterinary Service	Including the costs of the Nitrates Directive		
Seveso	Fire and Rescue Department			
Environmental Impact Assessment	Ministry of the Environment (MoE)			
Sewage Sludge	MoE	448 745 000	13 462 350	52 586 350
Urban Wastewater Treatment	Municipality	903 183 000	45 159 100	123 901 100
Plant Protection Products	Ministry of Agriculture, State Plant Protection Service			
Nitrates	MoA, MoE	431 263 572	4 312 636	41 912 636
Habitats	SSPA	4 817 642	7 776 829	8 432 829
Integrated Pollution Prevention and Control	MoE	0	0	0
Total ~:		1 795 000 000	75 100 000	232 200 000

During the first stage of the implementation of the Nemunas RBD Programme of Measures (2010-2015) good status is expected to be achieved in 56 water bodies in the category of rivers and 1 body of water in the category of lakes. Extension of the deadline for achieving environmental objectives until 2021 or 2027 will be requested for 264 water bodies at risk in the category of rivers, 63 lakes larger than 0.5 km2, 26 ponds, 4 transitional water bodies, and 2 coastal water bodies. The status of these water bodies will be subject to investigative and monitoring measures. The achievement of the tasks of the first planning cycle will be followed by assessment of the level of achievement of the water protection objectives. The

monitoring and assessment of changes in the status of water bodies will enable a better understanding of targets to be aimed at during the second and the third cycles. The objectives for the second stage will be set taking into account the outputs of the first stage and those for the third cycle will be based on the outputs of the first two stages.
The programme of supplementary measures encompasses measures which can be grouped together on the basis of the following aspects:

- type of the measure: measures can be legal and administrative; technical (investments); various studies, educational and pilot projects, and economic measures;
- application scope of the measure: measures can be national; applicable to problematic areas; applicable to specific areas only;
- time of application;
- sector of economy responsible for the implementation of the respective measure: measures can be implemented by national institutions, municipal administrations, including water supply companies, and the private sector (farmers, owners of hydropower plants, industrial enterprises).

In addition, supplementary measures can also be selected according to the type of water bodies (lakes, rivers, transitional and coastal waters) and individually for certain specific pollution types (like pollution with hazardous substances).

Supplementary measures include measures on basin district/national level and concrete measures within subbasins. For each measure responsible institution is appointed, implementation period established and financial resources needed indicated. Measures on basin district/national level foresee to carry out additional investigations for clarification of pollution sources, to amend existing or prepare new legal acts (mostly aiming to restrict pollution load from agriculture activities), to initiate public awareness campaigns, to implement pilot projects.
Nemunas RBD Management Plan and program of measures (supplementary measures) have been approved by the Lithuanian Government in July 2010. The present document on the Programme of Measures for the Nemunas RBD gives a description of the basic and supplementary measures, as well as specifies the costs of their implementation. Program of measures foresees upgrading or substantial reconstruction of wastewater treatment plants in 11 settlements, construction of 18 fish passes, and removal of barriers for fish migration in 18 dams. Also, a number of measures reducing agricultural pollution will be required. A significant part of measures for the attainment of good ecological status during the first stage of the implementation of the Programme (i.e. until 2015) will consist of various studies, research, enforcement of legislation, and pilot projects the outputs of which will enable planning further targeted investment measures.
Some examples of supplementary measures (extract):

Measure	Implementer	Deadline	Funds, LTL[1] / source of funds
To conduct additional studies in order to identify concentrations of biogenic substances, suspended matter, petroleum substances in surface runoff discharged into the Vyžuona River on the territory of Utena town, into the Šeimena River on the territory of Vilkaviškis town, into the Nevėžis River on the territory of Panevėžys city, into the Curonian Lagoon in Neringa town, into the rivers Akmena-Danė and Smeltalė on the territory of Klaipėda city, into the Ražė River on the territory of Palanga town. In Klaipėda Seaport area, concentrations of hazardous substances should be measured in addition to those of biogenic substances, suspended matter and petroleum substances, taking into account the type of activities of the companies operating in the port.	Municipalities Ministry of Environment of the Republic of Lithuania	2012–2014	LTL 40 thousand annually State budget/ municipalities
To prepare a feasibility study on impacts of the reduction / banning of the use of phosphorus in detergents on the quality of wastewater, evaluating a potential effect of the reduction or banning of the use of phosphorus on the economic and social environment.	Ministry of Environment of the Republic of Lithuania	2011–2012	LTL 50 thousand State budget
To increase wastewater treatment efficiency in 11 towns WWTP in order to reduce annual loads in effluents of BOD_7, ammonium nitrogen, total phosphorus.	Municipality	2011–2015	Cohesion Fund / municipality
To revise the national legislation which regulates the use of organic and mineral fertilisers and to establish the following in relevant legal acts: maximum allowable amount of nitrogen fertilisers per hectare, irrespective of whether organic or mineral fertilisers are used; maximum allowable amount of phosphorus fertilisers per hectare, irrespective of whether organic or mineral fertilisers are used; to introduce the requirement for farms which fertilise less than 150 ha of utilised agricultural land to develop fertilisation plans; to introduce regulation of natural and legal persons who develop fertilisation plans; to introduce environmental manure management requirements for farms which keep less than 10 livestock units.	Ministry of Environment of the Republic of Lithuania Ministry of Agriculture of the Republic of Lithuania	2011 2011 2011 2011 2011	No funds will be required
To develop and to implement annual plans of control over the implementation of the legal requirements set in accordance with the measures specified under paragraph 2.1 and to provide information on the implementation results to relevant departments of the Ministry of Environment of the Republic of Lithuania.	Ministry of Environment of the Republic of Lithuania	2012–2015	LTL 50 thousand annually State budget
To develop and enact a methodology for the development of fertilisation plans to be observed when calculating the economically optimal amount of fertilisers.	Ministry of Agriculture of the Republic of Lithuania	2011–2012	No funds will be required

[1] All funds have been estimated at the prices of 2008-2009

Measure	Implementer	Deadline	Funds, LTL[1] / source of funds
To put forward proposals to the Ministry of Agriculture regarding amendment of the Rural Development Programme for 2007-2013 and supplement of a new RDP with more efficient measures which would enable farmers to make use of the support for the reduction of agricultural pollution of water bodies.	Ministry of Environment of the Republic of Lithuania	2011	No funds will be required
To carry out a pilot project intended for assessment of the effectiveness of capturing pollutants emitted with drainage water under the Lithuanian conditions.	Ministry of Environment of the Republic of Lithuania	2012–2014	LTL 340 thousand State budget
To perform investigative monitoring in the areas where Measure 2.6 has been implemented.	Environmental Protection Agency	2012–2015	LTL 12 thousand annually State budget
To carry out a pilot project on river renaturalisation in the Merkys Sub-basin (in the Grūda River).	Ministry of Environment of the Republic of Lithuania	2012 2013	LTL 25 thousand LTL 175 thousand State budget
To perform investigative monitoring of the water bodies affected by HPP upstream of the dam.	Ministry of Environment of the Republic of Lithuania	2011–2015	LTL 14 thousand annually State budget
To prepare a financing programme for the replacement of HPP turbines which cause damage on the environment.	Ministry of Energy of the Republic of Lithuania	2011–2013	No funds will be required
To repair/reconstruct/construct a fish migration pass in the rivers	Fisheries Service under the Ministry of Agriculture of the Republic of Lithuania	2011-2015	EU funds and state budget
To develop a methodology for the monitoring of the invasive species specified in Order No. D1-663 of the Minister of Environment of 9 November 2009 in surface water bodies.	Environmental Protection Agency	2011	LTL 30 thousand State budget
To prepare a detailed study on identification of causes of water status problems in the water area of Klaipėda Seaport and selection of measures for addressing the water status problems.	Ministry of Environment of the Republic of Lithuania Ministry of Transport of the Republic of	2012 2013 2014	LTL 130 thousand LTL 130 thousand LTL 80 thousand

Measure	Implementer	Deadline	Funds, LTL[1] / source of funds
	Lithuania		State budget
To organise clearing of macrophyte overgrowth in the coastal zone of the Curonian Lagoon.	Municipalities in the Nemunas RBD	2011-2015	LTL 300 thousand annually State budget/ municipalities
To develop and test a methodology for the growing and collection of filtering molluscs (Dreissenidae) intended for the removing of biogenic substances from water bodies.	Ministry of Environment of the Republic of Lithuania	2012 2013	LTL 45 thousand LTL 15 thousand State budget
To draft a legal act obligating water supply companies abstracting > 10 m^3 of groundwater per day which are situated in groundwater bodies at risk to perform monitoring of the problematic quality indicators (Cl and SO_4) and to provide the data to the Lithuanian Geological Survey.	Lithuanian Geological Survey	2013	No funds will be required
To draft a legal act laying down guidelines for the assessment of wastewater toxicity to be observed by wastewater treatment facilities	Environmental Protection Agency	2013	No funds will be required
To draft a legal act laying down guidelines for the inventory of hazardous substances to be observed by economic entities subject to IPPC permitting and by public authorities which issue these permits.	Ministry of Environment of the Republic of Lithuania Environmental Protection Agency	2013	No funds will be required
To perform investigative monitoring (including monitoring of the near-bottom layer) and draw up inventory of pollution sources in order to identify the origin of pollution of the following lakes at risk (lakes which are subject to anthropogenic pressures due to either historic or present pollution):	Environmental Protection Agency	2011-2015	LTL 8 thousand annually State budget
To organise annual training courses, information campaigns for farmers on the maximum allowed fertilisation norms, the procedure of the development of fertilisation plans and their benefits.	Ministry of Agriculture of the Republic of Lithuania	2011-2013	LTL 15 thousand annually State budget / European Agricultural Fund for Rural

Measure	Implementer	Deadline	Funds, LTL[1] / source of funds
			Development
To organise annual information campaigns for the implementers of Programmes of Measures and the general public, as well as individual groups of interest on the Programme of Measures for the Nemunas RBD, the measures provided for therein, responsible implementers, and the role of the public and its individual groups in the implementation and supervision of the measures.	Ministry of Environment of the Republic of Lithuania	2011-2015	LTL 15 thousand annually State budget/ European Agricultural Fund for Rural Development
To organise annual information campaigns for farmers in regions on measures envisaged for individual areas (including incentives) and problems to be addresses by the measures, implementers in charge and the role of the society in regulating the implementation of the measures.	Ministry of Environment of the Republic of Lithuania	2011-2015	LTL 15 thousand annually State budget/ European Agricultural Fund for Rural Development
To organise trainings and seminars on hazardous substances, identification of their sources and entry into water, their impact, identification of such substances in raw materials, control and reduction of hazardous substances, including trainings on correct assessment of safety data sheets.	Ministry of Environment of the Republic of Lithuania	2012-2015	15 thousand annually State budget/ European Agricultural Fund for Rural Development

Summary costs of implementation of supplementary measures in the Nemunas RBD

A summary of all supplementary measures required for the implementation of the WFD assessed herein and their costs is provided in Table below. The summary cost lines provide the total costs and the costs of the priority measures for the first WFD implementation cycle. As demonstrated in the chapter on affordability, the measures of the upgrading of HPP turbines, renaturalisation of river beds and reduction of diffuse pollution are not to be implemented during the first cycle both due to lack of funds and acceptability.

The table demonstrates that in the event of the scenario which excludes investments into HPP and river renaturalisation the investment costs would go down almost by three times. However, as demonstrated in the affordability analysis, only the supplementary measures under the minimum scenario are proposed for the first implementation cycle because funds for 2007-2013 have already been distributed and in many cases it would be problematic to utilise funds in due time, as well as because municipalities have limited possibilities to afford the said measures.

Preliminary costs of implementation of supplementary measures in the Nemunas RBD: maximum scenario

Sub-basin / basin	Group of measures	Investment costs until 2015, LTL	Operational costs, LTL/year	Annual costs, LTL/year
MINIJA	HPP (replacement of turbines with modern ones which are less harmful for fish)	3 800 000	114 000	241 000
	Fish passes	493 300	11 880	43 000
	Renaturalisation	2 270 000	0	137 000
	Point pollution sources	0	0	0
	Measures against diffuse pollution	0	1 558 853	1 558 853
	Groundwater	0	0	0
Total		6 563 000	1 685 000	1 980 000
MERKYS	HPP	700 000	21 000	44 000
	Fish passes	324 700	9 741	31 000
	Renaturalisation	7 420 000	0	471 000
	Point pollution sources	1 200 000	60 000	140 000
	Measures against diffuse pollution	0	778 581	778 581
	Groundwater	0	0	0
Total		9 645 000	869 000	1 465 000
ŽEIMENA	HPP	0	0	0
	Fish passes	12 000	360	1 100
	Renaturalisation	1 500 000	0	95 000
	Point pollution sources	8 000 000	400 000	932 000
	Measures against diffuse pollution	0	508 766	508 766

Sub-basin / basin	Group of measures	Investment costs until 2015, LTL	Operational costs, LTL/year	Annual costs, LTL/year
	Groundwater	0	0	0
Total		9 512 000	909 000	1 537 000
ŠVENTOJI	HPP	1 080 000	32 400	69 000
	Fish passes	127 600	2580	10 640
	Renaturalisation	8 810 000	0	559 000
	Point pollution sources	0	0	0
	Measures against diffuse pollution	0	2 544 663	2 544 663
	Groundwater	0	0	0
Total		10 018 000	2 580 000	3 183 000
NERIS SMALL TRIBUTARIES	HPP	0	0	0
	Fish passes	915 327	21 800	80 000
	Renaturalisation	1 940 000	0	123 000
	Point pollution sources	3 960 000	198 000	461 000
	Measures against diffuse pollution	0	607 599	607 599
	Groundwater	0	0	0
Total		6 815 000	827 000	1 272 000
NEVĖŽIS	HPP	1 480 000	44 400	138 000
	Fish passes	0	0	0
	Renaturalisation	17 190 000	0	1 091 000
	Point pollution sources	6 000 000	300 000	730 000
	Measures against diffuse pollution	0	1 946 122	1 946 122
	Groundwater	0	0	0
Total		24 670 000	2 291 000	3 905 000
ŠEŠUPĖ (incl. Prieglius)	HPP	0	0	0
	Fish passes	220 000	6 600	21 000
	Renaturalisation	13 060 000	0	829 000
	Point pollution sources	1 150 000	57 500	133 500
	Measures against diffuse pollution	0	2 719 934	2 677 328
	Groundwater	0	0	0
Total		14 430 000	2 784 000	3 661 000
DUBYSA	HPP	1 052 000	31 600	99 000
	Fish passes	165 400	3 400	10 500

Sub-basin / basin	Group of measures	Investment costs until 2015, LTL	Operational costs, LTL/year	Annual costs, LTL/year
	Renaturalisation	6 130 000	0	389 000
	Point pollution sources	0	0	0
	Measures against diffuse pollution	0	1 126 291	1 126 291
	Groundwater	0	0	0
Total		7 374 000	1 161 000	1 625 000
NEMUNAS SMALL TRIBUTARIES	HPP	80 000	2 400	7 000
	Fish passes	298 380	8 300	18 900
	Renaturalisation	10 800 000	0	685 000
	Point pollution sources	17 100 000	855 000	1 992 000
	Measures against diffuse pollution	0	3 836 253	3 836 253
	Groundwater	0	0	0
Total		28 278 000	4 702 000	6 539 000
JŪRA	HPP	0	0	0
	Fish passes	870 486	25 600	80 800
	Renaturalisation	2 820 000	0	179 000
	Point pollution sources	800 000	40 000	93 000
	Measures against diffuse pollution	0	1 185 754	1 185 754
	Groundwater	0	0	0
Total		4 490 000	1 251 000	1 539 000
COASTAL RIVERS	HPP	0	0	0
	Fish passes	0	0	0
	Renaturalisation	0	0	0
	Point pollution sources	2 340 000	117 000	273 000
	Measures against diffuse pollution	0	420 154	420 154
	Groundwater	0	0	0
Total		2 340 000	537 000	693.000
NEMUNAS RBD	Hydropower plants	8 192 000	245 800	598 000
	Fish passes	3 427 200	90 300	297 000
	Renaturalisation	71 940 000	0	4 558 000
	Point pollution sources	40 550 000	2 027 500	4 754 500
	Measures against diffuse pollution	0	17 230 000	17 230 000

Sub-basin / basin	Group of measures Groundwater	Investment costs until 2015, LTL 0	Operational costs, LTL/year 0	Annual costs, LTL/year 0
	Studies on reduction of pollution of coastal and transitional waters	430 000	300 000	360 000
	Research, studies and pilot projects (excl. studies coastal waters)	1 015 000	155 000	268 000
Total (maximum scenario)		125 550 000	20 050 000	28 070 000
Grand total until 2015 (excl. replacement of turbines and river naturalisation)		45 418 000	19 804 200	22 914 000

The implementation of the Programme until 2015 would require about LTL 45 million of investment funds at 2009 prices. It should be emphasised that so far the funding of the investment costs has been secured only for the said basic measures meanwhile the funding source for the supplementary measures is not clear yet. As mentioned before, neither the state nor municipalities have the required amount.

Akmena-Danė catchment area

Planned measures in the Lithuanian Coastal Rivers Basin include reconstruction of four existing wastewater treatment facilities, construction of 28.7 km of new and reconstruction of 4.4 km of the existing sewerage networks. The investment costs provided in Table below also cover the costs of the implementation of the Drinking Water Directive. The total investment costs in the Lithuanian Coastal Rivers Basin are estimated at LTL 121.411 million.

National projects on renovation and development of water supply and wastewater management systems in the Lithuanian Coastal Rivers Basin sub-basin in 2007-2013

Municipality	Settlement	Planned works							Project value, million LTL
		New WWTP,	Renovated WWTP, unit	New sewerage networks, km	Renovated sewerage networks, km	New water supply networks, km	Renovated water supply networks,	New/renovated water improvement facilities	
Klaipėda city	Klaipėda			13.0		9.0		1	52.0
Klaipėda distr.	Kretingalė		1	4.0		1.2		1	10.92
Kretinga distr.	Kretinga		1						18.911
	Vydmantai		1	4.3		4.3		1	
Neringa	Neringa			1.2	4.4	1.8	14.5		24.48
Palanga town	Palanga		1	6.2		6.2			15.1
TOTAL			4	35	4.4	36	36	3	8888

Notes:

1. Development of Kretingalė water supply and wastewater infrastructure is included in the project Development of the water supply and wastewater management infrastructure in Klaipėda district. The project also includes development of the infrastructure in Vėžaičiai settlement (the Minija Sub-basin). The total value of the project is LTL 21.84 million. It is assumed that half of the project amount will be invested in the Lithuanian Coastal Rivers Basin.

2. Development of Kretinga and Vydmantai water supply and wastewater infrastructure is included in the project Development of the water supply and wastewater management infrastructure in Kretinga district. The project also includes development of the infrastructure in Salantai settlement (the Minija Sub-basin). The total value of the project is LTL 28.366 million. It is assumed that two thirds of the project amount will be invested in the Lithuanian Coastal Rivers Basin.

Only reconstruction of Kretinga WWTP is included in the measures for the reduction of pollution in the Akmena-Dane river basin. Costs of the measure, LTL, 2009

Settlement	Measure	Costs		
		Investment	Operating	Total annual
Kretinga WWTP	1. Extended aeration (nitrification), chemical precipitation of P with	2 340 000	117 000	273 000

	sand filters or microscreens			

The implementation of the mentioned basic measures would result only in minor changes in point pollution loads in the Akmena-Dane Rivers Basin. Since the measured concentration of total nitrogen in wastewater discharged from Kretinga WWTP in 2008 (15.15 mg/l) only slightly exceeded the requirements of the Wastewater Regulation (15 mg/l), it can be predicted that pollution with total nitrogen by Kretinga WWTP will practically remain the same. According to the data of 2008, it is ammonium nitrogen that constitutes the major part of total nitrogen. If the ratio of the concentrations of ammonium nitrogen to the concentrations of nitrate nitrogen does not change in future, the concentrations of ammonium nitrogen in the Tenžė and Akmena-Danė will continue to exceed the good ecological status requirements due to pollution discharged from Kretinga WWTP into the Tenžė and Akmena-Danė. Mathematical modelling results show that the concentration of ammonium nitrogen in the Tenžė below Kretinga may be as high as 5.4 mg/l and in the Akmena-Danė, upon the inflow of the Tenžė – 1.15 mg/l if the pollution load remains unchanged.

Since no reduction of pollution with BOD7 and total phosphorus is predicted for Kretinga WWTP, the concentrations of BOD7 and total phosphorus will continue to exceed the good status requirements in the Tenžė, and those of total phosphorus – in the Akmena-Danė. Consequently, supplementary measures will have to be implemented in Kretinga WWTP in order to achieve good ecological status of these rivers.

Poland

The measures in the Programme of Measures are selected for each consolidated water body. The work started with creating a catalogue of measures which contained all the possible measures that could be introduced to improve the status of the waters. Then for each consolidated water body the basic measures were chosen. If the water bodies were at risk and the analysis showed that the basic measures would not be enough to achieve the good status/good potential the supplementary measures were chosen. After that the economic assessment was performed to decide whether the measures were supposed to be effective and the costs were not disproportional.

To make the Programme of Measures easy to read and understand the measures were divided into 5 groups:

- organization, law and education,
- public utilities,
- water regulation, ecosystems,
- agriculture and forestry,

- spatial planning.

The specific group of measures was the measures for ground waters. It was presumed that all the measures for the consolidated water bodies have the positive effect for the ground waters. However for the ground water bodies which status was below good they might not be sufficient so the detailed analysis was carried out and specific measures for those ground waters had been planned.

Most of the measures have to be introduced by the municipalities. They are especially measures related to waste water management, waste management, inspection and spatial planning. The environmental inspection is also responsible for the inspection. The users are responsible for managing their own installations (waste water treatment plants, waste disposal sites) and inhabitants are responsible for managing their waste water if they live too far to connect to the sewage system.
To make it easy to find the measures which are planned in certain consolidated water bodies or municipalities all the measures were put into the access database. Except of finding the information about the planned measures and their estimated costs the data base shows the estimated total costs of the measures in consolidated water bodies, water regions, river basin districts and RWMB areas.

The measures in the Bauda River Basin

- Organization, law and education:
    - developing “water use conditions”,
    - inspection.

- Public utilities:
    - Mlynary 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 the septic tanks and individual treatment plants,
    - inspection of the septic tanks and individual treatment plants,
    - treating effluents from the landfills,
    - elimination of the illegal landfills,
    - modernization of the landfills for Frombork and Mlynary,
    - sludge management.
- Water regulation, ecosystems:
    - developing the protection plan for the Nature2000 - PLH280007 - Zalew Wiślany i Mierzeja Wiślana,
    - building fish ladders.
- Agriculture and forestry:

- proper soil cultivation to prevent the pollution run-off.

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

As the ground water body within which lies the pilot area is in good status no specific measures had been planned.

Sweden

The Water Authority of the Southern Baltic RBD has determined 38 measures that are directed to authorities and municipalities. The measures mainly concern

- establishing or improving legal regulations or other instruments,
- investigations to clarify prevailing conditions and pressures in order to design specific measures that are effective and localised to the "right spot",
- performing control that regulations are obeyed.

The 38 measures are thus not related to geographically specified anthropogenic activities or water bodies. All five water authorities of the Swedish RBD's agreed on determining 37 common measures. The Water Authority of the Southern Baltic RBD and the Western Sea RBD has complemented this with an additional measure (no 38 in list below). Many of the general measures are targeting eutrophication or hazardous substances, and some measures have impact on both (target is indicated by italics in the list below).

In the Programme of Measures there is also a description of specific measures that are judged possible come out as a result after that the 38 measures have been implemented by authorities and municipalities. For environmental problems that were identified from status classification and pressure analysis, there is a general description of previously performed measures, running measures and the need for additional measures. There is a list of specific measures that the Water Authority judged possible to be performed as a result after the implementation of the 38 measures. Types of specific measures are presented for following environmental problems:

- acidification
- eutrophication
- hazardous substances
- physical alteration (hydrology, continuity, hydromorphology)
- abstraction of water
- deficiencies in protection: sources for drinking water production
- climate change
- increased brown colour of waters

List of 38 determined measures directed to authorities and municipalities

Italics below each measure indicate whether it is regarded as a basic or complementary measure according to the WFD. There is also a notation for measures targeting problems of eutrophication and hazardous substances.

Authorities and municipalities

1. All agencies and municipalities subject to this Programme of Measures needs to report to the Water Authority, by February 28 of each year, the measures implemented during the previous calendar year in order to ensure reaching the EQS has for water bodies within the authority or municipality responsibility. Reporting starts in 2011. The reporting procedure will be development in cooperation with the Water Authority.
Complementary measure

Swedish Environmental Protection Agency [Naturvårdsverket] Eutrophication

2. Environmental Protection Agency needs, after consultation with the county administrative boards, to provide data (investigations), and develop regulations and/or other instruments to reduce emissions of nitrogen and phosphorus from sweagewater plants to surface water bodies that do not achieve, or may fail to achieve, good ecological status due to eutrophication.
Complementary measure - eutrophication

3. Environmental Protection Agency needs, after consultation with the county administrative boards, to provide data (investigations), and develop regulations and/or other instruments to reduce emissions of nitrogen and phosphorus from individual sewages/septics to the surface water bodies that do not achieve, or may fail to achieve, good ecological status due to eutrophication.
Basic measure - eutrophication

4. Environmental Protection Agency needs to provide data (investigations), and develop regulations and/or other instruments to ensure that water-related environmental monitoring should follow explicit clear and common requirements in terms of data quality, availability, traceability and comparability as well as for what is otherwise required by Regulation (2004:660) on the management of the quality of the aquatic environment.
Complementary measure

5. Environmental Protection Agency needs, after consultation with the Swedish Chemicals Agency, Geological Survey of Sweden, Swedish Board of Fisheries, Swedish Forest Agency and the Swedish Board of Agriculture, to improve the knowledge base on the priority substances, occurrence and environmental effects and the particular pollutants prevalence and impact on the ecological status of water bodies, in order to develop regulations and/or other instruments to reduce the effects of these substances, especially in those water bodies that do not achieve, or may fail to achieve, good chemical status or good ecological status.
Basic measure - hazardous substances

6. Environmental Protection Agency needs to develop the national system of collecting environmental monitoring data to include the quality elements and the indicators of anthropogenic pressure that are relevant to water management.
Complementary measure

7. Environmental Protection Agency needs, after consultation with the Swedish Board of Fisheries and the county administrative boards, to provide data (investigations), and adapt the national liming plan to cover the bodies of water does not reach, or may fail to achieve, good ecological status due to anthropogenic acidification.
Complementary measure

8. Environmental Protection Agency needs, in their work with grants to address the pollution damaged land and water areas, give particular priority to those areas that are leaking priority substances or other hazardous substances pollutants to water bodies that do not achieve, or may fail to achieve, good chemical status or good ecological status.
Basic measure - hazardous substances

Geological Survey of Sweden [SGU]

9. Geological Survey needs to produce maps showing farmland erosion susceptibility and risk of high losses of phosphorus, particularly in the surroundings of water bodies that do not achieve, or may fail to achieve, good ecological status.
Complementary measure - eutrophication

10. Geological Survey needs to develop hydro-geological maps relevant to water management needs, identifying the groundwater flow and exchange between groundwater bodies and surfacewater bodies, particularly for areas that do not achieve, or may fail to achieve, good chemical status or good ecological status.
Basic measure

11. Geological Survey needs to continue efforts to collect information on existing water supplies with an outlet larger than 10 cubic meters / day or supplying more than 50 people, and to delineate significant groundwater bodies.
Basic measure

12. Geological Survey needs, after consultation with the county administrative boards, to provide data (investigations) on groundwater, which shows the impact on terrestrial and aquatic ecosystems, especially for areas with water bodies that do not achieve, or may fail to achieve, good ecological status.
Basic measure

National Rail (incorporated in Swedish transport Administration 2010) [Banverket / Transportstyrelsen]

13. National Rail needs to develop the knowledge base and implement measures to eliminate or minimize the effects of artificial barriers hindering migrating organisms (such as salmon), and stormwater on surface and groundwater, especially in areas with water bodies that do not achieve, or may fail to achieve, good ecological status or good chemical status.
Hazardous substances
Basic measure

National Board of Housing, Building and Planning [Boverket]

14. National Board of Housing Building and Planning needs, after consultation with the Environmental Protection Agency, Geological Survey, National Heritage Board and the county administrative boards, to develop the knowledge base and advice to the Swedish social planning for the implementation of the EQS for water bodies and the present Programme of Measures.
Complementary measure - eutrophication, hazardous substances

Swedish Board of Fisheries [Fiskeriverket]

Board of Fisheries needs to assist other agencies covered by this action with the actions shown in the other ones.

Swedish Board of Agriculture [Jordbruksverket]

15. Board of Agriculture and the county administrative boards need to perform advisory activities (environmentally related) from a river basin perspective, giving priority to farms in areas with water bodies that do not achieve, or may fail to achieve, good ecological status or good chemical status. Complementary measure – eutrophication, hazardous substances

16. Board of Agriculture needs, after consultation with the Environmental Protection Agency and Board of Fisheries, to provide data (investigations), and develop regulations and/or other instruments to reduce the impact of agriculture on water quality, especially in areas of water bodies at risk of not achieving good ecological status or good chemical status.
Basic measure – eutrophication, hazardous substances

17. Board of Agriculture and the county administrative boards need, after consultation with the Environmental Protection Agency and the Chemicals Agency, prioritize their actions to reduce risks of and use of pesticides in areas with water bodies that do not achieve, or may fail to achieve, good ecological status or good chemical status.
Basic measure - hazardous substances

The Legal, Financial and Administrative Services Agency [Kammarkollegiet]

18. The Agency needs, after consultation with the Environmental Protection Agency, Board of Fisheries, to provide data (investigations) and strategies to remove effects of artificial barriers hindering migrating organisms (such as salmon), regulted water flow (hydro power) and other physical interventions affectting the water bodies so that they do not achieve, or may fail to achieve, good ecological status or good ecological potential.
Complementary measure

Swedish Chemicals Agency [Kemikalieinspektionen]

The Chemicals Agency needs to assist other agencies covered by this Programme of Measures with the steps shown in the other ones.
Complementary measure

Swedish Civil Contingencies Agency [Myndigheten för Samhällsskydd och Beredskap]

19. Authority for Civil Contingencies needs, after consultation with the Environmental Protection Agency and the county administrative boards, to develop guidelines for "investigative monitoring" of accidents, natural and other, which may affect the ecological, chemical or quantitative status of water bodies.
Complementary measure - hazardous substances

Swedish National Heritage Board [Riksantikvarieämbetet]

20. National Heritage Board needs, after consultation with the county administrative boards, to provide data (investigations) for the water structures (i.e. mills) and other environments

that have particularly high cultural value, located in or adjacent to water bodies where action is required to achieve good ecological or good chemical status.
Complementary measure

Swedish Forest Agency [Skogsstyrelsen]

21. Forest Agency needs, after consultation with the Environmental Protection Agency and the Fisheries Agency, to provide data (investigations) and develop regulations and/or other instruments addressing efficient protection zones and other protective measures to reduce leakage from forested areas adjacent to water bodies so that good chemical and good or high ecological status is maintained or achieved.
Basic measure – eutrophication, hazardous substances

National Food Administration [Livsmedelsverket]

22. National Food Administration needs, in consultation with the Geological Survey, to provide data (investigations) and develop regulations and/or other instruments for monitoring water quality for all localities with abstraction of water used for drinking water in water bodies where the total abstration is greater than 10 m³ / day or serving more than 50 people.
Complementary measure – eutrophication, hazardous substances

Statistics Sweden [SCB]

23. Statistics Sweden needs to provide socio-economic statistics at river basin level, with relevance to water management needs.
Complementary measure

Swedish Meteorological and Hydrological Institute [SMHI]

24. Meteorological and Hydrological Institute needs to develop hydrological information on water body level with relevance to water management needs.
Complementary measure - Basic measure

25. Meteorological and Hydrological Institute needs to develop climat predictions at a river basin level, as a basis for assessing the effects on the ecological status due to changes in high and low flows.
Complementary measure

26. Meteorological and Hydrological Institute needs to develop physical and hydrographic information describing water turnover in coastal areas relevant to water management needs.
Basic measure

Swedish Road Administration (2010 incoorporated in Swedish Transport Agency) [Vägverket /Transportstyrelsen]

27. Road Administration needs to develop knowledge base and implement measures to eliminate or minimize effects of artificial barriers hindering migrating organisms (such as salmon), and stormwater impact on surface and groundwater, especially in areas with water bodies that do not achieve, or may fail to achieve, good ecological status or good chemical status. Swedish Road Administration also needs to promote other road keepers to develop a similar knowledge base and implementation measures.
Basic measure – eutrophication, hazardous substances

The county administrative boards

28. The county administrative boards need to do a review of existing permits to perform environmentally hazardous activities, and if necessary to initiate a revised licensing process (activities covered by legislation in Environmental Code chapter 9 and 11), which may impact on the aquatic environment, particularly in areas with water bodies that do not achieve, or may fail to achieve, good ecological status or good chemical status.
Basic measure – eutrophication, hazardous substances

29. The county administrative boards need to ensure that operators implement the mandatory self-monitoring and environmental monitoring that is needed to evaluate the effect on ecological, chemical and quantitative status of water bodies.
Basic measure – eutrophication, hazardous substances

30. The county administrative boards are required to prepare a plan for their work with measures giving priority to river basins with water bodies that do not achieve, or may fail to achieve, good ecological status or good chemical status.
Complementary measure - hazardous substances

31. The county administrative boards have in their efforts to tackle pollution damaged land and water areas, in particular give priority to those areas that are leaking priority substances or priority hazardous substances, to water bodies that do not achieve, or may fail to achieve, good ecological status or good chemical status.
Basic measure - hazardous substances

Municipalities

32. Municipalities need, in their inspection and enforcement of environmentally hazardous activities and of pollution damaged areas that may have negative effects on the aquatic environment, to give priority to areas with water bodies that do not achieve, or may fail to achieve, good ecological status or good chemical status.
Basic measure – eutrophication, hazardous substances

33. Municipalities need to claim highest protection level for individual sewages that contribute to that a water body does not reach, or may fail to achieve, good ecological status or good chemical status.
Basic measure - eutrophication

34. Municipalities need to establish water protection areas with regulations for water supplies of municipal drinking water, so that long term water quality maintains good chemical status and good quantitative status.
Basic measure

35. Municipalities need to ensure that water supplies that are not maintained by the municipality, supplying more than 50 people or where water abstraction is more than 10 m^3/day, have good chemical status and good quantitative status and a long-term protection.
Basic measure

36. Municipalities need to develop their planning of housing and building so that EQS of water bodies is achieved and not infringed.
Basic measure – eutrophication, hazardous substances

37. Municipalities need, in collaboration with the county administrative boards, to develop water and sewagewater plans, particularly in areas with water bodies that do not achieve, or may fail to achieve, good ecological status, good chemical status or good quantitative status.
Complementary measure - eutrophication, hazardous substances

38. Municipalities need in collaboration with the county administrative boards to conduct investigations/compilations and implement measures to reduce impacts from outdoor life and boat tourism that may have a negative impact on the aquatic environment, particularly in areas with water bodies that do not achieve, or may fail to achieve, good ecological or good chemical status. Complementary measure - eutrophication, hazardous substances
- This measure applies only to the water districts of the North Sea and Southern Baltic

Cost estimations

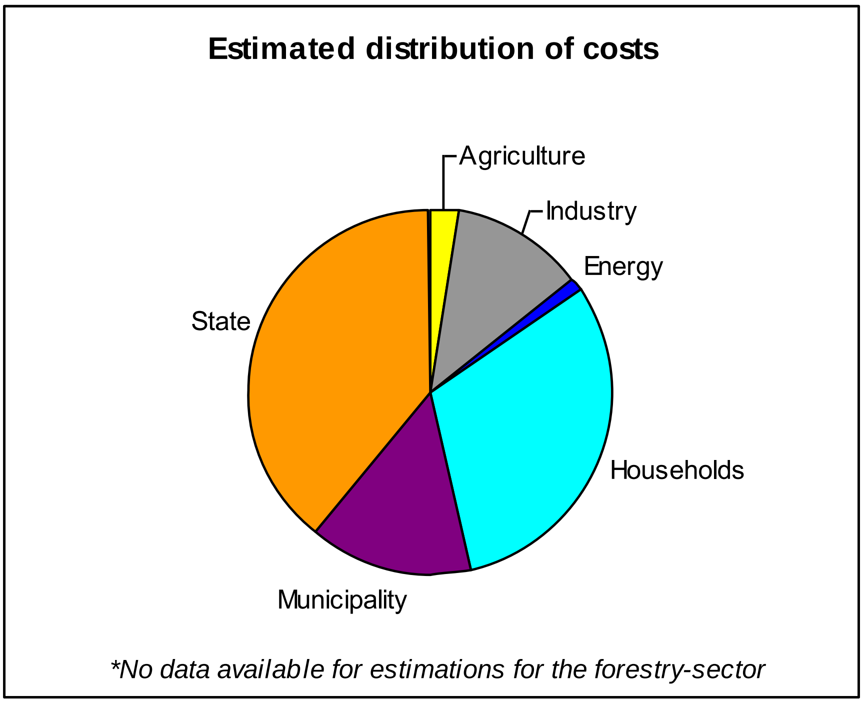
The costs for the 38 determined measures and the specific measures that may result were estimated. The estimations were based on ecological, chemical and quantitative status of water bodies within the district and the assessed need for additional specific measures against the environmental problems that were identified. Annual costs for measures in the entire RBD were approximated according to table below.

Approximated annual costs for measures within the Southern Baltic River Basin District, Sweden. Includes the 38 determined measures as well as specific measures that are judged possible to come out as a result after the implementation of the 38 measures.

ENVIRONMENTAL PROBLEM	COSTS (thousands SEK)
ACIDIFICATION	17 000
Running liming programme with supplements	*17 000*
Administrative costs	*included above*
EUTROPHICATION	400 900 - 610 000
Agriculture: wetlands	*54 600 - 61 000*
Agriculture: fånggröda/ springtime ploughig, harrowing	*18 300 - 55 000*
Agriculture: zones with restricted ploughing along vatercourses/beaches	*10 800 - 22 800*
Waste water treatment plants	*20 100 - 60 400*
Industry	*11 400 - 34 100*
Waste water treatment, single houses	*48 400 - 139 400*
Administrative costs: direct	*1 300*
Administrative costs: permit processing, inspections and reinforcement	*236 000*
PHYSICAL ALTERATION	11 580 - 54 490
Hydrology	*650 - 1 390*
Continuity	*7 570 - 17 780*
Morphological alteration	*940 - 2 606*
Others	*40 - 100*
Investigations	*1 710 - 31 890*
Administrative costs	*670*
HAZARDOUS SUBSTANCES	253 000 - 424 000
Investigations, screening: lakes, rivers, coastal waters	*20 500 - 15 100*

Investigations, screening: groundwater	*9 000 - 27 000*
Remendation of pollution damaged land	*241 000 - 381 000*
Administrative costst	*630*
ZONES FOR WATER PROTECTION	24 800 - 112 700
Establish protections zones for public drinking water sources	*11 400 - 45 500*
Revision of existing protection zones	*13 400 - 67 200*
Establish protections zones for non-public drinking water sources	*no data*
administrative costst	*included above*
OTHERS	7 400
Administrative costs	*7 400*
TOTAL COSTS	746 400 - 1 279 800

The distribution of costs on various economic sectors of the society was estimated (figure below). The estimation concerns the 38 determined measures as well as specific measures that are judged possible to come out as a result after implementation, table above.



Comparative remarks

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, but Lithuania and Poland also determined specific measures. General measures could be for instance; studies and compilations, development of new legal acts, enforcement of legislation, or public information campaigns. Specific measures are concrete and specified for a particular location or pollution source (plant or activity). 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

Lithuania

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

Within the Akmena-Dane River Basin there are several specific measures, for example

- reconstruction of 2 waste water treatment plants
- reconstruction of 4 km of existing sewerage networks

For the entire 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 the cost is related to measures regarding urban waste water treatment,

municipalities are responsible. Ministries and state authorities are responsible for the rest of the basic costs (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.

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; sometimes a group of adjacent water bodies). First the basic measures were chosen. If the water bodies were at risk and the basic measures would not be enough to achieve good status, the supplementary measures were chosen.

Most measures have to be introduced by municipalities.
(1 PLN = 0,2523 EUR, 2011-05-25).

Sweden

The Programme of Measures contains a list of 38 general measures directed to authorities and municipalities (the first 37 measures are identical for all five Swedish river basin districts). About half of the measures are regarded as basic and half of them as supplementary. Expected effects from the measures are not considered for basic measures separately, but basic and supplementary measures are treated altogether. Some measures require collaboration between specified 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 specific measures that are judged possible come out as a result after the implementation of the 38 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.

Annual costs for the river basin district were estimated for general measures together with the measures that were judged possible as a consequence. The indirect costs for specific measures that were judged possible are highly unsure, but the total costs were approximated to 83.64 – 145.63 M EUR (1 SEK = 0.1122 EUR, 2011-05-25). Parts of these measures and costs were determined and funded prior to the programme 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, state funding when operator is absent/unclear). 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 come out as a consequence of the 38 determined measures.

Conclusions of report

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 adapted 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.

Link to webpage; Download Water Frame Directive in English and LT/PL/SV

Annex I

Status limit values for transitional waters, Poland.

Numer wskaźnika jakości wód	Parameter	Unit	Limit value				
			I	II	III	IV	V
1	**Biological elements**						
1.1	Phytoplancton						
1.1.1	Chlorophyll „a” 1)	µg/l	<1,94 8)	3,76 8)	5,58 8)	7,40 8)	>7,40 8)
	Chlorophyll „a” 2)	µg/l	<2,50 8)	5,50 8)	8,75 8)	15,25 8)	>15,25 8)
	Chlorophyll „a” 3)	µg/l	<5 9)	7,50 9)	15 9)	25 9)	>25 9)
	Chlorophyll „a” 4)	µg/l	<2,50 9)	3,80 9)	5,10 9)	7,70 9)	>7,70 9)
	Chlorophyll „a” 5)	µg/l	<1 9)	23,20 9)	31,30 9)	50 9)	>50 9)
	Chlorophyll „a” 6)	µg/l	<10 9)	20 9)	30 9)	40 9)	>40 9)
	Chlorophyll „a” 7)	µg/l	<1,20 9)	2 9)	2,80 9)	4,30 9)	>4,30 9)
1.4	Macroalgae and angiosperms	not included – reference conditions are being established					
1.5	**Benthic invertebrate fauna**	not included – reference conditions are being established					
1.6	Fish fauna	not included – reference conditions are being established					
2.	Hydromorphological elements supporting the biological elements						
2.1	**Hydrological regime**						
2.1.1.b	The freshwater flow regime	The freshwater flow regime corresponds totally or nearly totally to undisturbed conditions. Limit values will be set in future					
2.3	**morphological condotions**						
2.3.1.c	Depth variations	Depth variations, substrate conditions, and both the					

2.3.2.c	substrate conditions	structure and condition of the intertidal zones correspond totally or nearly totally to undisturbedconditions. Limit values will be set in future			
2.3.4.b	the structure and condition of the intertidal zones				
3.	**Chemical and physico-chemical elements supporting the biological elements**				
3.1	General				
3.1.4	Secchi depth 1)	m	>6 8)	4,5 8)	no limit values
	Secchi depth 2)	m	>4 8)	3 8)	
	Secchi depth 3)	m	>5 9)	3,75 9)	
	Secchi depth 4)	m	>6 9)	4,5 9)	
	Secchi depth 5)	m	>1 9)	0,75 9)	
	Secchi depth 6)	m	>2,5 9)	1,9 9)	
	Secchi depth 7), 9)	m			
3.2	Oxygenation conditions and organic pollution				
3.2.1	Dissilved oxygen close to the bottom	mg O_2/l	>6 8)	4,2 8)	no limit values
3.2.2	BOD_5	mg O_2/l	≤ 2	4	
3.2.4	TOC	mg C/l	≤ 5	10	
3.2.5	Oxygen saturation (0-5 m layer)	%	90-110 8)	80-120 8)	
3.3	Salinity parameters				
3.3.1	Salinity				no limit values
3.4	Acidification parameters				
3.4.1	pH 1), 2), 3), 4), 5), 6), 7)	pH	7,0-8,0	7,0-8,8	no limit values
3.5	Biogenic substances				
3.5.1	Ammonium nitrogen 5)	mg N $_{NH4}$/l	<0,10 9), 11)	0,15 9), 11)	no limit values
	Ammonium nitrogen 6)	mg N $_{NH4}$/l	<0,04 9), 11)	0,06 9), 11)	
3.5.3	Nitrate nitrogen 1)	mg N $_{NO3}$/l	<0,08 10), 11)	0,12 10), 11)	no limit values
	Nitrate nitrogen 2)	mg N $_{NO3}$/l	<0,11 10), 11)	0,17 10), 11)	
	Nitrate nitrogen 3)	mg N $_{NO3}$/l	<0,18 9), 11),	0,27 9), 11)	

	Nitrate nitrogen [4]	mg N $_{NO3}$/l	<0,10 [9), 11)]	0,15 [9), 11)]	
	Nitrate nitrogen [5]	mg N $_{NO3}$/l	<0,20 [9), 11)]	0,30 [9), 11)]	
	Nitrate nitrogen [6]	mg N $_{NO3}$/l	<0,60 [9), 11)]	0,90 [9), 11)]	
	Nitrate nitrogen [7]	mg N $_{NO3}$/l	<0,007 [9), 11)]	0,011 [9), 11)]	
3.5.5	Total nitrogen [1), 2)]	mg N/l	<0,25 [8), 11)]	0,40 [8), 11)]	no limit values
	Total nitrogen [3]	mg N/l	<0,35 [9), 11)]	0,53 [9), 11)]	
	Total nitrogen [4]	mg N/l	<0,18 [8), 11)]	0,27 [8), 11)]	
	Total nitrogen [5]	mg N/l	<0,65 [9), 11)]	0,98 [9), 11)]	
	Total nitrogen [6]	mg N/l	<1,25 [9), 11)]	1,90 [9), 11)]	
	Total nitrogen [7]	mg N/l	<0,20 [9), 11)]	0,30 [9), 11)]	
3.5.9	Mineral nitrogen [1] (N $_{NO3}$+ N$_{NO2}$ + N $_{NH4}$)	mg N/l	<0,10 [10), 11)]	0,15 [10), 11)]	no limit values
	Mineral nitrogen [2] (N $_{NO3}$+ N$_{NO2}$ + N $_{NH4}$)	mg N/l	<0,15 [10), 11)]	0,25 [10), 11)]	
	Mineral nitrogen [3] N $_{NO3}$+ N$_{NO2}$ + N $_{NH4}$)	mg N/l	<0,21 [11)]	0,32 [11)]	
	Mineral nitrogen [4] (N $_{NO3}$+ N$_{NO2}$ + N $_{NH4}$)	mg N/l	<0,12 [11), 9)]	0,18 [11), 9)]	
	Mineral nitrogen [5] (N $_{NO3}$+ N$_{NO2}$ + N $_{NH4}$)	mg N/l	<0,25 [11), 9)]	0,38 [11), 9)]	
	Mineral nitrogen [6] (N $_{NO3}$+ N$_{NO2}$ + N $_{NH4}$)	mg N/l	<0,70 [9), 11)]	1,05 [9), 11)]	

	Mineral nitrogen [7] (N_{NO3}+ N_{NO2} + N_{NH4})	mg N/l	<0,017 9), 11)	0,026 9) 11)	
3.5.6	Phosphate [1), 2)]	mg P $_{PO4}$/l	<0,022 10), 11), 12)	0,035 10), 11), 12)	no limit values
	Phosphate [3)]	mg P $_{PO4}$/l	<0,022 9), 11)	0,035 9), 11)	
	Phosphate [4)]	mg P $_{PO4}$/l	<0,022 9), 11)	0,035 9), 11)	
	Phosphate [5)]	mg P $_{PO4}$/l	<0,030 9), 11), 12)	0,045 9), 11), 12)	
	Phosphate [6)]	mg P $_{PO4}$/l	<0,06 9), 11), 12)	0,09 9), 11), 12)	
	Phosphate [7)]	mg P $_{PO4}$/l	<0,002 9), 11), 12)	0,003 9), 11), 12)	
3.5.7	Total phosphorus 1)	mg P/l	<0,022 8), 11)	0,035 8), 11)	no limit values
	Total phosphorus 2)	mg P/l	<0,030 8), 11)	0,045 8), 11)	
	Total phosphorus 3)	mg P/l	<0,031 9), 11)	0,045 9), 11)	
	Total phosphorus 4)	mg P/l	<0,028 9), 11)	0,032 9), 11)	
	Total phosphorus 5)	mg P/l	<0,080 9), 11)	0,120 9), 11)	
	Total phosphorus 6)	mg P/l	<0,10 9), 11)	0,15 9), 11)	
	Total phosphorus 7)	mg P/l	<0,020 9), 11)	0,030 9), 11)	

1) Gdansk Bay
2) Gdansk Bay close to the Vistula estuary
3) Pomorska Bay close to the Swina estuary.
4) Pomorska Bay close to the Dziwna estuary.
5) Vistula Lagoon.
6) Szczecin Lagoon.

7) Puck Lgoon

8) Mean values from may to september

9) Annual mean values.

10) Mean values from january to march.

11) Vertical mean.

12) Orthophosphates.

Annex II

Status limits for coastal waters, Poland

Parameter no	Parameter	Unit	Limit value: I	II	III	IV	V
1	**Biological elements**						
1.1	Phytoplancton						
1.1.1	Chlorophyll „a” [1), 3)]	µg/l	<2,10 [4)]	3,15 [4)]	4,20 [4)]	6,25 [4)]	>6,25 [4)]
	Chlorophyll „a” [2)]	µg/l	<1,50 [4)]	1,90 [4)]	2,30 [4)]	3,10 [4)]	>3,10 [4)]
	Chlorophyll „a” [3)]	µg/l	<2,10 [5)]	3,15 [5)]	4,20 [5)]	6,25 [5)]	>6,25 [5)]
1.4	Macroalgae and angiosperms	not included – reference conditions are being established					
1.5	Benthic invertebrate fauna	not included – reference conditions are being established					
2.	Hydromorphological elements supporting the biological elements						
2.1	**Hydrological regime**						
2.1.1.b	Fresk water flow regime	The freshwater flow regime and the direction and speed of dominant currents correspond totally or nearly totalny to undisturbed conditions. Limit values will be set in future					
2.1.2	direction and speed of dominant currents						
2.1.3	Exposure to the waves						
2.3	**Morphological conditions**						
2.3.1.d	The depth variation	The depth variation, structure and substrate of the coastal bed, and both the structure and condition of the inter-tidal zones correspond totally or nearly totally to the undisturbed conditions. Limit values will be set in future					
2.3.2.c	structure and substrate of the coastal bed						

2.3.4.b	structure and condition of the inter-tidal zones				
3	**Chemical and physico-chemical elements supporting the biological elements**				
3.1	***General***				
3.1.4	Secchi depth[1)]	m	>4,7 [4)]	3,5 [4)]	no limit values
	Secchi depth [2), 4)]	m			
	Secchi depth [3)]	m	>5,0 [5)]	3,8 [5)]	
3.2	**Oxygenation conditions and organic pollution**				
3.2.1	Dissilved oxygen close to the bottom [3)]	mg O_2/l	>6,0 [5)]	4,2 [5)]	no limit values
	Dissilved oxygen close to the bottom	mg O_2/l	>6,0 [4)]	4,2 [4)]	
3.2.2	BOD_5	mg O_2/l	≤ 2	4	
3.2.4	TOC	mg C/l	≤ 5	10	
3.2.5	Oxygen saturation (0-5 m layer)[3)]	%	90-110 [5)]	80-120 [5)]	
	Oxygen saturation (0-5 m layer)	%	90-110 [4)]	80-120 [4)]	
3.3	**Salinity parameters**				
3.3.1	Salinity				no limit values
3.4	**Acidification**				
3.4.1	pH	pH	7,0-8,0	7,0-8,8	no limit values
3.5	**Biogenic substances**				
3.5.3	Nitrate nitrogen [1)]	mg N_{NO3}/l	<0,08 [6), 7)]	0,12 [6), 7)]	no limit values
	Nitrate nitrogen [2)]	mg N_{NO3}/l	<0,05 [6), 7)]	0,08 [6), 7)]	
	Nitrate nitrogen [3)]	mg N_{NO3}/l	<0,10 [5), 7)]	0,15 [5), 7)]	
3.5.5	Total nitrogen [1)]	mg N/l	<0,25 [4), 7)]	0,40 [4), 7)]	
	Total nitrogen [2)]	mg N/l	<0,20 [4), 7)]	0,30 [4), 7)]	

	Total nitrogen [3)]	mg N/l	<0,25 [5), 7)]	0,40 [5), 7)]	
3.5.9	Mineral nitrogen [1)] $(N_{NO3} + N_{NO2} + N_{NH4})$	mg N/l	<0,10 [6), 7)]	0,15 [6), 7)]	
	Mineral nitrogen [2)] $(N_{NO3} + N_{NO2} + N_{NH4})$	mg N/l	<0,06 [6), 7)]	0,10 [6), 7)]	
	Mineral nitrogen [3)] $(N_{NO3} + N_{NO2} + N_{NH4})$	mg N/l	<0,15 [5), 7)]	0,23 [5), 7)]	
3.5.6	Phosphate [1)]	mg P_{PO4}/l	<0,016 [6), 7), 8)]	0,024 [6), 7), 8)]	
	Phosphate [2)]	mg P_{PO4}/l	<0,010 [6), 7), 8)]	0,015 [6), 7), 8)]	
	Phosphate [3)]	mg P_{PO4}/l	<0,016 [5), 7)]	0,024 [5), 7)]	
3.5.7	Total phosphorus [1)]	mg P/l	<0,022 [4), 7)]	0,033 [4), 7)]	
	Total phosphorus [2)]	mg P/l	<0,020 [4), 7)]	0,030 [4), 7)]	
	Total phosphorus [3)]	mg P/l	<0,025 [5), 7)]	0,038 [5), 7)]	

1) Gdansk bay and waters adjacent to Vistula Spit.
2) middle coast waters.
3) Pomorska Bay and waters between Swina and Dziwna estuary.
4) Mean values from may to september.
5) Annual mean values.
6) Mean values from january to march.
7) Vertical mean.
8) Orthophosphates..

Annex III

Chemical parameters limit values

CAS [1] number	Parameter no	Parameter	Unit	Limit values			
				streams, rivers, channels	streams, rivers, channels	morskie wody wewnętrzne wody przejściowe i przybrzeżne	remarks
	4	**Hazardous substances**					
	4.1	**Priority substances [2]**					
15972-60-8	4.1.1	Alachlor	μg/l	0,7		0,7	max [3]
120-12-7	4.1.2	Anthracene	μg/l	0,4		0,4	max [3]
1912-24-9	4.1.3	Atrazine	μg/l	2,0		2,0	max [3]
71-43-2	4.1.4	Benzene	μg/l	50		50	max [3]
32534-81-9	4.1.5	Brominated diphenylether	μg/l	0,0005		0,0002	mean [4]
7440-43-9	4.1.6	Cadmium and its compounds [5]	μg/l	≤0,45-1,5		≤0,45-1,5	max [3]
85535-84-8	4.1.7	C10-13 Chloroalkane	μg/l	1,4		1,4	max [3]
470-90-6	4.1.8	Chlorfenvinphos	μg/l	0,3		0,3	max [3]
2921-88-2	4.1.9	Chlorpyrifos	μg/l	0,1		0,1	max [3]
107-06-2	4.1.10	1,2-Dichloroethane (EDC)	μg/l	10		10	mean [4]
75-09-2	4.1.11	Dichloromethane	μg/l	20		20	mean [4]

117-81-7	4.1.12	Di(2-ethylhexyl)-phthalate (DEHP)	µg/l	1,3	1,3	mean 4)
330-54-1	4.1.13	Diuron	µg/l	1,8	1,8	max 3)
115-29-7	4.1.14	Endosulfan	µg/l	0,01	0,004	max 3)
206-44-00	4.1.15	Fluoranthene	µg/l	1	1	max 3)
118-74-1	4.1.16	Heksachloro-benzene (HCB)	µg/l	0,05	0,05	max 3)
87-68-3	4.1.17	Heksachloro-butadiene (HCBD)	µg/l	0,6	0,6	max 3)
608-73-1	4.1.18	Heksachloro-cycloheksane (HCH)	µg/l	0,04	0,02	max 3)
34123-59-6	4.1.19	Isoproturon	µg/l	1	1	max 3)
7439-92-1	4.1.20	Lead and its compounds	µg/l	7,2	7,2	mean 4)
7439-97-6	4.1.21	Mercury and its compounds	µg/l	0,07	0,07	max 3)
91-20-3	4.1.22	Naphthalene	µg/l	2,4	1,2	mean 4)
7440-02-0	4.1.23	Nickel and its compounds	µg/l	20	20	mean 4)
25154-52-3	4.1.24	Nonylphenol	µg/l	2,0	2,0	max 3)
1806-26-4	4.1.25	Octylphenol	µg/l	0,1	0,01	mean 4)
608-93-5	4.1.26	Pentachloro-benzene	µg/l	0,007	0,0007	mean 4)
87-86-5	4.1.27	Pentachloro-phenol (PCP)	µg/l	1	1	max 3)

	4.1.28	Polyaromatic hydrocarbons (PAH)	sum of Benzo(b)fluoranthene and Benzo(k)fluoranthene and the EQS for the sum of Benzo(g,h,i)perylene and Indeno(1,2,3-cd)pyrene must be met.			
50-32-8		Benzo(a)pyrene	µg/l	0,1	0,1	max 3)
205-99-2		Benzo(b)fluor-anthene	µg/l	∑=0,03	∑=0,03	mean 4)
207-08-9		Benzo(k)fluor-anthene	µg/l			
191-24-2		Benzo(g,h,i)-perylene	µg/l	∑=0,002	∑=0,002	mean 4)
193-39-5		Indeno(1,2,3-cd)-pyrene	µg/l			
122-34-9	4.1.29	Simazine	µg/l	4	4	max 3)
688-73-3	4.1.30	Tributyltin compounds	µg/l	0,0015	0,0015	max 3)
12002-48-1	4.1.31	Trichloro-benzenes (TCB)	µg/l	0,4	0,4	mean 4)
67-66-3	4.1.32	Trichloro-methane	µg/l	2,5	2,5	średnie 4)
1582-09-8	4.1.33	Trifluralin	µg/l	0,03	0,03	średnie 4)
	4.2	**Other polluting substances (according to COM 2006/0129(COD)** Total concentration (not filtrated sample))				
56-23-5	4.2.1	Tetrachloromethan	µg/l	12	12	max 3)
309-00-2	4.2.2	Aldrin ($C_{12}H_8Cl_6$)	µg/l	∑=0,010	∑=0,005	mean 4)
60-57-1	4.2.3	Dieldrin ($C_{12}H_8Cl_6O$)	µg/l			
72-20-8	4.2.4	Endrin ($C_{12}H_8Cl_6O$)	µg/l			
456-73-6	4.2.5	Izodrin ($C_{12}H_8Cl_6$)	µg/l			
50-29-3	4.2.6 a	para-para-DDT	µg/l	0,01	0,01	mean 4)

nie dotyczy	4.2.6 b	DDT tptal [6)]	µg/l	0,025	0,025	mean [4)]
79-01-6	4.2.7	Trichloroetylen (TRI)	µg/l	10	10	mean [4)]
127-18-4	4.2.8	Tetrachloroetylen (PER)	µg/l	10	10	mean [4)]

1) American organisation Chemical Abstracts Service (CAS)..
2) Except cadmium, lead, mercury and nickel; total concentrations in non filtrated sample; metals concentrations are set for the dissolved metals.
3) Maximum concentration
4) Annual average value.
5) Depending on water hardness: ≤0,45 (class I<40 mg $CaCO_3$/l), 0,45 (class II 40-<50 mg $CaCO_3$/l), 0,6 (class III 50-<100 mg $CaCO_3$/l), 0,9 (class IV 100<200 mg $CaCO_3$/l), 1,5 (class V ≥ 200 mg $CaCO_3$/l).
6) comprises the sum of the isomers 1,1,1-trichloro-2,2 bis (p-chlorophenyl) ethane (CAS number 50-29-3); 1,1,1-trichloro-2 (o-chlorophenyl)-2-(p-chlorophenyl) ethane (CAS number 789-02-6); 1,1-dichloro-2,2 bis (p-chlorophenyl) ethylene (CAS number 72-55-9); and 1,1-dichloro-2,2 bis (pchlorophenyl) ethane (CAS number 72-54-8)

MOMENT
modern water management

ABOUT PROJECT MOMENT

In cooperation between seven regions in four countries around the South Baltic Sea area the project MOMENT aims at reducing the outflow of nutrients and hazardous substances by modern water man-agement. This includes the establishment of Water User Partnerships allowing a “bottom up” approach starting at a local level and working within river basins letting the water set its own independent boarders. The project is co-financed by the South Baltic cross-border programme 2007-2013 and runs from September 2009 until August 2012.

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