Water Management and Assessment of Ecological Status in Transboundary River Basins

Abstracts of presentations, Final Seminar of the TRABANT project
Helsinki, Finland, 11–13 September 2007

Milla Laita (ed.)
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FOREWORD

The final seminar of the project Transnational River Basin Districts on the Eastern Side of the Baltic Sea Network – TRABANT was arranged in Helsinki, Finland, in the Finnish Environment Institute on 11–13 September 2007. The TRABANT project endeavours to improve basis for the integration of significant ecological and management aspects in the Eastern Baltic Sea region, including links to spatial development. The project concentrates on cross-regional cooperation between EU countries and also with non-EU countries. Consequently, the project compares, evaluates and tests methods and tools to be used in the key tasks in river basin analyses and management, especially taking into account transnational issues. The project started in 2005 and ends in 2008 (Website of the project www.environment.fi/syke/trabant).

The topic of the seminar was "Water Management and Assessment of Ecological Status in Transboundary River Basins". The programme was divided into sessions. The main themes were 1) Water issues in Europe, in the Baltic Sea region and in transboundary waters, 2) Methodologies of river basin management and analyses, 3) Methods and tools in river basin analysis and status assessment, with examples from Eastern Baltic Sea region and 4) Methods of river basin management and public participation. There were ca. 60 participants from nine countries, mainly from the Baltic states and Finland.

This publication includes 24 abstracts of oral and poster presentations held in the seminar. The papers reflect well the research and activities in the field of the TRABANT project. The participants of the project would like to thank all the authors for their valuable contribution to the seminar.
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Presentations
WFD application - links between water management and spatial planning in the Baltic Sea Region countries

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Introduction

The European Union Water Framework Directive (WFD) was adopted in 2000. The WFD takes an integrated approach to water management and the overall objective is to achieve good water status for all waters in Europe. Within work package 2 of the BSR Interreg IIIB project TRABANT the WFD application in 11 countries in the Baltic Sea Region (BSR) has been scrutinised. The main questions that have been investigated are:

- What influence has the WFD implementation had on the national spatial planning systems?
- What is the relationship between spatial planning and water management?

The investigated countries are Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, and Sweden. In addition, we have investigated whether, and how, WFD ideas are applied in three non EU Member States in the BSR; Belarus, Norway and the Russian Federation.

The analysis is based on three analytical approaches; vertical implementation, horizontal integration and transnational cooperation. The approaches are related to the demand for an integrated approach to managing river basin districts (RBD), the setting up river basin management plans (RBMP) and, ultimately, to meeting the objectives of the WFD. By vertical implementation we are referring to the integration between organizations directly involved with water management. Horizontal integration stands for the integration between water management and other sectors, such as spatial planning. We refer to the integration of international river basins in the context of transnational cooperation.

Method

The study is based on 11 country reports performed in 2006. The country reports describe the various national spatial planning systems and water management systems and, in particular, their adaptation to the demands put forward in the WFD. In addition, the connection between the WFD implementation and spatial planning systems, including legislative and institutional aspects is analysed. Additionally, the trans-national dimension to the national implementation of the WFD and the national spatial planning system has been connected.
The national reports describe the water management and spatial planning systems before and after the implementation of the WFD. By before we are referring to the system in use before the adoption of the WFD in 2000, after in consequence means, after 2000. Where changes have emerged it is however possible that causes other than the WFD implementation process were responsible.

**Main results**

**Applied WFD principles**

The assessment of the introduction of eight WFD key principles shows that many were new for the BSR countries. This implies that changes had to be made in order to adapt to the Directive. It is also evident that significant efforts have indeed been made to adapt to the Directive. Among the non-EU-countries, Norway is implementing the Directive. In Belarus and Russia some of the WFD principles are now applied.

A WFD principle already partly rooted in some BSR countries was the “river basin as a planning and management unit”. Here the adoption of the WFD has led to an enforcement of the principle. The same development can be seen for the principles “assignation of international River Basin Districts and cross border / transnational cooperation”, and “public participation”. The principle of “river basin authorities” was not well applied in the investigated countries before the WFD and this principle has still not yet been applied to any great extent. The principle of having a “river basin management plan” was not used in the investigated countries before the adoption of the WFD, but has now been applied after adoption. The same development can be seen for the principles “economic analysis of water use”, “water quality objectives in legislation” and “combined approach for point and diffuse sources”.

**Vertical implementation**

In respect of vertical implementation, WFD implementation has been adapted to the hydrological and the prevailing institutional settings in water management. Thus far all EU-countries in the BSR seem to have adopted a minimalist approach to WFD implementation in this respect, implying that changes have been carried out without making any radical modifications. The minimalist approach can, in part, be regarded as the consequence of the tight time schedule for implementing the Directive.

Two models covering the implementation of river basin management can be identified in accordance with the intentions of the Directive. The first model has the competent river basin authority located at the national level; the second has the main authorities located at the regional level. The local level is often assigned the operative tasks in water management e.g. distribution of drinking water and sewage collection and treatment. Coordination bodies have been established in all investigated EU-countries. Their function is mainly consultative and monitoring-based and they will support the work of water management units as well as of authorities from other sectors. Moreover, the coordination bodies work as a participatory platform where national, regional and local public actors as well as private stakeholders and NGOs have the opportunity to participate in the elaboration of the RBMP.
Horizontal integration

When it comes to horizontal integration it can be concluded that two systems, one for water management and one for spatial planning, have been, and will continue to be, used in all investigated countries. In most countries the implementation of the WFD has not had any greater influence on the integration between water management and spatial planning thus far. The introduction of the WFD in the national legislation does however imply that the linkage between spatial planning and water management will be reinforced in some countries. The established coordination bodies provide for instance a potential means to integrate spatial planning and water management. This role is not however stressed in many countries. The relationship between the RBMPs and spatial plans will be of great importance for integrating spatial planning and water management. What this relationship will look like will become clearer when the drafting of the RBMPs is completed.

The mismatch between the geographical boundaries of the spatial planning units and the RBDs, the difference in timing between the RBMP and spatial plans and a general lack of resources, i.e. time and money, may all hamper the synergy between water management and spatial planning. In some countries moreover a number of legislation-related elements are also lacking to facilitate integration. However, a number of joint instruments for improved and meaningful water infrastructure; support of and collaboration with third sector actors; and models, tools and assessments for common purposes are at hand. An evident link between spatial planning and water management is for instance protection zones. In addition, the Environmental Impact Assessment is a tool where water management and spatial planning can move towards further integration. Another potential cooperation field is that of public participation; where established procedures in spatial planning processes could serve as a model.

Transnational cooperation

Transnational cooperation is of great importance in the BSR. All EU Member States in the BSR share at least one RBD with a neighbouring country. Due to the shape of the Baltic Sea Region most of the transnational RBDs include only two countries. Many of the EU Member States in the BSR, i.e. Estonia, Finland, Latvia, Lithuania, Poland and Sweden, share international river basins with non EU-member countries (Belarus, Norway and The Russian Federation). In general, WFD implementation appears to have initiated, intensified, or improved cooperation on water resources shared by EU Member States. This observation is based on the notion that international RBDs have been appointed, agreements have been signed and commissions or working groups have been set up to deal with WFD issues. However, the different structures of the national systems for both water management and spatial planning may hamper transnational cooperation within cross border river basin.

Conclusions

The EU-Member States in the BSR as well as Norway are on their way to implement the WFD. Also in Belarus and the Russian Federation some principles are applied. Additionally, the Directive has stimulated transnational cooperation. The integration between spatial planning and water management can be further developed in all investigated countries and this is needed in order to achieve a good water status. There is a distinction between water management and spatial planning. Spatial planning
is characterized by consensus and the task to balancing different kinds of needs, i.e. social, economic and ecological. Water management has traditionally been focused on command and control of the resource water. Consequently, spatial planning and water management have had different goals and different understanding, therefore it is important to cooperate between experts at all levels in order to facilitate integration between water management and spatial planning.
HELCOM Baltic Sea Action Plan,
Adaptive management within the Baltic Sea drainage basin

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Within the Helsinki Commission (HELCOM), the governing body of the “Convention on the Protection of the Marine Environment of the Baltic Sea Area”, a regional implementation of Ecosystem Approach was initiated in 2003 by the HELCOM and the joint HELCOM/OSPAR Ministerial Declarations (HELCOM 2003; HELCOM & OSPAR 2003). These Declarations put explicitly Ecosystem Approach at the centre of HELCOM work and the joint declaration further commits the contracting parties to apply and develop measures necessary to implement the Ecosystem Approach by 2010. This activity should also be harmonised with other similar activities, such as the European Marine Strategy and the Water Framework Directive.

At the moment the contracting parties to HELCOM are jointly implementing the Ecosystem Approach to the Baltic Sea by developing the HELCOM Baltic Sea Action Plan. The HELCOM Baltic Sea Action Plan will be based on ecological objectives supported by indicators and targets that will guide the future actions of the HELCOM states to achieve a good ecological and favourable conservation status of the Baltic Sea. Ecological objectives will be clear, measurable, scientifically sound and politically agreed. They will dictate the need for actions to be taken jointly by the Baltic Sea countries in order to restore the environment and ensuring a holistic and integrated approach to the protection of the marine environment.

Currently the involved HELCOM groups are having the final series of consultations and drafting sessions before the adoption of the set of targets and actions at the HELCOM Ministerial Meeting in Poland in November 2007.

The HELCOM Baltic Sea Action Plan includes four strategic goals (HELCOM 2005) reflecting the four main topics of concern. These include: 1) Baltic Sea undisturbed by eutrophication, 2) Baltic Sea life undisturbed by hazardous substances, 3) maritime activities in the Baltic Sea carried out in an environmentally friendly way, and 4) favourable status of Baltic Sea biodiversity.

Eutrophication is a major problem in the Baltic Sea and therefore it has been a central focus area of the Action Plan already from the start. Excessive nitrogen and phosphorus loads coming from land-based sources, within and outside the catchment area of the Contracting Parties, are the main cause of the eutrophication of the Baltic Sea. About 75% of the nitrogen load and at least 95% of the phosphorus load enter the Baltic Sea via rivers or as direct waterborne discharges. About 25% of the nitrogen load comes as atmospheric deposition. HELCOM assessments clearly show that problems with eutrophication persist in most of the sub-basins of the Baltic and that good environmental status has not been reached.

Experts from HELCOM countries have quantitatively defined good eutrophication status for the Baltic Sea in several experts group meetings (HELCOM 2007). Swedish MARE program has put efforts in combining pollution load models with environmental effect models enabling predictions of the environmental effects of various policies (Savchuk and Wulff 2007; Wulff et al. 2007). The results of MARE policy scenarios have been compared with HELCOM target levels for environmental indicators. The results provide an estimate on how far the proposed measures, will bring the Baltic
towards the Ecological Objectives for eutrophication, and indicates need for further actions to reach good environmental status.

The preliminary results of the MARE scenarios show that policy actions targeting municipality sewage treatment have still today a great potential to further decrease nutrient inputs. The scenario results also show that if effective treatment of sewage and a ban of phosphorus in detergents are combined these measures will reduce the phosphorus load to the Baltic significantly. Also a substantial reduction in both nitrogen and phosphorus can be obtained if balanced strategies optimising nutrient use and minimising nutrient fluxes from agricultural systems, such as animal feeding, handling of manure and crop cultivation are applied. The sources of airborne nutrient input as well as transboundary loads of nutrients should be addressed.

In conclusion it can be said that we have a possibility to improve the Baltic Sea and reach good ecological status if the contracting parties are committed and ready to adopt the proposed measures we have on the table. We also have to adopt and implement more stringent measures both for human induced waste waters as well as agriculture if we want to reach our targets. It also means that to make the Action Plan to be an effective instrument in combating eutrophication it has to enhance full enforcement of already existing legislation. And it should have a review mechanism showing us where additional nutrient reductions are still necessary to bring the Baltic Sea to a good environmental status. During the process of developing concrete actions for the eutrophication segment of the Action Plan it has become clear that, even if not perfect, the currently available modeling tools and scenarios are useful in identifying the extent to which further measures are needed. As it is clear that a failure in reaching the objectives for eutrophication will impair the achievement of favourable status of biodiversity.

REFERENCES:
HELCOM 2003. HELCOM Ministerial Declaration (HELCOM Bremen Declaration).
Water management in transboundary waters: Assessing the status of transboundary rivers, lakes and groundwaters

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Many rivers criss-cross the border between two or more countries, the basins of lakes are shared between two or three countries, and transboundary aquifers underlie two or even three countries. The sustainable management of such shared resources requires common approaches to prevent, control and reduce pollution, based on joint objectives and institutional frameworks. For the first time, principles of transboundary cooperation within river basins were laid down in a convention under international law, the 1992 UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention, www.unece.org/env/water).

The Water Convention applies to all transboundary waters (surface waters and groundwaters). It promotes a river basin approach to water management and recognizes the river basin as the natural unit for water management. The Convention also aims to achieve good status for waters and related ecosystems, taking into account the specificity of river basins. Moreover, it promotes a “combined approach” to pollution control through simultaneous setting of emission limits and water-quality objectives. It calls for the involvement of all stakeholders, including the public, in the decision-making process, and it establishes joint bodies as the institutional framework for riparian countries to prevent, control and reduce transboundary impact.

Under the Water Convention, the riparian Parties shall, at regular intervals, carry out joint or coordinated assessments of the conditions of transboundary waters and the effectiveness of measures taken to prevent, control and reduce transboundary impact. The results of these assessments shall be made available to the public.

On the occasion of the sixth ministerial conference “Environment for Europe” (Belgrade, 10–12 October 2007), an assessment of transboundary rivers, lakes and groundwaters in the UNECE region will be published. The 450-page publication, supported by maps and figures, is the first ever produced in-depth report on transboundary waters in the UNECE region. The assessment has been carried out under the auspices of the Meeting of the Parties to the Water Convention, under the overall leadership of Finland. More than 150 experts from all over Europe participated in this undertaking. The assessment highlights the achievements of over 10 years’ work under the Water Convention to prevent, control and reduce transboundary impact.

The assessment includes 145 transboundary rivers (most of them with a basin area over 1,000 km²), 26 transboundary lakes and 70 transboundary aquifers in the European and Asian parts of the UNECE region, which all were considered by riparian countries as “major” water bodies, mostly due to their importance for water supply and the maintenance of ecological functions.

The assessment serves as a point of reference for such measures by governments, international river basin organizations (joint bodies), other international organizations and relevant non-governmental organizations to improve the status of transboundary
waters and agree on joint measures related to integrated water resources management. The assessment also underlines the challenges that countries face in implementing further measures to counteract still existing pressures and improve the ecological and chemical status of transboundary waters.

One major part of the assessment deals with transboundary surface waters. It describes the hydrological regime of these water bodies, pressure factors in their basins, the status of the water bodies (e.g. ambient water-quality data, water-quality classifications), transboundary impact as well as trends, future developments and management measures envisaged. This part also aims to summarize the major findings of the assessment: monitoring of transboundary rivers and lakes, pressures from natural and anthropogenic sources, status and impact, and finally response measures (pressure-related responses and good governance).

Another important part deals with transboundary aquifers in South Eastern Europe, the Caucasus and Central Asia. In general, this part is structured similarly to the surface waters’ assessment. Due to the specificity of groundwaters, the following aspects have been dealt with: characteristics of transboundary aquifers, uses and functions, groundwater abstraction and use, problems related to groundwater quantity and quality, evidence for transboundary effects and groundwater management measures for the transboundary aquifer. This part also summarizes the major findings of the assessment of the transboundary groundwaters.

Surface water and groundwater interactions in the same basins have not yet been dealt with in an integrated manner and the assessment report is still split into separate sections dealing with these water bodies. The reason is quite obvious: the assessed transboundary aquifers represent only part of the many other aquifers in the basins of the analyzed transboundary surface waters, and an analysis of the interactions between surface waters and groundwaters would thus be premature. Future assessments will deal with this deficiency.

In the present assessment, the impact of human activities on the chemical status has been dealt with more comprehensively than hydromorphological alterations by human activities and their impact on the status of watercourses. Moreover, water-quality problems have been analyzed more deeply than water-quantity problems. Thus, the present assessment focuses on the most critical problems in the region and calls for holistic assessments to be made in the future.

The basins of transboundary rivers and lakes and the recharge areas of transboundary aquifers are widely heterogeneous from the economic and environmental points of view, and display very specific problems, calling for tailor-made solutions. Nevertheless, the assessment pointed to nine major issues to be jointly dealt with in the future:

- The effects of climate change became visible in almost all of the analysed river basins.
- In transboundary river basins, water sharing among countries in the same basins is often a major water quantity issue, and continues to cause upstream-downstream conflicts.
- In transboundary aquifers, increasing abstraction for agricultural purposes and drinking water supply is often a major water-quantity issue, and in some cases leads to overuse.
- Organic pollution, nutrient pollution, pollution by hazardous substances and – in the case of rivers – hydromorphological alterations are the most important issues for further action to improve the chemical and ecological status of transboundary waters.
• The contamination of drinking water supplies is significant in EECCA and SEE, and causes such water-related diseases as cholera, dysentery, coliform infections, viral hepatitis A and typhoid.

• Action to decrease water pollution from point sources (municipal sewage treatment; old industrial installations) is of primary importance in basins in EECCA and SEE.

• Pollution from diffuse sources (e.g. agriculture, urban areas) is of high importance for action in basins in Western and Central Europe.

• Plans for integrated water resources management still need to be developed for almost all basins; proper attention should be devoted to land-use planning and the joint management of surface waters and groundwaters.

• In developing assistance programmes, taking into account the specificity of each basin, special attention should be given to countries in Eastern Europe, Caucasus and Central Asia and South Eastern Europe as these countries face the biggest challenge to reduce transboundary impact.
Cooperation in transboundary river basins – Tornionjoki River Basin District

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Lapland is the northernmost province in Finland, sharing borders with three countries, Sweden, Norway and Russia. The location, with long borders and numerous watercourses shared with these nations, has emphasized the importance of cooperation in environmental issues. Cooperation in these areas has long traditions, forms of which have been developing during decades. It is based on bilateral governmental agreements or more directly with international agreements (for example in Arctic cooperation). The implementation of the EU Water Framework Directive gives some new perspective into this work. Lapland Regional Environment Centre (LREC) represents the Finnish environmental administration in the region, participating actively in the cooperation in its everyday work and also contributing with environmental expertise in wider context.

The agreement between Finland and Russia on transboundary waters was signed in 1964. The agreement encompasses all surface waters that cross or flow along the Finnish-Russian border and gives a basement for the management of the shared waters. The Joint Finnish-Russian Commission’s work is based on this document. The agreement covers all main forms of water use including hydropower, transportation, fisheries and water level regulation. Regulations controlling water pollution are also included. Principles and procedures for resolving water resource issues are set in the agreement, as well as provisions for compensations if damage occurs. The practical implementation includes for example the monitoring of the transboundary waters. Considerable part of the cooperation has been project based, including comparisons and development of laboratory analysis and methodology into field surveys.

Norwegian and Finnish governments concluded an agreement on transboundary waters in 1980 and established the Finnish-Norwegian Transboundary Water Commission. The commission has an advisory role. The main tasks include submitting proposals and motions and issuing statements on matters related to the management of the transboundary waters, supervising and monitoring the condition and quality of them, preventing the deterioration of the transboundary waters, and monitoring construction along the waterways and other activities affecting the state of them. Achievements include common water quality monitoring and reporting program of the River Tenojoki, common multiple use plans for the main rivers and many common research and planning programs. It has improved cooperation with Norwegian and Finnish border municipalities as well as improved water quality in border rivers.

The Finland-Sweden Frontier Rivers Agreement was signed in 1972. The current agreement includes regulations concerning water protection, construction in water bodies, and fishing. Opposite to the earlier mentioned agreements, this one replaces the national legislation in its scope both in Sweden and Finland. The Frontier Rivers Agreement is thus directly applicable legislation. The Frontier River Commission acts as the permit authority for the applications concerning common water bodies: the transboundary water bodies must be utilized so that both countries can enjoy the advantages of the water bodies, that the interests of the border region are promoted in the best possible way, that special importance is attached to nature conservation and the preservation of the fish stock, and that the pollution of the water is prevented as effectively as possible. The scope of the agreement covers a wide range of issues.
otherwise provided by national laws. Negotiations for the reforming the agreement have been ongoing for several years - the main reasons are the amendments made in both national and EU legislation. Beyond this, the cooperation between the County Administrative Board of Norrbotten (CAN), that is the regional authority in Sweden, and Lapland Regional Environment Centre is part of every day work. It has been widened since the 1990s including several projects.

With the implementation of the EU Water Framework Directive, river basins in Lapland were divided into four districts, two of which were delineated to be international river basin districts. These districts are Tornionjoki basin (Rivers Torne and Muonio) together with Sweden, with minor areas also in Norway, and Teno-Paatsjoki basin (Rivers Tana and Paz) with Norway and Russia. With Sweden cooperation is between member states implementing the directive. Norway, as an EEC member, follows the directive, but with a delayed schedule, whereas EU legislation does not bind Russia.

The final forms of cooperation in WFD issues have not been decided yet. With Norway it is open whether the Transboundary Water Commission will be the coordinating authority, though this seems the most natural step in the cooperation. Between Finland and Sweden, a note was exchanged for agreeing upon the cooperation needed to fulfil the demands set by WFD. LREC and CAN are responsible for the most of the practical cooperation in these issues. The renewal of the Frontier Rivers Agreement will most likely give the Frontier River Commission a new role as an advisory committee, and it would act as the coordinating organ for the management of the river basin district. The permit issues would be handled according the national legislation and procedures.

WFD leads the cooperation into more set frames and strengthens the role of the whole river basin in the management work. This is a natural development in the environmental work in the border regions of Lapland.

Cooperational projects – TRIWA as an example

An example of the continuum of cooperational projects is currently running Interreg III A project ‘Best practices for the management of an international river basin district – Torne River’, TRIWA II.

In 1990’s the cooperation between LREC and CAN started to become more active, leading to the first larger common project funded by the LREC and CAN themselves and the Finland-Sweden Frontier Rivers Commission. The results were published in 2001 in a report describing the status and pressures in the major transboundary rivers of Torne and Muonio (Puro-Tahvanainen et al. 2001). Needs for developing the joint work were described in the report, and the next step was TRIWA (2003–2006) project that was formed with subprojects funded by Interreg III A, Border River Commission and the North Calotte Council. This project concentrated in the tributaries and lakes in Torne River catchment area, and participants included also Finnish Game and Fisheries Research Institute (FGFRI) and Swedish Board of Fisheries. Results of this project were presented in web pages (www.triwa.com) and in a report (Elfvendal et al. 2006).

As a continuum a project for developing the management practices in the area was started in 2006. Project is currently continuing. The project aims at developing management practices and activating cooperation between regional and local authorities as well as local actors and people, and also to test chosen biological methods for evaluating the ecological state of the northern environment. This project is funded by Interreg III A, project partners are LREC, CAN, FGFRI, Swedish Board of Fisheries and SYKE.
REFERENCES:
Identification of pressures and impacts, regional and project experience

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The WFD requires identification of different pressures and assessment of impacts on water bodies. That is the basis of river basin management planning, to estimate the risk level, possibilities and measures to achieve the good ecological status. Reference conditions should be also estimated by evaluation of existing pressures and its impact to water ecological status. In TRABANT project the research field is transboundary water bodies in Baltic Sea region, where transnational river basins are divided between EU-countries and non-EU countries with different approach to water management planning issues. In transboundary context the main pressures to solve together are:

- point pollution of waste water treatment plants
- diffuse pollution, mainly from agriculture
- husbandry
- mining activities
- regulation of water flow (hydropower station, damming)
- morphological changes of water bodies
- fishery
- etc.

Lake Peipsi catchment area as one pilot area in the project, in the state level have serial of data of general physical and chemical pollution (O2, BOD, COD, N, P etc) enabling to estimate the pollution load and chemical ecological status. Pollution load discharged into the lake has reduced during last decade, but there are still no changes of better ecological status in water quality in the lake. There is also still insufficiency of biological data in the lake basin water bodies. The main problem is different approach and classification to water quality standards and criteria, both for chemical and biological parameters. Due to these differences, we estimate also differently pressures and their impact on environment. So, we don’t have overview of the common understanding of the ecological status of our common water body. During last decade agricultural pollution has decreased remarkable with impact of decreasing nitrogen load discharging into the lake. The phosphorus load is quite stable and due to that N:P ration in the lake is extremely low at present, less than 10:1, making nitrogen limiting factor.

The other group of problems in the transboundary water body level is difference approach or lack of data of pollution sources as overflows, stormwater loads, load from sparse population, impact of farm storages, also insufficient information of loads form different land use and crops, load from farm level, common understanding of background load etc. The real problem can rise in research level on small catchment areas where pressure and its impact variability can be high.

The main negative impacts of these pressures are fish killing, water blooming, changes in ecosystem, increasing internal load etc.

Usually, pressures are combined (urban, agriculture etc) causing mixed impact. Therefore estimation of these pressures and impacts is complicated as there is absence of good methodology to identify impacts and level of risk of several pressures in different hydrological regime.
Typology of surface waters in the Baltic Sea Region – results of the TRABANT project research team

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TRABANT project team compiled information on typology systems in the eastern Baltic Sea region area. Natural lake type is a basis in the assessment of surface water status in the Water Framework Directive. Typologies of four countries were studied and use of various factors and definition methods summarised. Altogether ca. 60 lake and river types were in use. In 2007 some revision of types was still going on. According to the system B in the Water Framework Directive both obligatory and optional factors were used for type definition. Optional factors for Estonian and Finnish river typology systems included soil and land cover information (e.g. coverage of peat land). Latvian rivers were sub-divided by velocity and Lithuanian rivers by slope of river-bed. Optional factors for lakes included e.g. water hardness in Estonia and Latvia, alkalinity in Finland and humic content in all these three countries. The number of factors used in different countries varied from 2–6 for rivers and 2–5 for lakes. In practical division to types GIS data, morphometric or hydrological data and water quality data were all used, supported by expert judgement in some cases.
Identification of pressures and impacts – basics, methodologies and experiences in the eastern Baltic Sea region

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One important component in the implementation of the Water Framework Directive (WFD) is the pressure and impact analysis. It aims at identifying where and to what extent human activities affect surface and ground waters. Member States have to assess the likelihood that water bodies in their river basin districts will fail to meet the WFD’s environmental objectives, such as to prevent deterioration in the status of all water bodies, to protect, enhance and restore all water bodies, to achieve good surface water status by 2015, and to reduce pollution by priority substances. In order to assess the likelihood of failing to meet these objectives, Member States must collect information on type and magnitude of pressures. Potential pressures can be categorized into the following components: a) point sources of pollution, b) diffuse sources of pollution, c) effects of modifying the flow regime through abstraction or regulation, and d) morphological alterations. Member States must also collect information on the characteristics of (discrete and significant) water bodies liable to different pressures. The characteristics of water bodies determine their susceptibility to various pressures (= risk screening). The impacts of different pressures can be changes in the state of biological quality elements (macrophytes, phytoplankton, benthic invertebrates etc.), changes in hydro-morphological elements (hydrological regime, river continuity, morphology etc.), and changes in physico-chemical elements (transparency, nutrient status, acidification etc.).

The results of the pressure and impact analysis will be used for targeting monitoring programmes, for setting objectives for water bodies, for designing targeted and proportionate measures to achieve the Directive’s objectives, for selecting potential reference sites, for selecting potential intercalibration network, for refining the identification of water bodies, and for carrying out the economic analysis of water use. One of the basic ideas is not only to assess the current situation, but also to forecast what the situation is prior to 2015. The pressure and impact analysis is an ongoing process within the river basin management cycle.

Pressure identification has been a widely-discussed issue for the last few years both at national and international levels. Besides national implementation of the WFD there has been many international projects dealing with the pressure and impacts analysis. Several EU projects, such as the Rebecca and BMW projects, have provided a good variety of potential tools to be applied within the pressure and impact analysis. Within the TRABANT project, we have collected experiences from such projects and different national approaches. The basic structure of national approaches seems to be pretty similar, although some differences were detected between countries.

The commission has provided a report on the analysis of Article 5 reports. According to the pressure and impacts analysis screening about 40% of EU surface water bodies were identified as being at risk and around 30% not at risk. In the eastern Baltic Sea Region the percentage of water bodies being at risk was announced to be as follows: in
Lithuania around 6 %, in Latvia around 18 %, in Estonia around 14 %, and in Finland the exact number of water bodies was not informed.

Only 12 Member States have reported information on the relative importance of different pressures and impacts for surface waters. Only 5 Member States have provided complete information on the following main pressures: point source pollution, diffuse source pollution, water flow regulations/morphological alterations and water abstraction. In the future, the climate change has to be recognized as an additional pressure factor on EU surface waters.
Main purpose of the study was an analysis of the Vuoksi River phosphorus balance formation. The initial information was taken from statistical reports of the Ministry of Natural Resources of the Russian Federation (forms 2TPVodhoz), data of the Institute of Limnology RAS, FGU Baltvodhoz and Southeast Finland Regional Environment Centre. Three components of total phosphorus (Ptot) balance of the Russian part of the Vuoksi River immediate catchment were assessed:

1. Ptot loads from point sources on the Russian part of the Vuoksi River immediate catchment, calculated using data from statistical reports 2TPVodhoz;
2. Ptot loads on Lake Ladoga from Vuoksi basin, assessed by Institute of Limnology using results of their own measurements of nutrient concentrations and data of water discharges from HPP re-calculated for the whole catchment area;
3. Ptot load on the Vuoksi River from Lake Saimaa taken from protocols of 44 meetings of Joint Russian and Finnish Commission on transboundary water systems.

The following main conclusion can be made based on the results of the analysis:

1. Ptot income to Lake Ladoga with waters of the Vuoksi River has decreased by 50 % by 2005 compared to 1990;
2. Current phosphorus inputs from Lake Saimaa and point sources to the Vuoksi River are correspondingly 8 and 13 % of phosphorus income to Lake Ladoga with the Vuoksi River waters;
3. The main component of nutrient balance of the Vuoksi River is non-point load from the catchment area.

The analysis of Ptot concentration variability along the Vuoksi River (after measured data of Baltvodhoz in 2006) showed that discharges from Svetogorsk CBK enhance Ptot concentration in the Vuoksi River water by 50 % compared to issue from Lake Saimaa. In the Vuoksi River mouth Ptot concentration increases by another 25 %. Most possible reason of it may be intensive diffuse Ptot load from the catchment which exceeds the processes of self-purification of water mass of the studied aquatic system (sedimentation, utilization by biota, etc.) in lakes Vuoksi and Sukhodolskoje.
Macrophytes as a biological quality element – experiences of national, EU and GIG work.

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Aquatic macrophytes have been largely neglected ecological quality indicators of lakes before implementation of WFD. Diversity of littoral zone means relatively time consuming and costly surveys, although ecological indicator value of macrophytes has shown a good response against eutrophication and hydrological alteration. Lacking common standards related to field methodology and species lists have harmed utilization of macrophytes. Aquatic macrophytes are one of the biological quality elements of WFD, which raised a significant need to focus more research on it. Aim of this presentation is to describe experiences in methodology development, how to utilize aquatic macrophytes in developing national lake classification and within intercalibration exercise of Northern geographical intercalibration group (N-GIG).

National macrophyte methodology is largely based on numerous lake regulation development projects, where developed diverse methodology was further investigated and selected within Life-Vuoksi project. Developed standard methodology called main belt transect is applied commonly in small lake surveys and is also under quality control procedure. Quality control consists of field work manual and annual training sessions for people in charge of work. It includes also a common data storage where field sheets and even data handling procedures are collected. Main belt transect fulfills the demands of CEN Guidance proposal for lake macrophyte surveys. Despite of this recent approach, national database is collected from diverse sources and methodologically dominated by whole lake surveys of individual researchers. Best indicator against eutrophication pressure described by total phosphorous seems to be a share of type specific species and also predicted community composition. These both indicators lean significantly on an approach developed for national benthic invertebrate community classification. Finnish national lake typology is relatively complicated and therefore especially data of reference lakes is very limited.

Biological constraints of intercalibration work are related to significant physical distances within the area of the geographical intercalibration group. Northern GIG consists of lakes ranging from Northern Lapland to Southern Ireland. Plantgeographical obstacles are significant and climate varies from continental to Atlantic. N-GIG group decided to pool all available lake specific species data and phosphorous data together and developed a common intercalibration index. It was based on species specific response on phosphorous pressure. A relatively similar response along region was identified and all lakes were positioned on the eutrophication gradient. National classification schemes from Ireland, United Kingdom, Norway, Sweden and Finland were used and same lakes were classified both with national and common index. All other national indices correlated relatively well with common one except Finnish index. Finnish lakes were compared by using contingency tables which showed a good comparability of these two methods and leaded to proper outcome of intercalibration.

Despite of positive success and examples related to use of aquatic macrophytes, a lot of work is still needed especially related to estimation of abundance of macrophytes to reach a common understanding of their role in lakes. Further development of general status classification of lakes may also raise the need to check their indicator value and its comparability to other biological elements.
Characteristics and status of Lake Peipsi, a large transboundary lake

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Lake Peipsi (3,555 km², mean depth 7.1 m) is the largest transboundary lake in Europe, shared between Estonia and Russia. As in many shallow lakes in Europe, eutrophication is the most serious environmental problem for Lake Peipsi. According to Battarbee et al. (2005), the natural evolution of a lake is defined as ontogenesis, whereas eutrophication is a result of external nutrient loading from human sources. Both these processes may induce increase in bioproductivity and changes in the biological structure of a lake. Differences in natural conditions (topography, water depth, relative size of catchment area) among parts of Lake Peipsi may determine the varying sensitivity and response of the ecosystem to eutrophication in addition to natural processes (e.g. fluctuations of water level and temperature). In addition, transboundary conditions complicate the implementation of policies that might prevent or mitigate environmental damage in the Peipsi region.

Lake Peipsi is elongated in north-south direction (Fig. 1), while the major part of the catchment area is situated to the south of the lake. Previous long-term investigations have demonstrated that the water characteristics and biological communities in Lake Peipsi change from north to south. A difference in conditions between the opposite ends of a lake basin is termed polarity. The study clarifies differences in nutrient content between the northern and southern parts of the lake (lake polarity) and indicates possible causes of eutrophication of this large international lake. This new approach to deal with lake polarity in respect of nitrogen (N) and phosphorus (P) concentrations seems to be a promising and understandable way to show long-term changes of spatial differences of eutrophication within a lake. The aim of the study was to clarify whether the differences in nutrient content between the northern and southern parts of the lake have remained relatively stable over the years, showing that they are mainly due to natural environmental conditions, or whether they are increasing and showing greater human impact.

We investigated changes in the spatial distribution of N and P in Lake Peipsi using data from 1985 to 2006. The results show a steady gradient in total P (TP, Fig. 2) and total N (TN, Fig. 3) content along the lake: the northern and deepest part, Lake Peipsi s.s., is significantly less loaded with nutrients than the southern and very shallow part, Lake Pihkva, into which the main inflow, the Velikaya River discharges. However, the long-term temporal patterns of N and P polarity are different. Statistical analysis, using technique of parametric functions in the framework of general linear analysis provided by SAS procedures GLM and MIXED (Kangur & Möls, 2007) revealed that the polarity of N compounds has been relatively stable over the years and can be related to differences in natural conditions between the lake parts. Our study indicates that the in-lake N concentrations are quite stable in long-term scale and internal processes (e.g. N₂ fixation by cyanobacteria and heterotrophic bacteria, bacterial denitrification) can largely compensate for year-to-year changes in the external N load. On the contrary, the increasing polarity of TP content is the primary eutrophication phenomenon in the lake and shows clearly that input of P from the south is increasing. An increasing concentration of P has been observed in Lake Pihkva (Fig. 4), where the inflow of the Velikaya River contributes more than half the entire inflow to the whole of Lake Peipsi. According to Carpenter (2003), lake P dynamics can be explained by a critical threshold value. Once the P level in the lake
exceeds this threshold, it may take many years to return to low P levels; in some cases, the lake will never recover. In the case of Lake Peipsi, this threshold level of P seems to have been exceeded and the lake is “full” of P. Even a small emission of P from external sources, plus release of P from sediments into the water, have pushed the ecosystem of Lake Peipsi over a threshold to a degraded state. The limnological time-series data from 1950 to 2006 indicate deterioration of lake water quality and adverse changes in the whole ecosystem of Lake Peipsi. Eutrophication has led to an undesirable growth of algae, massive blooms of cyanobacteria accompanied by oxygen depletion during the night and fish kills, cyanotoxins in water, low water transparency and siltation of the lake bottom. The eutrophication phenomena are most intensive in the southern part of the lake, Lake Pihkva. Doubled TP, PO4-P and chlorophyll a contents, increased total alkalinity (HCO3-) and pH, as well as decline in water transparency and winter oxygen conditions, indicate a clear rise in the trophic level of Lake Pihkva (Kangur et al., 2007). Our results confirm that the input of P is the main reason for anthropogenic deterioration of Lake Peipsi ecosystem. Eutrophication phenomena in this large shallow lake with a relatively long residence time (about two years) are quite stable on the long-term scale and the observed ecosystem changes are probably of long duration or irreversible.

Acknowledgements

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REFERENCES:


Fig. 1. Sampling stations on Lake Peipsi during Estonian-Russian joint expeditions in summer since 2001.

Fig. 2. Concentration of total phosphorus (TP) averaged for 5-year periods (days 100-310 within the year) in the three parts of Lake Peipsi in 1985-2006.

Fig. 3. Concentration of total nitrogen (TN) averaged for 5-year periods (days 100-310 within the year) in the three parts of Lake Peipsi in 1985-2006.

Fig. 4. Changes of total phosphorus (TP) in Lake Peipsi ss. and Lake Pihkva for the 5th August and the depth of 1 m. Dashed lines show 95% confidence limits.
GIS analyses of the river basins of Dvina/Daugava and Neman/Nemunas – Belarusian experiences

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The water management is one of key sectors, the successful operation of which ensures a basis of stable progressing of all industrial and social infrastructure of the country. There is today an increasing awareness of the importance of protecting our water resources and ecosystems.

The river basins of Nemunas/Neman and Daugava/Zapadnaya Dvina constitute parts of the Baltic Sea catchment area. The UN-ECE Convention of Protection and Use of Transboundary Watercourses and International Lakes have been ratified by Republic of Belarus in April, 2003. This convention states that action programmes should be developed for transboundary water basins and the convention is in several aspects in line with the principles of the EU Water Framework Directive.

One of the new strategic approaches obtaining the progressing in the Water Framework Directive (WFD) is catchment-based approach. This approach to water management requires water to be managed on the basis of river basins, rather than according to geographical or political boundaries. This enables assessment of all activities which may affect the watercourse and their eventual control by measures which may be specific to the conditions of the river basin.

The structure units of the water management system (regional and municipal) at the basin level should have the informational system, oriented not only on data receiving, but data processing and providing it to the users in the format that makes possible to take managerial decisions.

The most optimal use of Geographic Information System (GIS) can be the base for creating detailed informational systems. The GIS techniques will be essential for the derivation of various information layers (e.g., on characteristics of river basins and water bodies, on the chemical and ecological status of water bodies, monitoring networks, protected areas and etc.) as well as GIS will be a tool for the preparation and delivery of the GIS layers required for the reporting.

The Central Research Institute for Complex Use of Water Resources in the framework of TRABANT Project – Tacis part in 2007 carries out a task for creation some GIS layers under Water Framework Directive requirements for Belarusian parts of Nemunas/Neman and Daugava/Zapadnaya Dvina river basins.

The developed GIS-layers will be divided in three main groups:

• Characteristics of the river basins and basic information
• Monitoring network
• Protected areas

The results of this project activity will be also used for preparation in future the River Basin Management Plans at the national as well as on the international levels. That is also of help in order to achieve a sustainable management of the entire Baltic Sea basin.
Application of GIS tools in water pollution control planning on river basin scale

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In many rivers and lakes the nutrient loading comes mainly from non-point sources, such as agriculture, forestry and scattered settlements. Controlling this loading is more demanding than that from point sources, and requires effective planning methods covering the whole area of the drainage basin. GIS data and systems offer several application opportunities for this purpose.

By GIS tools it is possible to explore and analyse geographical information, such as land use, soil characteristics, soil elevation and different kinds of administrational borders, and present the data on maps. This data can assist in exploring the loading sources, in estimating the environmental impacts of the loading on watercourses, and in analysing possibilities to apply water pollution control methods in purification of waste and runoff waters from different sources.

The GIS softwares and data are usually commercial and can therefore be expensive. In addition, the basic versions of GIS software don’t necessarily have all the features, which are needed or could be useful in water pollution control planning. In some cases, it is possible to buy extensions for the software, but not always. These facts may delay or completely prevent utilising GIS effectively in practical water pollution control planning.

There is a huge need for cost-effective GIS planning tools in water pollution control planning on the whole river basin scale. A good example of this kind of tool is the RiverLifeGIS, a non-commercial software created originally in the RiverLife project (1998–2001) in Finland. It is a system for performing hydrological and water quality related computation on river catchments using monitoring water quality data and geographical information (GI). The software has been developed further in the recently finalised Baltic Sea Interreg IIIB project Watersketch (2004–07), and is now available for free on internet at URL toolbox.watersketch.net.

With RiverLifeGIS you can:
- make estimations of nutrient loading and its sources on drainage basin scale on the basis of various characteristic loading figures above any chosen point in the river channel network or above a lake
- determine the need to decrease the loading in order to prevent eutrophication and to improve the ecological status of aquatic ecosystems
- review and analyse flow and water quality data
- make statistical analyses of time series
- make studies of land use distribution in various areas
- extract upper drainage area from any chosen point of the drainage basin
- study the effects of point source loading in rivers during average, maximum and minimum flow

The basis for many computations in the RiverLifeGIS is the water flow layer computed from the Digital Elevation Model (DEM). It defines flow directions for all points in
the given drainage basin area, which allows outlining the upper catchment area of any point of the river channel network.

Estimates of nutrient loading and of their impacts on rivers are simple and therefore have an advantage of being easy to understand and quick to compute. The results can be visualised on maps. The software has been utilised for example in seeking potentially suitable locations for overland flow wetlands constructed on peat soils. It can also be used in locating ditches sensitive for erosion.

REFERENCES


Ludza basin management plan and public participation, Latvia – results of a cooperation project

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Latvian Environment, Geology and Meteorology Agency (LEGMA) is responsible authority for preparing basin management plans and program of measures. WFD has been included in national legislation of Latvia and several projects have been carried out for capacity building and implementation of WFD.

Latvian-Finnish bilateral project, “Supporting implementation of WFD in Latvia”, contributes to further implementation of WFD in Latvia by supporting and enhancing the process. The focus has been on the river basins with insufficient or lack of data, which complicates assessing of ecological and chemical quality of water, identifying environmental impacts and preparing program of measures. The objective is also to enhance capacity building in LEGMA for WFD implementation purposes and to test how the national methods developed this far perform in the pilot river basin area of the River Ludza.

The project was founded based on cooperation program between Ministries of Environment of Finland and Latvia. Project partners include Finnish Environment Institute (SYKE), Latvian Environment, Geology and Meteorology Agency (LEGMA), Estonian, Latvian & Lithuanian Environment (ELLE), Pirkanmaa Regional Environmental Centre (PREC), Latvian University of Agriculture (LUA), State Forest Service of Latvia (SFS) and Latvian Fish Resources Agency (LFRA).

Two approaches were used for preparing program of measures for pilot territory. Finnish approach was the multicriteria Web-HIPRE (the value-tree) analysis for prioritisation of measures and qualitative CEA: Input data:

- Pressures-impacts matrix;
- Measures-impacts matrix.

Latvian approach – ECOLAS CEA-tool:

- **EXCEL based tool**
- Deals with pressures that generate diffuse and point source discharges of nutrients;
- Based on financial costs of measures only;
- Provides the most cost-effective combination of measures.

Selected measures mostly were provided for reducing diffuse pollution from agricultural lands.
Public participation approaches in river basin management – pilot studies in Estonia

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In the framework of the project TRABANT pilot projects of public involvement were carried out, through which different interest groups were involved in the activities of water management and planning. Web-based role games as well as organised seminars/training sessions were used and, in accordance with the wishes of local governments, study materials of public involvement were prepared and several training sessions of public involvement were held for specialists associated with water management and spatial planning.

TRABANT’s focus is on practices of transboundary water management in the Baltic Sea countries. From below you can find an overview of pilot projects on public participation methods by Peipsi Center for Transboundary Cooperation (Peipsi CTC). Peipsi CTC is an international non-profit institute, which works to promote balanced development of border areas, especially in Lake Peipsi/Chudskoe region. Below there are pilot studies in Estonia that are used for public participation approaches in river basin management.

Pilot studies

Role-playing game for schoolchildren

In 2005–2006, Peipsi Center for Transboundary Cooperation utilised a role-playing game, ORK. The simulation game, ORK, was targeting public participation in the spatial/physical planning system. Spatial/physical planning activities are carried out routinely by cities and municipalities. Those processes, complex as they seem to be, have many different interest groups involved. The simulation game concentrated on two planning cases in order to let schoolchildren know how key development decisions are being made. The simulation game was played by small groups (ages 14–16) from different Estonian schools. In both parts of the game participants got a role, similar to one from real life. For example, they were a fisherman, journalist, environmentalist, developer, decision-maker and so on. At the end of games two meetings for all participants were held, where experts gave a short overview about solving similar problems in real life. There was also special home page (www.ctc.ee/ork) held on the role playing game.

Role-playing game for adults in Peipsi CTC summer school

During the Peipsi CTC Summer School, Peipsi CTC held a pilot example of public participation training. One part of the training was a role-playing game. The scenario
of the game was the same as for schoolchildren - port construction in a small town. The purpose of the game was to make people think how difficult is to find a solution, which is good for everyone. Before the role-playing game there was a theoretical overview of public participation and its methods. After that all participants were asked to simulate a roundtable conference of port founding discussion with all stakeholders.

Public participation training “Impact of Water Framework Directive on general planning and public participation”

Peipsi Center for Transboundary Cooperation, in collaboration with Tartu County Environmental Service Department, held a training and conference “Impact of Water Framework Directive on general planning and public participation”. The target group of the event was environmental protection and development experts from Estonian local governments.

The conference introduced the EU Water Framework Directive, state of its implementation and public participation in Estonia. The training introduced the theoretical background for public participation and public participation needs in water management, based on the Estonian and EU legal frameworks. The training was combined with several practical tasks where participants have to solve problems in simulated situations where public participation is an important component.

The conference and training session were based on needs assessment carried out by Peipsi CTC among local governments in 2006. Study is available from website www.ctc.ee/riverdialogue/index.php?tree_id=107.

Conclusion

Role-playing games are a public participation method. It enables participants to communicate involving different social roles. It also enables making sense of your own understanding of the handled topic and increases knowledge. Role-playing games are leading discussions on a general level. Every participant gets a new role in the role-playing game (they don’t represent themselves but someone else whom they are neither in a social nor in a job context), whose attitude they have to represent in a simulated situation. The purpose of role-playing games, in a public participation process, is to increase people’s knowledge of the different social groups and find solutions for problems in a playful and creative way, and also to understand other peoples’ point of view and make sense of your own.

The training course gave theoretical knowledge and practical experience about public involvement in water management planning and general planning activity. Issues of the training programme are that the local government representatives obtain more knowledge about the benefits of delivering information, involving public stakeholders, and are encouraged to implement the techniques that they become acquainted with throughout the training course.

The aim of the training is to share information for stakeholders of the public participation related needs in water management and spatial planning in order to achieve overall good awareness by holding trainings in different areas.
Planning in transboundary water basins and public participation – Lake Peipsi/Chudskoe basin

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Water management and planning in transboundary context is always more problematic and challenging than within national borders, so public participation in this case is often not considered as a priority due to rather complex and complicated character. However, public participation in transboundary water management and planning is of utmost importance in order to build a trust among riparian states and different stakeholders and to stimulate cooperation on different levels.

Public participation in general is a continuous process of interaction between citizens and decision-makers than:

- Conditions are set and the public is aware on the mechanisms and procedures;
- Public has an access to full information about relevant issues which are of their interest;
- All the stakeholders have a chance to declare their points of view, requirements and preferences related to use of resources, alternative solutions, or other information relevant to the decision being taken.

Public participation in transboundary water management and planning is an integral part of the process. For example Integrated Water Resource Management (IWRM) principles require an active stakeholders engagement on various levels and various sectors. Water users’ support in this case is required for setting realistic water prices and effective implementation of water protection measures in water basins. It is wroth to mention also an organizational component of IWRM: prevention or settlement of contradictions/conflicts by means of public participation in decision-making process. In transboundary context, UN ECE Convention on Protection and Use of Transboundary Water Courses and International Lakes (UN ECE, 1997) also comprises several regulations covering public information in the sphere of transboundary water management. On the European level, the EU WFD demands integrated approach to water resource management, i.e. all member state should manage their basins as a whole (i.e. it establishes basin approach in water resources management) and reach good water status for their water bodies by 2015. Basis of the WFD is the planning system for river basin management. The member countries should promote active involvement of all the stakeholders into this process. EU WFD also requires sufficient coordination and cooperation with non-member states, sharing joint transboundary basins. So, in Europe expansion of public participation in elaboration of Water Management Plans has become one of the key aspects of the WFD. Public participation in this case is defined as direct participation in decision-making process of both organized stake-holders and non-organized groups (wide public groups).

Lake Peipsi/Chudskoe, is located on the external EU border and being shared mainly by Estonia and Russia. Having a basin area about 53,000 km² and over 1 million inhabitants in a region, with relatively low population density, this area is a good example of integrating public participation activities into water management.
and planning in transboundary context. Already established legal base (agreement on “Cooperation in Protection and Sustainable Use of Transboundary Waters” that was settled between Estonia and Russia in 1997 and other legal acts) has clear provisions on cooperation in the water management and protection sphere on joint transboundary water basins (River Narva, including Lake Peipsi/Chudskoe partial basin).

In order to structure such cooperation and outline major intervention areas, Lake Peipsi/Chudskoe Transboundary Basin Water Management Programme was developed in 2005–2006. Funding was provided by the UNDP/GEF, EU and national governments. The Programme was actively discussed with the stakeholders and the Joint Commission and officially adopted by the co-Chairs of the Joint Commission. So the major challenge, which is currently facing cooperating states, is an implementation of the Programme.

Besides this issue, there are more specific challenges facing public participation activities in the region:

- Waters management in a transboundary context is much more complex than within one nation – state; several issues including specific conditions created by the interaction of two or more political and administrative systems. These include differences in management systems of states sharing international water basins, as well as in cultures, languages and economies of neighboring nations. The differences in rules and regulations across the Estonian – Russian border are considerable since this is the EU external border.

- For a smooth implementation of the water management programme it is important that all major stakeholders would be involved in the decision-making. However, local stakeholders in Estonia and Russia, first, usually do not have possibilities to meet since, first, visas to cross the border are expensive and are not easy to arrange and, second, in the rather poor peripheral region those meetings and information exchanges are difficult if not impossible to arrange if no external funding from international funding agencies are available. Therefore, successful public involvement in implementation of the transboundary water management programme cannot take place without support of international funders or strong state facilitation.

- Local stakeholders also have little knowledge about water quality and water management issues and they are often passive.

In order to meet these challenges, the following tools and solutions are used in the basin: public participation plan is a tool for integration of public process into transboundary water management. However, the question of practical implementation and its effectiveness is still open since riparian states are not eager to invest state financing into stakeholders’ engagement into water management, so such activities are often being carried out under the international projects being funded by different donors.

For example, UNDP/GEF Project “Development and Implementation of the Lake Peipsi/Chudskoe Basin Management Programme” in 2003–2006, besides elaborating joint strategically documents and plans, had two special practical components on capacity building and information, that allowed to raise local capacities on water management and public participation, as well as actively work with information dissemination and networking in the basin. As a result, several groups of stakeholders got involved into Peipsi Council/Forum activities and started new initiatives and joint actions in the region. Project “Transnational River Basin Districts on the Eastern Side of the Baltic Sea Network – TRABANT”, aimed to improve premises for the integration of significant ecological and management aspects, including spatial development, in the Eastern Baltic Sea region area in the view of the implementation.
of the WFD. The project compares, evaluates and tests methods and tools to be used in the key tasks in the river basin analysis and management especially taking into account transnational issues. The project develops common approaches and practical evaluation and testing of available methods across the Baltic Sea Area, including the aspect of stakeholder participation in water management and planning.

Training programme is being developed by Peipsi CTC that addresses needs of local municipalities, NGOs, environmental specialists and water management officials who in their every-day lives should communicate with stakeholders. The programme concentrates on the rationale of public participation, its practical use and methodologies for implementation. It will give theoretical knowledge and practical experiences about public involvement in water management planning and general planning activity.

In conclusion, this is important to note that continuous public participation processes in the basin is currently being mainly supported via international and national projects, having spatial and temporary variability that brings in the problem of state ownership and real support by the governments as being the prerequisite of fruitful dialogue in transboundary water management and coherent stakeholders participation process.

Implementation of a joint public participation plan that is a component of the Lake Peipsi/Chudskoe Water Management Programme is challenging, but really promising in terms of benefits to be achieved via increased public involvement and better stakeholders participation in water management process.

In order to overcome those challenges, several joint measures are needed, such as trainings, capacity building actions, information exchange and other supportive measures. It is recommended to include such measures into the special programs, which should be built in the state plans and, at least partially, be supported from the state budget.
The Odra Commission as an example of successful international collaboration on water issues

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Of the 31 major rivers in Europe more than half are transboundary. One such body of water is the Odra River which belongs to three countries (the Czech Republic, the Republic of Poland and the Federal Republic of Germany) constituting a significant stretch of the border between Germany and Poland. The Odra River accounts for the third largest catchment area in the Baltic Sea basin and is one of the most important sources of nutrients and heavy metals discharged into this sea due to a large number of cities and industries located within the river basin. At the same time the valley of the Odra River belongs to one of the key ecological corridors in Central Europe, ensuring the maintenance of biodiversity in this region.

As management of the shared waters becomes increasingly important and cooperation is needed to protect and restore the trans-boundary river basin, the three countries have agreed to commonly coordinate the implementation of the WFD within the framework of the International Commission for the Protection of the Odra River Against Pollution (ICPO). The ICPO is a platform of coordination for the whole basin of the Odra River. The work of the ICPO is conducted in its working parties which are composed of the experts appointed by each national delegation. For the purpose of achieving specific objectives the working parties draw up action programmes which are submitted to the ministries involved in each of the three countries as proposals and recommendations.

In 2002, ICPO received the mandate to coordinate the implementation of the WFD within the international Odra River basin. Since then the three countries involved, Poland, the Czech Republic and Germany (Germany: the Federal Republic together with the States of Brandenburg, Mecklenburg-Vorpommern and Sachsen) have cooperatively developed international reports on WFD implementation. This work is proceeding well all relevant authorities of the three involved countries are engaged while a rough timetable exists in respect of how the work should continue. Notwithstanding this however a number of barriers must still be overcome. These include language problems, difficulties over the lack of guidelines for the implementation of programmes of measures, the need for working groups to work on these programmes, the limited involvement of broader stakeholder groups, and differences between the administrative systems and cultures of the countries involved.

The WFD has accelerated cross-border cooperation in respect of the work on the international management plan for the Odra River basin given its clear implementation time schedules and because of its request for concrete plans and actions to be produced before a given deadline. Notwithstanding the creation of the ICPO these WFD implementation requirements have become a major driver for cooperation in the international Odra River basin. Twinning or pilot projects have proved to be a very successful way of establishing contact practicing collaboration and finally actually implementing planned actions.
Testing participatory planning methods in Karvianjoki river basin, south-western Finland

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The demonstration area of the pilot project was the river Karvianjoki watershed in south-western Finland. Total area of the river basin is about 3440 km². During the last decades Karvianjoki watershed has been heavily modified by human activities. Plans to decrease eutrophication, pollution and harmful effects of water level regulations have been made but they have not led to many real activities. Therefore local inhabitants have partly lost they trust in planning processes. Fortunately there are still people and stakeholders who are willing to use their time and knowledge to improve water management practices and water quality in a communicative planning process.

Main collaborative activities were organized by establishing a plenary group and two thematic subgroups. Plenary meetings gathered together about 40–50 people representing local interests. Both polluters and water protection associations were invited, but last-mentioned participated much more actively. Plenary meetings were arranged with two or three months frequency. Meanwhile the process was boosted by two subgroups of 10–15 people. Subgroups were concentrated on GIS issues and evaluation of proposed water protection activities.

Group work methods were tested by Finnish Environment Institute. The methods included brainstorming, group interviews, decision-making methods and different kind of map exercises.

According to feedback gathered methods used were fruitful, interesting and kept the intentness on amongst the participants. Discussions in sub groups were living and target orientated. Listening group mates representing different interest and different areas helped to understand each other’s views better. In general the participants were active, but some group meetings suffered from lack of people. Participatory methods are very demanding in terms of time and place of meetings. It is a big challenge to arrange meetings in a way which enables participation of all interested parties. All in all Karvianjoki project managed to increase community spirit as well as feeling of influence on decision making. The participants felt collaborative approach as a productive and interesting way to promote water management in the area.
Methods for estimating the nutrient loading in Finland

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In Finland, the point source nutrient loading, particularly of phosphorus, has declined during the past decades. This has resulted to the increase of relative contribution of non-point sources to the total nutrient loading. Of the anthropogenic sources, agriculture comprises the largest part of the loading. In Finland, the hydrological cycle is modelled for the whole country with the combined watershed simulation and forecasting system (SYKE-WSFS) while process based water quality models are typically applied for singular river basins or single field plots, not covering the entire country. Different nutrient transport models (e.g. ICECREAM, SWAT, INCA, COUP) which vary in application scale as well as in complexity, have been tested in Finnish soil and weather conditions. Some of these models are physically based models, while others are simplified models based mainly on regression equations. Some models estimate nitrogen fluxes while others include also phosphorus and erosion components.

The practical implementation of Water Framework Directive (WFD) has put new requirements also for modelling approaches. Since physically based models are not yet operational, the usability of these models for all river basins in Finland is unrealistic. Therefore, more simple modeling tools, such as VEPS, have been utilized in the first phase of WFD work to allocate the river basins which are potentially susceptible to risk of eutrophication. VEPS calculates potential annual nutrient load (agriculture, forestry, point load, deposition, peat production and natural background load) for all 3rd level sub catchments in Finland. Since this static annual approach does not take into account the hydrological variability the simple phosphorus transport model has been developed as part of the SYKE-WSFS. The SYKE-WSFS phosphorus transport model can be classified as conceptual nutrient transport model lying between the physically based nutrient transport models and the simple source apportionment assessment tools such as VEPS. The phosphorus transport is based on the simplified conceptual method and calibration is used to estimate the parameters describing the phosphorus transport.
Posters
Environmental monitoring includes several steps such as sampling, sample preparation, testing and data evaluation. In the past, quality assurance typically focused on the laboratory work. We now know that sampling is a very complicated process, especially the sampling required for soil, wastes, sludges, sediments, composts and other heterogeneous media. Thus, proper sampling is the most important step for obtaining reliable environmental data.

There are several standards and guidelines for environmental sampling. Standards are often insufficient for performing the concrete sampling procedures in the field. Quality control procedures have been suggested, for instance for water sampling in Finland, but none is yet implemented. Accreditation of sampling is used in some countries. It is also sometimes used in Finland, albeit typically only for specific purposes.

With this in mind and in order to improve the quality standards for environmental research and monitoring, a scheme for the certification of personnel in the field of environmental sampling has been established by the Finnish Environment Institute. The scheme is designed to ensure that people working in environmental sampling as well as in the fields of measuring and monitoring have appropriate qualifications for the work. The system offers certificates for those who 1) have at least two years practical experience on sampling in the field and 2) have participated in theory-based training courses in specific areas. The applicant can receive a certificate of competence in five fields. The areas of special qualification are:

1) Water and water body sampling
2) Soil and solid waste sampling
3) Precipitation, rain water quality, air quality
4) Biological sampling
5) Environmental observing and monitoring.

At the moment, we have 515 certified samplers. The certificate programme is an independent certification system. It is arranged as set out in the ISO standard “Certification of Persons – ISO 17024 General requirements for bodies operating certification of persons” (August 2003). The operative qualifications of the decision making certification body were ascertained through accreditation in the beginning of the year 2004. This was done in order to ensure the international comparability and also the reciprocal approval of the scheme for certification of environmental sampling personnel and the certificates issued.

The certification scheme includes a Certification Board with representatives of the most important interest groups in environmental research. The board has defined the policy for certification and supervises the implementation of the certification scheme.
Survey of stream macroinvertebrates, their responses to hydro-morphological pressures and preliminary evaluation of ecological status in the River Vuoksi

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The river Vuoksi is an outlet stream of the Lake Saimaa crossing the Finnish-Russian border and flowing ca. 150 kilometres into Lake Ladoga. The upper fifth of River Vuoksi is channelled and dammed by four hydropower plants, which perform intensive daily regulation in discharge. To define the ecological effect of anthropogenic pressures three distinct areas (the rapids of Imatrankoski, Losevo and Burnaja) were sampled using kick-netting with six replicates.

The densities of total invertebrates were higher in near-natural riffles of Losevo (on average: 2683 individuals/sample) and Burnaja (1425 ind. /sample) when compared to the average densities of regulated rapids Imatrankoski (829 ind. /sample). Net-spinning caddisflies were the dominant benthic group in each area with some differences among the species composition between the riffles. The total numbers of Hydropsychid caddisflies were more than 5.5 times and twofold higher in Losevo when compared with Imatrankoski and Burnaja, respectively. Some common caddisflies like *Rhyacophila nubila* and *Hydropsyche siltalai* were missing in the heavily modified Imatrankoski, and *Arctopsyche ladogensis* occurred only in the Losevo rapids.

According to benthic indices solely, the preliminary ecological status of Imatrankoski was somewhat lower compared with other sampling areas. Albeit the number of EPT taxa was the lowest in Imatrankoski the overall diversity did not differ among the riffles. The chemical water quality is excellent in the upper parts of Vuoksi, whereas point source pollution raises total phosphorous and nitrogen after the municipalities of Svetogorsk, Lesogorski and Kamennogorsk. After the processes of sedimentation and fixation in Lake Vuoksa, the physico-chemical water quality could still be classified as good in the rapids of Losevo and Burnaja. This case study was the first attempt to monitor stream benthos in this very large transboundary river (MQ 590 m³/s) and might give a further rise to ecological classification studies in large rivers.
Water protection measures in the Republic of Belarus implemented in the Western Dvina and Neman river basins

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The national water use and protection policy in the Republic of Belarus is oriented towards:

• providing population, industry and agriculture with safe and continued water supply taking due account of other users’ interests and preserving water capacity and biodiversity;
• improving organizational, legal and economic tools for water use and protection management;
• taking actions to ensure fine cleaning of waste waters, to reduce pollutants carryover from urbanized and agricultural areas and introduce non-water and low-waste technologies;
• developing international cooperation on use and protection of transboundary water bodies.

In Republic of Belarus, there are water protection zones and coastal belts along the banks of small, medium and large rivers, natural and artificial water bodies. The water-protection zone is the territory adjoining to water areas of the rivers, lakes and other superficial water objects on which the special mode economic and other kinds of activity is established with the purpose of prevention of pollution, a contamination, muddying and exhaustions of water objects.

The zones contribute to improvement of hydrological regime, reduce water and wind erosion of soils, coastal zone abrasion, ensure preservation of coastal and tree-and shrub vegetation, which perform the water protection, wind protection and recreation functions. They also partly solve the problems of preserving fish spawning grounds, feeding, rest grounds and habitats of land animals.

The organization of water-protection zones of the rivers and the ponds and realization of a complex of nature protection actions in their territories should provide the following factors:

• the improvement of hydrological and hydrochemical modes of superficial waters;
• the improvement of qualitative structure of underground waters drained by river network;
• the reduction of water and wind erosion of the soil;
• the reduction of abrasion of a coastal zone.

The projects of water protection zones were elaborated for Western Dvina and Neman rivers as well as for main tributaries Shchara and Viliya during 2002–2005 year period. The proposed in the projects main water protection measures includes actions which are regulated parameters of the anthropogenic loads on the water body and actions for elimination of the negative consequences.

The projects of water protection zones and buffer strips approved by local or oblast administration will support regional authorities in sphere of water management.
Tests on use of GIS and water quality data in typology of lakes

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Properties of lakes and their catchments in the Vuoksi river basin and nearby areas were tested in definition of lake type. Target lakes were small or medium-sized lakes of varying humic content. The use of GIS data (determination of percentage of peatland in the catchment) and water quality data (water colour) were compared. Catchments of lakes were delineated on screen on the top of topographic maps. The detailed peatlands’ spatial data (National Land Survey, the Topographical Database) were used to calculate percentage of peatland in the catchment. Data of the water colour of the lakes were analysed statistically. Boundaries of the Finnish typology of lakes were tested in both approaches and principles of Finnish guidelines for definition of a lake type evaluated.

Also Corine Land Cover 2000 (CLC2000) data were used for determination of peatland coverage and compared to the results of the respective national data. Corine Land Cover 2000 (CLC2000) provides consistent information of land cover across Europe (minimum mapping unit of 25 hectares).

In Figure 1 the median of water colour in surface layer of polyhumic lakes has been presented along the gradient of peatland percentage in the direct catchment of the lake. The boundary between mesohumic and pohumic lakes in the Finnish lake typology is 90 mg Pt/l. In the Finnish guidelines for type definition of lakes, a median of surface layer is recommended for the basis in use of water colour in type definition. Furthermore, it is tentatively presented that smaller lakes that have peatland coverage in the catchment higher than 12–15 % might be expected to be polyhumic. Based on the material of this study this expectation seems to be justified. Three lakes in the material have lower percentage of peatland than above mentioned level. For two of those the percentage of peatland in the whole catchment is significantly higher than in the direct catchment area. Thus, peatlands farther off have influenced the water colour of these lakes. The range of peatland percentages in polyhumic lakes is, however, rather wide and no significant trend is detected. The analysis will be continued for further possibilities and reliability of the use of peatland data in typology of lakes. The use of GIS data would be valuable in the typology in areas, where data of lake water analyses is missing or scarce.

Fig. 1. Peatland percentage of the direct catchment area and median of water colour in the surface layer of the lake in a group of polyhumic Finnish lakes. Horizontal line = lower boundary of water colour of polyhumic lakes in the Finnish typology system. Vertical lines = tentative range for lower level of peatland percentage for polyhumic lakes in Finnish guidelines for type definition.
Application of GIS in the assessment of surface water status, monitoring and identification of pressures – case study of River Narva catchment

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As load of pollutants in water bodies depends highly on the diffuse emissions which, in turn, depend on the land use, the quality of water bodies depends on proper land use management. Such management requires spatial data and GIS analysis as well as modelling of alternative diffuse load scenarios. Following the EU Water Framework Directive, countries in the EU border, such as Estonia and the Russian Federation, should cooperate in the management of transboundary water bodies in river basin principle. This case study applied transboundary GIS to assess the status of surface waters as well as identify and monitor pressures to River Narva drainage basin. For that purpose, the project created a GIS database describing the annual average transport of nitrogen and phosphorus. It involves sources, pressures, emissions, loads and concentrations.

GIS analysis and modelling with PolFlow resulted with a proposed plan of measures for spatial planning in the River Narva drainage basin. The major problem appeared to be eutrophication of Lake Peipsi/Chudskoe, resulting mainly from severe overload of phosphorus and slight overload of nitrogen to the lake. As the southern part of the lake was worse affected, the analysis split the entire River Narva drainage basin into three spatial regions with different vulnerability and thus different management recommendations.
Planning of the integrated water management in the Baltic region of Russia

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Introduction

The basic document in planning water management is the Scheme of complex use and protection of water bodies in a catchment’s basin. In the Scheme analysis of water quality and conditions water ecosystems is carried out, the degree of use of water resources in borders of watershed is estimated, problems of basin come to light and the purposes of a water policy are determined. The Scheme provides integrated approach to definition of loadings and impacts on water bodies, to an establishment of requirement for water resources, definition of actions on protection of water bodies and directions of activity on prevention of negative influence of waters.

Materials and methods

The developing water legislation of the Russian Federation aspires to realization of integrated approach in water resources management. In article the Russian acts and materials of developed Scheme of complex use and protection of water bodies of Baltic Sea basin are used. Comparison of the Russian approaches to planning water resources management with the approach determined in the Water Framework Directive of the European Union is carried out.

Results and discussion

The analysis of integrated approach is constructed as a concrete definition of integrative aspects of the water management, suggested in the Water Framework Directive, on examples sold in Russia.

1. Integration of the water legislation into the common consecutive structure.
   A basis of the water legislation in Russia is the Water Code of the Russian Federation (2006). Amendments and changes are brought in all other laws and acts which contain the positions concerning water relations. In the Water Code main principles of the water legislation, including, basin approach and integrated approach of water resources use are proclaimed.

2. Integration of various levels of decision-making which influence on water resources and water condition. Management of basin water-economic complex is under construction on the linear - functional basis. The linear basis creates vertical subordination of the state bodies forming a hierarchical pyramid. The central part is basin water administration.
3. Integration of all kinds of management for planning sustainable use of water bodies of river basin. Joining of authorities, departments, establishments carrying out certain powers on water management and providing of water management bodies of different information, necessary for acceptance of administrative decisions, including, sphere of water management planning, represents the functional basis.

4. Integration of the purposes of water management. At planning water management the main strategic purposes which are dismembered on a more specific goals and tasks are determined. Target parameters which should be achieved during the planned period are determined.

5. Integration of all water resources. Water resources of surface, underground water bodies and sea’s coastal waters are united for the purposes of management according to hydrographic division into districts in borders of river basin. For water-economic calculations hydrographic units share on water-economic sites.

6. Integration of all kinds of water use, all kinds values of water. The water body in the Water Code is considered as a component of the environment, a habitat of animals and flora. Water is the natural resource used for personal and household needs, for economic and other activity, and also is object of the property right and other rights. Complex use of water bodies is provided.

7. Integration of disciplines for carrying out of estimations and the analysis of loadings and impacts on water bodies. In the Scheme integrated approach to the analysis of the data of monitoring, definition of loadings and impacts on water bodies is provided. Requirements for water resources are established, actions on protection of water bodies and directions of activity on prevention of negative influence of waters are determined.

8. Integration of a wide range of measures, including economic and financial tools, for achievement of water management purposes. The programme of water protection actions and measures on protection against negative influence of waters is developed in the Scheme with attraction of various experts, including, experts on spatial planning, economists, etc. Thus, administrative measures, adaptable, preventive, engineering actions, and also economic tools are used.

9. Integration of all participants of management and the public for decision-making. For coordination of activity of all water management participants Basin Councils are created. Structure Basin Councils includes representatives of the federal enforcement authorities, authorities of the Russian Federation subjects, municipalities, water-users, non-governments organizations and other stakeholders.

10. Integration of water management between the various states incorporated by transboundary river basins. Management of transboundary river basins is carried out according to Intergovernmental agreements, with the help of the Joint Commissions and working groups.

The conclusion

Modern Russian approaches to planning water resources management in many respects coincide with the conceptual approach of the European Union. In July, 2007 the Ministry of Natural resources authorizes Methodical instructions on development of Scheme of complex use and protection of water bodies which establish the order, structure, methodical approaches to development of Scheme as basic document for
planning and implementation of water-economic and water-protection actions within the framework of federal, regional and departmental target programs. On the basis of Scheme regulation of water use in river basin is made. The modern approach to planning water resources management in Russia opens new opportunities for drawing up of joint plans of management by transboundary river basins.

REFERENCES:


Методические указания по разработке схем комплексного использования и охраны водных объектов, утв. 04.07.2007. – М., 2007. In Russian. [Protection and comprehensive use of water resources – Planning instructions for the scheme.].

The final seminar of the project Transnational River Basin Districts on the Eastern Side of the Baltic Sea Network – TRABANT was organized in Helsinki, Finland 11–13 September 2007. The topic of the seminar was “Water Management and Assessment of Ecological Status in Transboundary River Basins”. There were ca. 30 speakers and 11 posters presented in the seminar. The main issues of the seminar were: water issues in Europe, Baltic Sea region and in transboundary waters; methodologies of river basin management and analyses; methods and tools in river basin analysis and status assessment, with examples from Eastern Baltic Sea region; and methods of river basin management and public participation.

In this publication there are 18 abstracts of the oral presentations and 6 abstracts of the poster presentations.

Keywords

Water management, status of surface waters, international river basins, Baltic Sea, spatial planning
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### Water Management and Assessment of Ecological Status in Transboundary River Basins

Abstracts of presentations, Final Seminar of the TRABANT project Helsinki, Finland, 11 – 13 September 2007

(Уход за водными ресурсами, оценка экологического состояния международных водных объектов)

### Заключительный семинар проекта «Transnational River Basin Districts on the Eastern Side of the Baltic Sea Network - TRABANT» (Сеть восточных речных бассейнов Балтийского моря) был проведен в г. Хельсинки 11-13 сентября 2007 года. Семинар был посвящен теме «Water Management and Assessment of Ecological Status in Transboundary River Basins» (Управление водными ресурсами и оценка экологического состояния трансграничных бассейнов). На семинаре было заслушано ок. 30 презентаций и выставлено 11 стендовых докладов. Главными темами семинара были: водные вопросы в Европе, бассейне Балтийского моря и трансграничных водоемах; методы ухода и мониторинга водоемов; методы и инструменты ухода и оценки состояния водосборных бассейнов; примеры из восточной части бассейна Балтийского моря; методы территориального планирования водосборных бассейнов; привлечение заинтересованных сторон. Резюме 18 устных презентаций и 6 стендовых докладов приведены в настоящей публикации.

### Ключевые слова

Уход за водными ресурсами, состояние поверхностных вод, международные водоемы, Балтийское море, территориальное планирование

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Milla Laita (ed.)