

Effectiveness of measures for improving the status of Lake Peipus

Has the pollution load in Lake Peipus decreased?

Report of the National Audit Office of
Estonia to the Estonian Parliament

Tallinn, 26 March 2012

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Summary of audit results

What did we audit?

The National Audit Office of Estonia audited whether the state is aware of the sources of pollution influencing the status of Lake Peipus and whether the measures implemented for the protection of the lake have helped to reduce the pollution load and will ensure the good status of Lake Peipus by 2015.

Why is it important?

Lake Peipus is the 4th largest lake in Europe and the largest transboundary water body in the European Union. The lake is an important source of freshwater and it is also important because of its fish stocks, recreation areas and waterways. In addition, it is the habitat of many species, including migratory birds.

The status of the lake has greatly deteriorated over the last decades: according to the latest data, the status of Lake Peipus (the main northern part) is “moderate” and the status of both Lake Lämmijärv and Lake Pihkva is “poor”. The status of Lake Peipus is influenced by the everyday activities of about 1 million people living on the Estonian and Russian side of the catchment area, as well as activities related to agriculture, extraction of mineral resources, forest management and other economic activities. The main problem is the lake’s eutrophication (nutrient saturation, especially of phosphorous and nitrogenous compounds), which causes changes in the lake’s ecosystem, reduces fish stocks, decreases the quality of water and in critical cases also encourages the spread of blue-green algae that emit poison which endangers the biota as well as the health of swimmers.

The audit was started based on the cooperation agreement concluded in 2010 between the National Audit Office of Estonia and the Accounts Chamber of the Russian Federation, according to which both states shall audit the factors influencing the status of Lake Peipus in their respective states.

What did we find and conclude on the basis of the audit?

According to the NAO the current activity of the Estonian state does not ensure the reduction of the pollution load of Lake Peipus so that it would help to achieve the lake’s good status by the year 2015 to meet the requirements of the European Union, or by the next deadline in 2021. Here, the main reason is that upon reducing the pollution by eliminating point source pollution not enough attention is paid to agricultural diffuse sources of pollution which constitute the main part of anthropogenic pollution load on the Estonian side. Likewise,

cooperation between Estonia and Russia should be more efficient in improving the lake's status.

Main observations of the NAO:

- Over the last ten years the nutrient content of Lake Peipus as a whole has remained stable. However, water monitoring indicates continuous increase of pollution in the catchment area on the lake's Estonian side. Thus, Estonia has not been successful in ensuring Lake Peipus' cleanliness. It is not yet possible to precisely assess the impact of implemented measures on the improvement of the status of water.
- On the Estonian side of the catchment area 68% of anthropogenic phosphorous pollution and 90% of nitrogen pollution is due to agricultural diffuse pollution. The percentage of the remaining sources of anthropogenic pollution is significantly smaller. However, currently planned and implemented water protection measures do not take this proportion into account and the state has spent proportionally the largest share of funds on the reduction of point source pollution. Measures for reducing agricultural diffuse pollution are lenient and supervision of diffuse pollution is insufficient.
- The state's water management investments have largely been spent on the development and construction of wastewater treatment plants and sewerage systems. This is especially important for the reduction of phosphorous pollution. However, only a fifth of Lake Peipus' anthropogenic phosphorous pollution comes from the municipal wastewater. The audit also identified many cases where, despite all the investments, the efficiency of large wastewater treatment plants has not improved and there are problems with operating the small plants.
- Although the Ministry of the Environment has developed a river basin management plan to achieve the good status of Lake Peipus, the coordination of the execution of the plan's activities is poor. The state does not have an overview of all activities currently implemented in the basin of Lake Peipus that can influence the status of lake. The river basin management plan does not address in a detailed manner the measures for reducing agricultural pollution and it is unknown to what extent the environmental protection measures of the rural development plan help to improve water protection. There has not been sufficient cooperation with the Ministry of the Agriculture in the field of pollution reduction. Likewise, the state does not know the impact of already implemented measures (incl. those funded by the state) and whether planned activities facilitate achievement of objectives as it has not assessed the performance of those activities.
- National environmental monitoring enables to assess the status of Lake Peipus and changes in its condition. However, the monitoring system is not entirely in compliance with the requirements of the EU water framework directive. The distribution of Lake Peipus' pollution between different sources is calculated on the basis of monitoring and survey data but this cannot be precisely confirmed due to the scarcity of data. Therefore it is difficult to plan efficient measures for the reduction of the pollution load and assess the

performance of their implementation and impact on the status of the lake.

- As 2/3 of Lake Peipus' catchment area lies in Russia, both states must take steps to improve the status of the lake. Estonia and Russia's transboundary joint committee for the coordination of cooperation in the protection and sustainable use of Lake Peipus has been successful in exchanging current information and organisation of joint monitoring expeditions and research seminars. There is still room for development when it comes to improving the efficiency of cooperation: so far there are no agreements regarding joint environmental objectives to improve the status of Lake Peipus, no long-term joint monitoring program or harmonised methods and criteria for the assessment of the lake's status. Neither have the states seen the need for the development of a joint river basin management plan which would help better to coordinate setting the objectives related to water management, to take steps improving status of lake and to use of necessary finances.

Replies of audited entities:

Minister of the Environment concurs with most of the NAO's conclusions and recommendations. Minister of the Environment admitted that agricultural diffuse pollution plays an important role in the total nutrient load of Lake Peipus. Point source pollution is addressed mostly in relation to the requirements of the urban wastewater directive and the nitrate directive. In the future, the Ministry of the Environment intends to thoroughly examine the potential measures for reducing diffuse pollution. Renewal of river basin management plans began at the beginning of 2012 and in the future the river basin management plan's programme of measures shall include more detailed information.

For the better use of data related to the organisation of water management the Ministry of the Environment intends to initiate a project in 2012, the final objective of which will be to make decision-making related to the development and implementation of river basin management plans more efficient. To this end, current databases on water management shall be updated and options for cross-usage shall be created in order to assess and estimate the status of the water environment, anthropogenic pollution, and the impact of measures planned for the reduction of pollution load.

Ministry of the Environment is aware of the fact that not all financed wastewater treatment plants meet the requirements and the Ministry has submitted a proposition to the Environmental Investment Centre and the authority carrying out supervision over funding from the Cohesion Fund to conduct more detailed follow-up inspection of water management projects.

To improve the cooperation within the joint committee on the protection and sustainable use of Estonia and Russia's transboundary water bodies the Ministry of the Environment shall continue to improve the exchange of information and setting of joint objectives. Joint monitoring programme for 2012–2013 is about to be completed and preparations are made for the development of a long-term cooperation programme (for 2013–2015).

Minister of Agriculture concurred with the recommendation to cooperate with the Ministry of the Environment in updating river basin management plans as well as with the need to assess the impact of agricultural subsidies on the basis of a basin. The Minister is of the opinion that the NAO's recommendations on updating the agricultural subsidies for environment-friendly management can be taken into consideration when drawing up the development plan for a new programme period.

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Overview

Did you know?

Peipus is the largest transboundary water body in Europe with an area of 3555 km². Average depth 7.1 m, deepest point 15.3 m and total volume 25 km³.



Catchment area of Lake Peipus and River Narva

Source: Peipus. EMÜ. 2008.

Catchment area – an area from where a water body (river, lake, sea) or a part thereof (bay) gets its water.

Nitrate vulnerable zone – area established in areas of intensive agricultural production for the protection of groundwater and surface water where agricultural activity has increased or may increase the content of nitrate ions in groundwater, and where the bodies of surface water have or may become eutrophicated due to agricultural activity.

Eutrophication – saturation of a water body with nutrients, especially phosphorus and nitrogen compounds, which causes the proliferation of phytoplankton and taller water plants, subsequent lack of oxygen, deterioration of water quality and changes in the water body's ecosystem.

Lake Peipus

1. Located between Estonia and Russia, Lake Peipus is the 4th largest lake and the largest transboundary water body in Europe. Lake Peipus refers to Lake Peipus Suurjärv (the northern part), Lake Lämmijärv and Lake Pihkva. The catchment area of Lake Peipus amounts to 47 800 km², whereof 58% on Russia's, 34% on Estonia's and 8% on Latvia's territory. The largest rivers flowing into the lake are Velikaja (more than half of inflow), Emajõgi and Võhandu, and the only outflow is taking place through River Narva.

2. Most of the catchment area on the lake's Estonian side remains within Jõgeva, Tartu, Põlva ja Võru Counties, extending somewhat to some other counties as well. The Russian side of Lake Peipus is divided between Leningrad and Pihkva Oblasts. The catchment area of the lake has a total population of about 1 million whose domestic, agricultural, mining, forestry etc activities influence the ecological status of the lake.

3. Lake Peipus is an important source of freshwater and it is also important because of its fish stocks, recreation areas and waterways. In addition, it is the habitat of many species, including migratory birds. About 10% of the catchment area on the lake's Estonian side is covered by protection areas and the territory of the **catchment area** encompasses the Pandivere ja Adavere-Põltsamaa **nitrate vulnerable zone** of Pandivere and Adavere-Põltsamaa. 540 km² of Lake Peipus (northern part) (or ca 21% of its area) on the Estonian side is subject to nature protection with focus on protecting the lake's ecosystem and related rare and endangered species.

4. Over the last decades, the status of the lake has deteriorated considerably. The main problem is **eutrophication**, meaning that the lake receives too much nutrients, primarily nitrogen and phosphorus. The inflow and content of nutrients in Lake Peipus is influenced by human activities as well as natural processes.

5. The average nutrient inflow from Estonian and Russian rivers amounts to 707 tons of phosphorus and 16 785 tons of nitrogen per year.¹ The main sources of phosphorus include fertilisers, municipal wastewater and the leaching of accumulated phosphorus from sediments. The oversaturation of nutrients triggers various processes leading to changes in the lake's biota and the entire ecosystem.²

¹ Data of the Environment Information Centre, average for 2006–2010. Nutrient load from Latvian territory is included in the load from Russian territory.

² Example of a change in ecosystem due to the multitude of nutrients: reduces water transparency > not enough light for phytoplankton for photosynthesis > oxygen deficiency in deeper layers > coldwater fish die > not enough food for predatory fish > pressure on and decrease of zooplankton > proliferation of phytoplankton, etc.

Organisation of protection and use of Lake Peipus

6. In ground and surface water protection Estonia is mainly guided by the Water Framework Directive³ (hereinafter WFD). The environmental objectives of the Directive include preventing the deterioration of the status of surface water and groundwater and attain a good water status (both chemical and ecological) by 2015.

7. The WFD requires the Member States to:

- prepare **water monitoring programs** to assess the status of surface water and groundwater in order to get a complete overview of water status in each river basin;
- prepare and **implement river basin management plans** to achieve a good status of water bodies in all EU Member States by 2015;
- apply **environmental quality standards** to pollutants and biota to evaluate the ecological and chemical status of water bodies taking account of the impact which cannot be reasonably prevented due to the nature of human activities or of pollution.

Did you know?

In 1992, the UN Economic Commission for Europe drew up the Convention on the Protection and Use of Transboundary Water Bodies and International Lakes.

This Convention determines the principles of international cooperation and requirements for the evaluation of the status of a transboundary water body, its protection and sustainable use, and for the exchange of information and joint management of emergency situations.

Estonia ratified the Convention in 1995.

8. The good status of Lake Peipus as an international transboundary water body can be achieved only by joint efforts and effective cooperation between Estonia and Russia. Both states have ratified the Convention on the protection and use of transboundary watercourses and international lakes. Since the EU Water Framework Directive is not binding on the Russian Federation, the Convention on transboundary water bodies constitutes a common legal basis for the two neighbouring countries in improving the status of Lake Peipus.

9. Guided by the UN Convention on the protection and use of transboundary watercourses and international lakes, the Government of the Republic of Estonia and the Government of the Russian Federation signed a co-operation agreement on the protection and sustainable use of transboundary water bodies in 1997. This cooperation is steered by the Ministry of the Environment of the Republic of Estonia and the Ministry of Natural Resource and Environment of the Russian Federation.

10. Compliance with the cooperation agreement is coordinated by the Estonian-Russian Joint Committee on Protection and Sustainable Use of Transboundary Water Bodies established in 1998. Since then, the meetings of the Committee have taken place every year, alternately in Estonia and Russia (a total of 15 meetings held).

Lake Peipus affects the status of the Baltic Sea

11. The water from Lake Peipus reaches the Baltic Sea via River Narva, thus affecting the status of the Baltic Sea. Both Estonia and Russia have acceded to the so-called Helsinki Convention⁴ aimed at protecting the Baltic Sea. To implement this Convention, the Helsinki Commission (HELCOM) was established. In 2007, based on HELCOM's decision, the Baltic Sea Action plan was developed. In 2008, the Estonian Government approved the operational program (2008-2011) of the Action Plan. The

³ Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000, establishing a framework for Community action in the field of water policy.

⁴ Convention on the Protection of the Marine Environment of the Baltic Sea Area.

Action Plan includes the objective to resolve all major marine environment problems 2021. To this end, the phosphorus and nitrogen pollution originating from the entire catchment area must be reduced by 42% and 18%, respectively (absolute figures).⁵ This means that Estonia must reduce the phosphorus discharges originating from its entire territory by at least 200 tons and the nitrogen discharges by at least 900 tons.

River basin management plans

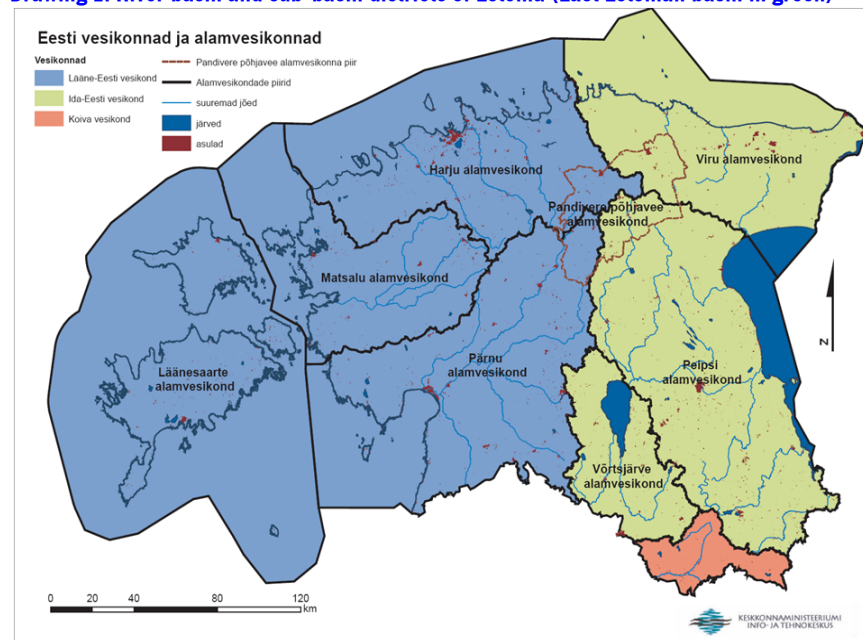
Body of water – a unit for the purpose assessing water status which may be a body of surface water, body of groundwater, artificial water body or heavily modified water body. A water body may consist of several bodies of water.

12. Water protection and use is organised by river basin management plans specific to each catchment area. These plans include an overview of the river basin's **bodies of water**, major effects of human activities, areas requiring protection, the status of surface water and groundwater, and environmental objectives.

13. The East Estonian river basin management plan⁶ contains sub-basin management plans (SBMP) of Lake Peipus, Viru and Lake Võrtsjärv and the SBMP for the groundwater of Pandivere (see Drawing 1). Since 2010, the SBMPs are no longer renewed and the activities envisaged therein are consolidated into river basin management plans.

14. The most important part of management plans is the programme of measures which includes activities for achieving good water status and other objectives. According to estimates, the total cost of implementing the programme of measures of the East Estonian river basin management plan in 2009-2015 is EUR 824 million (EEK 12.9 billion).

Drawing 1. River basin and sub-basin districts of Estonia (East Estonian basin in green)



Source: homepage of the Ministry of the Environment

⁵ Study of phosphorus and nitrogen load from diffuse sources of pollution. Assessing the risk of pollution of Cadmium from the phosphatic fertilisers. Tallinn University of Technology, 2010.

⁶ Adopted by Order No. 118 of 01.04.2010 of the Government of the Republic.

15. The development of river basin management plans and the programme of measures is organised by the Ministry of the Environment in cooperation with the Environmental Board. The development of management plans involves county governments, local governments and local population within the river basin territory, and other stakeholders. To this end, working groups coordinating the implementation and updating of management plans are set up for each basin.

Did you know?

Water protection projects account for the largest share of projects financed by the Environmental Investment Centre. In 2004-2010, more than EUR 200 million was invested in water protection projects on the territory of Lake Peipus sub-basin.

16. The state is responsible for meeting the objectives of the Water Framework Directive. Various parties are responsible for the implementation of specific water protection measures. For example, the local government is responsible for reconstruction of the wastewater treatment plant, the farmers are responsible for the appropriate use of fertilisers, etc. Funds for implementing the measures can be applied for from the Environmental Investment Centre (EIC) (e.g. elimination of residual pollution, reconstruction of wastewater and drinking water treatment plants, rehabilitation of water bodies) and from the Agricultural Registers and Information Board (ARIB) (e.g. environmental aid, incl. for water protection measures, and investment aid for reconstructing animal farms).

Monitoring the status of Lake Peipus

17. Environmental monitoring is an important tool for evaluating water status and changes therein, developing - within the river basin management plans - measures necessary for achieving good water status, and subsequent assessment of the effectiveness of these measures.

18. According to the Environmental Monitoring Act, environmental monitoring is broken down into environmental monitoring carried out by the state, local governments, and undertakings. Currently, water monitoring is carried out mostly on the state level. On undertaking and especially local government level, environmental monitoring is rather limited. Pursuant to the requirements of the EU Water Framework Directive, Estonia had to renew by 2006 the water monitoring scheme applicable at the time.

19. Where monitoring or other data indicate that the good status of a water body cannot be achieved, the Member State must ensure that the underlying reasons are determined and effective measures are taken to improve the status, including the adoption of stricter environmental quality standards where necessary.

Did you know?

A five-level scale is used to evaluate the ecological status of bodies of water:

Ecological status
high
good
moderate
poor
bad

All bodies of water must achieve at least good status by 2015.

20. Lake Peipus has a total of 15 monitoring stations for various types of monitoring – 15 on the Estonian and 10 on the Russian side (see Annex B). In stations on the Estonian side, hydrobiological and hydrochemical samples are taken on the basis of the monitoring program to determine a number of chemical, biological and physical parameters (see Annex A). Since 2001, joint monitoring expeditions have been carried out with the Russian counterparts with samples taken in a total of 15 monitoring stations whereof 6 stations are located on the Estonian side (see also par. 127-128).

Evaluation of the status of bodies of water

21. Biological, physicochemical and hydromorphological monitoring data are used for evaluating the status of water bodies. The ecological and chemical status of water bodies is evaluated separately. The overall assessment of the status of a water body is based on the worst indicator (e.g., if the ecological status is moderate and chemical status is good, the overall assessment is „moderate“). Based on the monitoring data for 2010, the **overall assessment for Lake Peipus (teh northern part) and Lake Lämmijärv is „moderate“ and for Lake Pihkva „poor“**. Based on the monitoring data for 2011, the status of Lake Lämmijärv has been assessed as „poor“, in addition to Lake Pihkva (see also Annex A).

Assessment of pollution load and the status of the ecosystem of Lake Peipus

22. Water monitoring plays an important role in evaluating the status of Lake Peipus and determining the origin and amount of pollution. The objective of water monitoring is to evaluate changes in the quality and ecological status of surface water, and determine the sources of pollution and their impact. For the status assessments of transboundary water bodies to be clear to the neighbouring country, jointly agreed indicators of environmental status and evaluation criteria must be employed.

The exact share of pollution sources is unknown

23. To reduce the **pollution load** of a water body it is necessary to know the sources and amounts of pollution discharged to the water body or environment as well as the **internal load** of the lake and the nutrient load resulting from natural processes, i.e. background load.

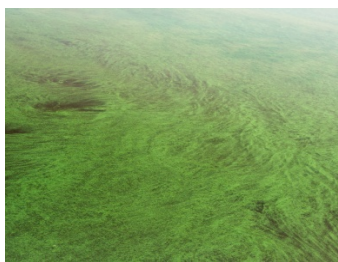
24. With reference to the objective to reduce the pollution load on the Baltic Sea⁷ Estonia regularly prepares pollution load calculations for HELCOM. Pollution load is assessed on the basis of data received from national monitoring programs and various studies. As Lake Peipus is a transboundary water body, reference data for Russian pollution sources are also needed to assess the total load. Based on HELCOM's methodology⁸ the calculation of pollution loads of inland water bodies must take into account the background (natural) load and the nutrient metabolism and sedimentation processes in the water bodies.

Pollution load – amount of pollutant released into the environment over a certain period.

Internal load – nutrients previously settled in a water body.

⁷ Objectives to reduce the pollution load on the Baltic Sea have been defined in HELCOM's Baltic Sea Action Plan which was approved at the meeting of the Ministers of the Environment in Kraków on 15 November 2007.

⁸ HELCOM's Baltic Sea Action Plan, approved at the meeting of the Ministers of the Environment of the Baltic Sea countries in Kraków on 15 November 2007.



Proliferation of algae in Lake Pihkva caused by eutrophication, 13.08.2008.

Photo by: Külli Kangur

External load – pollution originating from sources outside the water body.

25. The greatest impact on the surface water of the Peipus catchment area comes from the excessive load from nutrients which cause eutrophication - nitrogen and phosphorus. Data received from the Estonian as well as the Russian side indicate that on the aggregate the increase in the pollution load of the lake has been prevented over the last ten years (see Table 1). The phosphorus load per area unit was just about equal for both counterparts: 0.14–0.15 kg/ha. However, according to their data for the same period, the Russian side has been able to reduce nitrogen pressure on Peipus by 18% whereas on the Estonian side the nitrogen load has increased by the same amount. As calculated per area unit of the catchment area the nitrogen load on the Estonian side is 6.0 kg/ha and 2.2 kg/ha on the Russian side which is about equal to the natural background load in Estonia.

Table 1. External load of nutrients on Lake Peipus in 2001–2010

State	Catchment area		Nutrient load							
			2001–2005				2006–2010			
	km ²	%	N (t)	%	P (t)	%	N (t)	%	P (t)	%
Estonia	16 250	34	8325	49	270	36	9815	58	258	36
Russian Federation	31 550	66	8532	51	489	64	6970	42	450	64
Total	47 800		16 857		759		16 785		707	

Source: Estonian Environment Information Centre

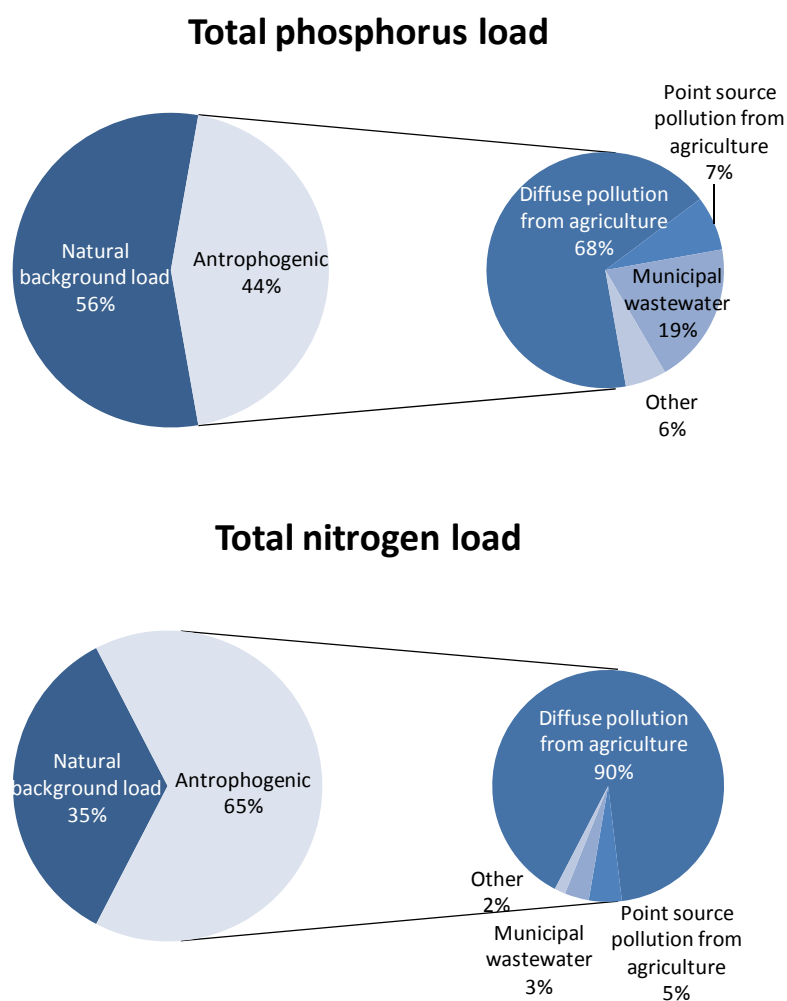
26. Nevertheless, according to the monitoring data from joint expeditions on Lake Peipus, the average nitrogen concentration in Lake Pihkva has increased during the period 2006–2010 as compared to earlier values⁹ (see also Annex A, Drawing 2). As the catchment area of Lake Pihkva is mostly on the Russian territory, the increase in the nitrogen load in Lake Pihkva is in conflict with the overall decrease in the nitrogen load as per the Russian counterparts. The comparability of data might be influenced by the differences in sampling and analysis methods of the two states.

On the Estonian side, agriculture is the major polluter of Lake Peipus

27. According to the Environment Information Centre's data for 2009, *ca* 44% of external phosphorus and 65% of external nitrogen load due to human activities (i.e. anthropogenic pollution). Anthropogenic pollution can be divided into point and diffuse pollution where agricultural diffuse load is the major contributor, accounting for 68% of phosphorus and 90% of nitrogen pollution (see Drawing 2, Table 2).

⁹ Hydrobiological monitoring and inspection of transboundary water bodies (Lake Peipus and Narva reservoir) in 2011. Centre for Limnology of the Estonian University of Life Sciences, 2012.

Drawing 2. Breakdown of total phosphorus and nitrogen load and anthropogenic pollution in Lake Peipus catchment area (average for 2009)



Source: NAO – based on data from Estonian Environment Information Centre

28. The share of remaining anthropogenic pollution sources is considerably smaller. Phosphorus load from settlements formed only 9% of total load and 19% of anthropogenic load (see also Table 2).



Agricultural diffuse pollution (spreading of manure on fields).

Source. Presentation by Enn Loigu at the NAO on 20.04.2011

Table 2. Breakdown of nitrogen and phosphorus load in Lake Peipus catchment area (on Estonian territory) in 2009, on the average (D – diffuse load, P – point load)

Source of nutrient load	Total nitrogen		Total phosphorus	
	Tons per year	%	Tons per year	%
Total anthropogenic load, incl.	7 292	65,2	119,6	44,4
Point pollution from agriculture (manure storage facilities, P)	311	3	8,7	3,3
Diffuse load from agriculture (D)	6 624	59	81	30
Municipal wastewater (P)	246	2,2	23,0	8,6
Clear cutting (D)	49	0,4	1,6	0,6

Anthropogenic load from peat areas (D)	20	0,2	1,7	0,6
Municipal rainwater not directed to sewerage (D)	14	0,1	2,2	0,8
Mines and quarries (P)	28	0,3	1,4	0,5
Total background load, incl.	3 895	34,8	149,8	55,6
Background load from usable agricultural area (natural grassland) (D)	1 751	15,7	70	26
Forest (D)	1 689	15,0	61,0	22,6
Background load from wetlands (D)	299	2,7	7,8	2,9
Rainwater load on surface of water bodies (D)	156	1,4	11,0	4,1
Total load	11 187	100,0	269,4	100,0

Source: data from Estonian Environment Information Centre

The share of various pollution sources is not completely clear

29. A large share of background load comes from arable land (nitrogen forms 16% and phosphorus 26% of total load). Background load from forests and wetlands and precipitation accounts for 19% of total nitrogen and 30% of total phosphorus load. Due to the scarcity of reference data and the employed methods the anthropogenic diffuse load from arable land might include other potential load sources like pollution from fish farms which has become more intense in the Lake Peipus catchment area (currently, this is not distinguished due to lack of data), and pollution from areas with a low density of population.

30. Furthermore, the overall nutrient load is influenced by the so-called internal load from the phosphorus deposits in the sediments of Lake Peipus (mostly from the Soviet era due to intensive agriculture and insufficiently purified municipal wastewater). When released, it considerably affects the amount of nutrients in water, depending on the environmental conditions. This phosphorus released from deposits in the sediments, i.e. internal load, is not currently recognised in balance calculations as it is impossible to assess its amount.

31. Thus, the amount and type of nutrient inputs is known, but the NAO believes that the current reference data and load calculation methods do not allow exactly determining the share of individual pollution sources like felling of timber, crop production, and aquaculture or other. Further, the internal nutrient load of the lake is unknown. One of the reasons is that the monitoring scheme has not been fully developed yet.

The objective of **surveillance monitoring** is to obtain a general overview of the status of the body of water and assess long-term changes in status.

Operational monitoring carries out a detailed evaluation of the status of the bodies of water that are not in good condition or are at risk of becoming polluted; likewise, the impact of measures for the improvement of status (operational programmes) is assessed, and the distribution of pollution load by different sources of pollution specified.

Investigative monitoring specifies the causes for a certain status in the bodies of water whose status is not good, provides a detailed assessment of the scope and impact of pollution and the efficiency of measures taken to alleviate the consequences of pollution.

Fish fauna monitoring is not included in the biological monitoring of Lake Peipus

Water monitoring yet to meet the WFD requirements in full

32. According to the Water Framework Directive (WFD), the Member States were required to launch water monitoring programmes meeting the requirements of the Directive by 2006 which necessitated modifications in the applicable national monitoring scheme. Among other things, the WFD provides for implementing the so-called three-level monitoring scheme consisting of individual sub-schemes for **surveillance**, **operational** and **investigative monitoring**, which serve different purposes.

33. Currently, the national monitoring program lacks the level of investigative monitoring and the share of operational monitoring points in the monitoring network is very small – meaning that the three-level monitoring scheme required by the WFD is not fully developed. The European Commission finds¹⁰ that in Estonia operational monitoring covers only 5% of surface water bodies which are subject to a pollution risk or for which there is insufficient data. Thus, there are not enough monitoring data to reliably determine the share of various pollution sources - for example, the possible leaching of nutrients due to exploitation of arable and forest land.

34. The lack of funds has also hindered the development of a monitoring scheme meeting the WFD requirements. According to the Ministry of the Environment, national monitoring has been financed insofar as necessary to satisfy the basic need for monitoring data and evaluate the status of Lake Peipus, but this has been insufficient for reliably determining the share of various pollution sources. The Ministry finds that the funding of the monitoring of Lake Peipus should be increased by about 25% as compared to the current level.

35. In addition to the general monitoring scheme, the WFD specifies biological, physicochemical and hydromorphological water quality indicators which must be included in the monitoring program of water bodies so that the water status assessments of various Member States and different types of water bodies would be based on similar criteria and be comparable.

36. Most indicators necessary for assessing the ecological status of Lake Peipus have been monitored for decades already. This is essential for determining long-term changes in status. The indicators monitored in Estonia include some not required by the WFD. Currently, the national monitoring program does not include fish fauna monitoring which is deemed an important quality indicator for assessing ecological status.

37. As for fish fauna, the stocks of managed fish species are evaluated outside the national scheme in order to determine the catch quotas for managing the resources, but the fish fauna of Lake Peipus on whole is not monitored. According to experts from the Centre for Limnology of the Estonian University of Life Sciences, the fish fauna of Lake Peipus is imbalanced which adversely affects through food chains the entire ecosystem of the lake by changing the proportions of other groups of biota. Thus, the scientists deem it essential to include fish fauna in the

¹⁰ The Report from the Commission to the European Parliament and the Council in accordance with the article 18.3 of the Water Framework Directive 2000/60/EC on programmes for monitoring of water status. Brussels, 01.04.2009. SEC(2009)415.

Identification of hazardous substances in surface water is not included in the national monitoring program

Hazardous substance – element or compound which poses or may pose a threat to human health and harms other living organisms or ecosystems due to its toxicity.

monitoring of other biota and hydrochemical indicators, because wrong decisions in managing fish populations based only on the interests of fish industry and not first and foremost on the ecological status of Lake Peipus could adversely affect the entire ecosystem of Lake Peipus.¹¹

38. The NAO took a closer look at the organisation of monitoring of **hazardous substances** because the elimination of these substances is an objective set out in the WFD. Although the impact of hazardous substances on the status of Lake Peipus is not of primary importance based on previous monitoring data, their monitoring is essential for pollution risk management, being part of the monitoring requirements listed in the WFD.

39. The monitoring of hazardous substances as part of national chemical monitoring was discontinued in 2007 due to lack of funds and independent studies have been conducted since then. National monitoring has not detected cases of pollution caused by hazardous substances in the Lake Peipus catchment area. It could be that the volume of monitoring of hazardous substances has been too small. There are problems with the capability of labs to identify substances (see par. 44). Other studies besides monitoring indicate a far greater presence of hazardous substances: the screening studies in 2009-2011 by the Baltic Environmental Forum¹² detected occurrences close to the environmental quality limit value in Lake Peipus (monobasic phenols etc). Further, relatively high concentrations of heavy metals were detected in Lake Peipus sediments (currently, no limit values apply to sediments).

40. For hazardous substances the national environmental monitoring program does not specify the monitoring frequency, or when and for which hazardous substances samples should be taken from water and for which from living organisms (e.g. fish) accumulating these substances.

The analysis methods of monitored substances require harmonisation

41. The Estonian-Russian cooperation agreement provides for the harmonisation of standard water quality indicators and collection of water samples and analysis methods to ensure the comparability of analysis results and assessments. In Estonia, the chemical and physicochemical parameters are analysed in accredited test labs in accordance with international standards.¹³

42. What has created problems are the considerable differences in the analysis results of chemical water indicators of Estonian and Russian labs mostly due to differing sampling and analysis methods. Although in the last ten years or so, methods have been exchanged and reference tests made, and the Estonian side has started to determine certain indicators (biochemical oxygen demand BOD₅, chemical oxygen demand COD_{Cr})

¹¹ Assessment of the status of bodies of surface water, reference bodies of water and class limits for the status of surface water by biological quality elements. Centre for Limnology of the Institute of Agricultural and Environmental Sciences of the Estonian University of Life Sciences, 2010.

¹² Baltic Actions for the Reduction of Pollution of the Baltic Sea from Priority Hazardous Substances. Baltic Environmental Forum Estonia, 2011.

¹³ Surface water sampling adheres to the international standard ISO 5667-4 („Guidance on sampling of lakes...“) and ISO 5667-6 („Guidance on sampling of rivers and streams“). Analysis of samples adheres to EN, ISO and SFS standards.

using the Russian methods, some analysis methods are not harmonised yet.

43. At the end of 2011, the Monitoring, Evaluation and Applied Research Working Group of the Joint Committee carried out a comparative analysis of sampling, sample preparation and analysis methods and the comparability of analysis results of labs which participate in the monitoring of transboundary water bodies. The Working Group found that for the monitoring of transboundary water bodies Estonian and Russian labs employ different analysis methods to determine colour, biological oxygen demand, dissolved oxygen content and the concentrations of nitrate, chlorine and sulphate ions and total nitrogen and petroleum products.

44. The reference tests of Estonian and Russian labs show that the analysis results of determining heavy metals also display considerable differences although, according to the opinion of the Joint Committee's Working Group, the limits of analytical determination of Estonian and Russian labs are comparable. For example, the results of reference tests for determining heavy metals at the Estonian Environmental Research Centre and the Pihkva Laboratory¹⁴ differed even multifold (see Table 3). The reason could be different methods: Estonia analyse heavy metals unfiltered, but Russia use previously filtered water samples.¹⁵ However, it is clear that there should be no such big differences in results. Different diagnostic capabilities and non-harmonisation of methods causes incomparability of analysis results which could lead to wrong conclusions about the status of Lake Peipus.

Due to differences in analysis methods the actual load and sources of heavy metal pollution are unknown

Table 3. Results for heavy metals identified in Lake Peipus water samples in 2011

Indicator	Institution	Sample	Result 1	Result 2	Result 3
Cu (µg/l)	EERC* Tartu branch	1	1,1	1,1	1,1
	Pihkva lab		3,19	3,15	3,18
	EERC Tartu branch	2	< 1	< 1	< 1
	Pihkva lab		1,74	1,81	1,79
Pb (µg/l)	EERC Tartu branch	1	< 1	< 1	< 1
	Pihkva lab		7,31	7,23	7,31
	EERC Tartu branch	2	< 1	< 1	< 1
	Pihkva lab		7,47	7,47	7,58

¹⁴ In 2010 and 2011, Pihkva Laboratory, carrying out analyses in Lake Peipus and Lake Pihkva, and the laboratory of the Estonian Environmental Research Centre participated in the comparative trial of the Estonian surface water, organised by the Tallinn University of Technology.

¹⁵ EU has established the environmental quality standard only for the filtered sample of certain heavy metals (Cd, Pb, Hg and Ni); other norms apply to unfiltered samples. According to HELCOM's methodology, only unfiltered samples should be analysed.

Cd (µg/l)	EERC Tartu branch	1	< 0,1	< 0,1	< 0,1
	Pihkva lab		1,15	1,12	1,13
	EERC Tartu branch	2	< 0,1	< 0,1	< 0,1
	Pihkva lab		0,98	1,02	0,99

* Estonian Environmental Research Centre

Source: NAO - based on data from Estonian Environmental Research Centre

45. The NAO believes that environmental monitoring data is sufficient for assessing the status of Lake Peipus and determining its pollution load so that Estonia meets its primary water monitoring obligations set out in the WFD. However, the inadequately developed water monitoring system and scarce monitoring data do not allow determining the exact share of actual nutrient load sources for Lake Peipus. For example, the share of agricultural pollution sources cannot be clearly distinguished from background load due to scarce monitoring data. Therefore, for calculating the pollution load and nutrient balance, also scientific institutions use indirect data and modelling where the limits of uncertainty have not been assessed. Since the monitoring program currently excludes fish fauna and hazardous substances monitoring, environmental monitoring does not yet meet the WFD requirements in full.

46. NAO recommendations to the Minister of the Environment:

- Develop sub-schemes for surveillance, operational and investigative monitoring and integrate these into a single long-term water monitoring scheme. In developing these sub-schemes, take account of the need to evaluate the effectiveness of implementing the measures of river basin management plans.
- Consolidate aquatic environment monitoring data and results of all ministries so that the necessary information would be readily available and analysable for the entire basin (e.g. the Environment Information Centre should develop a comprehensive information system).
- Include monitoring of hazardous substances in the long-term national monitoring scheme. In the monitoring scheme, specify the hazardous substances monitoring points on Lake Peipus and on river discharging therein, and monitoring frequency and methods. Include the detection of priority hazardous substances in living organisms in the monitoring of hazardous substances.
- Include fish fauna monitoring in the national hydrobiological monitoring to allow evaluating the status of Lake Peipus fish populations and their relationship with the lake's ecosystem in entirety. To this end, develop the fish fauna monitoring methods first.
- Provide for monitoring methods (frequency, analytical determination methods) also in transboundary cooperation documents.

Reply from the Minister of the Environment: the long-term water monitoring program in Estonian river basins for 2010-2015 has already been drafted and approved by Directive No. 1085 of 15.07.2011 of Minister of the Environment. The said program includes surveillance and operational monitoring. Investigative monitoring is carried out as investigation needs arise. To this end, there must be capacity to respond to adverse developments without modifying the long-term monitoring program.

The draft program for joint water monitoring of transboundary water bodies for 2012-2013 has been developed and approved and will be submitted for adoption at the next meeting of the Joint Committee. In principle, it is a long-term monitoring program which is reviewed and modified periodically and implemented over the following periods too.

Second recommendation: to improve the accessibility of environmental monitoring data collected within the government area of the Ministry of the Environment, the program „Development of Environmental Monitoring and Data Acquisition“ (KESE) financed from the European Regional Development Fund and ending on 31.12.2015 has been launched. The program is used to renew the monitoring data system to improve data acquisition and meet the information needs of users as regards monitoring data.

The consolidation of the records of the Environmental Register and the results of environmental monitoring carried out within the government areas of other ministries can be done on output level (not information system, namely this database), considering:

- limitations on databases maintained by public authorities set out in the Public Information Act (it is prohibited to establish separate databases for collecting the same data, i.e. data must be physically consolidated into a database of a certain authority);
- legislative (e.g. Spatial Information Act, Environmental Register Act, etc) and technical issues related to the cross-usage of databases of relevant authorities to avoid the above situation;
- the complexity, labour intensity and cost of developing IT solutions for consolidating the records of databases with different software platforms and different structures.

In view of the above, we find it reasonable that the records of different authorities are made available (cross-usage of data) by data stewards themselves, not consolidated into a single database. These aspects are considered also in the development of the environmental monitoring information system within the KESE program.

Third recommendation: the long-term water monitoring program in Estonian river basins for 2010-2015 has been drafted and approved by Directive No. 1085 of 15.07.2011 of Minister of the Environment. The program specifies monitoring points on the Estonian side where hazardous substances must be monitored to determine the chemical status of surface water.

Where necessary, the monitoring program is adjusted according to the analysis results of samples taken in points specified in the program. The next adjustment is planned in 2014 once the inventory results for all hazardous substances are available. Then, the need for constant monitoring of hazardous substances will be considered. Currently, the results of special surveys for detecting hazardous substances (incl. in biota and sediments) have not implied the need for constant monitoring since the concentrations of hazardous substances in transboundary water bodies have remained below the limits of analytical determination of labs and/or limit values.

According to the Estonian-Russian joint monitoring program, hazardous substances are monitored one (heavy metals) to four (petroleum products, phenols) times per year, depending on the substance.

Fourth recommendation: each year, the stocks of managed fish species are monitored, but specific fish fauna monitoring to evaluate the ecological status of water bodies is not carried out. To improve the assessment of the ecological status of Lake Peipus the Ministry of the Environment plans to outsource the development of fish fauna monitoring methods and the analysis of the cost of monitoring. These methods and analysis should be complete in 2014 at the latest. Monitoring based on these methods will start in 2016 provided that funds will be made available to this end. The details of fish fauna monitoring will be negotiated with the Russian counterparts.

Fifth recommendation: the Estonia-Russia Joint Committee took note of the information on EU monitoring methods. For hydrochemical indicators the Estonian and Russian counterparts have agreed on the choice of methods and monitoring frequencies. The choice of methods and need for harmonisation for the remaining indicators will be decided in connection with subsequent modification and updating of monitoring programs.

State's activities for improving the status of Lake Peipus

47. The monitoring of the aquatic environment and pollution load calculations help to determine the status of bodies of water and the reasons for the moderate or poor status of some water bodies. This information must be used as reference for setting water protection objectives and planning and implementing improvement measures and for subsequent assessments to determine whether the measures taken led to the desired outcome. The main instrument for planning these measures is the river basin management plans. The management plans must include a program of measures, i.e. activities to achieve the objectives. For a body of water as large as Lake Peipus, activities must be planned for a long term. Plus it has to be kept in mind that the impact of measures taken could be evident only years later.

All water protection objectives of Lake Peipus and catchment area will not be achieved by 2015

48. The WFD sets out the objective that by 2015 the good status of all bodies of water in Europe must be achieved. The same objective is included in the Estonian Environmental Strategy 2030. There are 165 bodies of water on the territory of the Peipus sub-basin whereof 40 (24%)

Basic measure – requirement of a water protection directive which must be met by the set deadline (according to legislation). E.g. reconstruction and construction of wastewater treatment plants in a wastewater collection area with a population equivalent over 2000 (by the end of 2010).

Supplementary measure – measure implemented in addition to basic measures for the achievement of water protection objectives, e.g. improvement of removal of phosphorus from municipal wastewater. Supplementary measures can be chosen by the state.

Pressure factor – sources and activities causing environmental problems. Pressure factors include:

- **point pollution** – municipal wastewater, animal farming, fish farming, waste management, polluted areas, etc;
- **diffuse pollution** – agricultural diffuse load, forestry, households not connected to public sewerage;
- **physical changes in water bodies** – land improvement, barrages, excessive beaver populations, etc;
- **internal load** – nutrients previously settled in a water body.

Body of surface water – a discrete and significant element of surface water such as a lake, reservoir, stream, river or canal, part of a stream, river or canal, a transitional water or a stretch of coastal water.

Water Act, § 2

have moderate or poor status¹⁶ (see Table 4), incl. Lake Peipus with moderate status and Lake Pihkva with poor status (see Annex A).

49. The WFD provides that a river basin management plan and a program of measures must be drafted to achieve the objectives. Firstly, the obligation is to implement **basic measures** and - should these fail - **supplementary measures**. The requirements of each individual directive could be implemented without the WFD, but the purpose of the WFD was to gather the requirements of various water protection directives¹⁷ under a single umbrella to provide for combined implementation.

50. The river basin management plans should propose measures for reducing the impact of all major **pressure factors**. For example, if it is known that the status of the lake is affected by a point pollution source and by agricultural diffuse pollution, it is necessary to determine measures for reducing both impacts in a way which allows achieving optimal results. The management plans focus mainly on reducing the impact of anthropogenic pressures, because the background nutrient load cannot be reduced substantially. For Lake Peipus (northern part) and Lake Pihkva the major pressure factors include agricultural diffuse pollution, internal load and municipal wastewater.¹⁸

51. The achievement of WFD objectives by 2015 is problematic throughout the EU, incl. Estonia. The WFD allows extending the deadlines for achieving the objectives and set less strict objectives. 10 out of the 40 non-conforming bodies of water in the East Estonian basin must achieve the objective by 2015 and for the remaining 30, incl. for Lake Peipus and Lake Pihkva, the attainment of objectives has been postponed to 2021 (i.e. by one reporting period for basin management plans) (see Table 4). According to the objectives of the East Estonian management plan, in 2021 there should be no bodies of water with moderate, poor or very poor status in the Lake Peipus sub-basin or the entire East Estonian basin. However, the management plan is controversial in this regard, stating that according to the current assessments only 80% of the bodies of water will have good or very good status by 2027.¹⁹

Table 4. The number of non-conforming (moderate, poor or very poor status) bodies of surface water (2009) and objective for 2015 on the territory of Peipus sub-basin (from East Estonian basin management plan)

Status of bodies of water	2009	2015
Total number of watercourses (rivers, streams, ditches)	134	
Moderate	23	17
Poor	2	–

¹⁶ East Estonian RBMP, Annex 1

¹⁷ Bathing Water Directive (76/160/EEC), Birds Directive (79/409/EEC), Drinking Water Directive (80/778/EEC) as amended by Directive 98/83/EC, Major Accidents (Seveso) Directive (96/82/EC), Environmental Impact Assessment Directive (85/337/EEC), Sewage Sludge Directive (86/278/EEC), Urban Wastewater Directive (91/271/EEC), Pesticides Directive (91/414/EEC), Nitrates Directive (91/676/EEC), Habitats Directive (92/43/EEC), Integrated Pollution Prevention Control Directive (96/61/EC), etc.

¹⁸ East Estonian RBMP, p. 196.

¹⁹ See East Estonian RBMP, p. 101 and Annex 1.

Total number of bodies of standing water (lakes, reservoirs)	31	
Moderate	13	11
Poor	2	2
TOTAL number of bodies of water	165	
TOTAL number of bodies of water not in a good status	40	30

Source: East Estonian river basin management plan (2010), Annex 1

52. The WFD requires that the extension of the deadline for objectives must be well justified.²⁰ The extension of the deadline for achieving the objectives related to all non-conforming natural lakes, incl. Lake Peipus (northern part) and Lake Pihkva, is justified in the East Estonian river basin management plan (RBMP) with the fact that natural conditions do not allow improving the status of the body of water in due time.²¹ However, the major pressure on Lake Peipus (northern part) and Lake Pihkva indicated in the plan is anthropogenic pollution²² - the limiting of this pollution is likely to affect the status of the lake. The RBMP does not specify the measures²³ for achieving the good status of these water bodies. The RBMP pays little attention to the fact that the achievement of objectives for Lake Peipus (northern part) and Lake Pihkva does not depend only on the activities of the Estonian side, 2/3 of the lake's catchment area is on the Russian territory and more than half of the pollution comes from there.

53. NAO recommendation to the Minister of the Environment:

Describe in the RBMP and its programme of measures in greater detail the supplementary measures to be taken by 2015 which improve the status of water bodies with unsatisfactory status, incl. Lake Peipus (northern part) and Lake Pihkva, and which would ensure the attainment of objectives by 2021 at the latest. Make sure that the operational plans for the programmes of measures of the RBMPs specify the timetable and institutions for implementing the measures.

Reply from the Minister of the Environment: rendering the envisaged measures more detailed is inevitable and no measures could be implemented otherwise. The Ministry of the Environment is preparing the draft Government Regulation „Procedure for Preparing River Basin Management Plans“ which provides that information included in the programmes of measures of river basin management plans must be much more detailed.

By the end of 2012, an interim evaluation of the RBMP will be carried out to collect additional information on measures, cost, technical feasibility, implementing possibilities and bodies, interconnection with

²⁰ §3⁹(3) of the Water Act: „Extension of the term for environmental objective and its justification, measures taken for the gradual achievement of environmental objective, basis for the significant delay in the implementation of such measures and the estimated schedule for the implementation of measures shall be determined by a water management plan“.

²¹ East Estonian RBMP, Annex 4.2.

²² East Estonian RBMP, Annex 3.

²³ Requirement arises from Article 4(4)(d) of the WFD; §3⁹(3) of the Water Act.

objectives, etc. The results of interim evaluation will be considered in preparing and updating the implementing plan of the RBMP.

In April 2012, the action plans for implementing the programmes of measures will be submitted for review to the Water Management Committee set up by the Minister of the Environment which allows immediate consideration of the recommendations on the timetable and bodies for implementing the revised measures. Once endorsed by the said Committee, the action plans will be submitted for approval to the Minister of the Environment.

The water protection measures focus on point pollution: diffuse pollution has not gotten enough attention

54. The selection of water protection measures should be based on the status of the specific body of water, the major pollution sources affecting its status and the measures best helping to improve its status.

55. The basin management plan includes a list of important pressure factors, but does not clearly indicate the basis for evaluating their importance. Further, the plan does not indicate whether and how much the identification of important pressure factors has contributed to planning the measures, i.e. developing the programme of measures. Thus, there is no assurance that important problems are addressed.

56. The Lake Peipus sub-basin management plan envisages 5% of the total cost of measures (EUR 12 million) for managing diffuse pollution whereby only 0.5% as basic measure. The reconditioning of point pollution sources as a basic measure form 65% of the cost of basic measures in the programme of measures of the Lake Peipus sub-basin management plan (see Table 5). In principle, the East Estonian RBMP has the same priorities. This indicates that the management plans mostly focus on eliminating point pollution sources and not on managing the main pressure factor for the basin - agricultural diffuse pollution.

Table 5. Total planned cost of water protection measures in the Lake Peipus sub-basin management plan (approved in 2008).

Measure	Planned cost of measures in the Lake Peipus sub-basin management plan (2006-2014), in EUR million		
	Basic measure	Supplementary measure	Total
1. Reconditioning of drinking water systems	51,32	7,67	58,99
2. Reconditioning of point load sources (total)	118,17	17,83	136,00
Reconditioning of wastewater collection systems	62,76	14,51	77,27
Reconditioning of animal farms	52,60	0,00	52,60
Reconditioning of polluted areas (residual pollution)	2,81	3,32	6,14
3. Limiting of diffuse load	0,90	11,12	12,02

The importance of measures has not been evaluated

4. Maintaining the quality and reserves of groundwater	0,06	3,13	3,20
5. Rehabilitation of surface water bodies	6,39	16,68	23,07
6. Coastal water	0,00	0,00	0,00
7. Management of management plans	4,09	0,00	4,09
TOTAL	180,94	56,43	237,38
<i>Diffuse load limiting measures as a percentage of total sum</i>	<i>0,50%</i>	<i>19,71%</i>	<i>5,07%</i>
<i>Reconditioning of point load sources as a percentage of total sum</i>	<i>65,76%</i>	<i>19,22%</i>	<i>56,52%</i>
<i>Cost of basic measures as a percentage of total sum</i>			<i>76,23%</i>

Source: Lake Peipus sub-basin management plan

57. Focus on point pollution is due to the obligation to comply with the requirements of EU Directives and the fact that point source pollution is much easier to address than diffuse pollution. Point pollution sources have a specific location and are subject to emission limit values. Diffuse loads required focusing on scattered sources which are hard to identify and more difficult to manage (e.g. modification of agricultural processes, reduction of motor vehicle pollution and the amount of phosphates in detergents). Thus, currently the major criterion for selecting water protection measures in Estonia is not reliance on monitoring data and scientific research but compliance with the requirements of EU Directives.

58. Although it is known that basic measures alone will not achieve the good status of Lake Peipus, the planning of supplementary measures has received little attention. Supplementary measures in the Lake Peipus sub-basin management plan formed 24% of the total cost of all measures with only 1/5 of that 24% earmarked for managing diffuse pollution. On the one hand, Estonia has the obligation to implement basic measures and hence focusing of basic measures stands to reason. On the other hand, however, the WFD objective of achieving the good status of water bodies must be adhered to, although achieving it is unlikely unless more attention is paid to diffuse pollution and supplementary measures.

Did you know?

In East Estonian RBMP, the cost of all measures is an estimated EUR 824 million (EEK 12.9 billion).

In Lake Peipus sub-basin RBMP, the cost of all measures is an estimated EUR 237 million (EEK 3.7 billion).

59. The East Estonian RBMP applicable since 2010 pays more attention to diffuse pollution than all the three sub-basin management plans taken together: 12% of total cost and 60% of the cost of supplementary measures has been earmarked for managing diffuse pollution. This is first and foremost due to the fact that the RBMP has been complemented with the requirements of the HELCOM's Baltic Sea Action Plan which provide that phosphorus and nitrogen discharges to the Baltic Sea must be considerably reduced. As these substances originate mostly from diffuse pollution sources, corresponding supplementary measures have been planned.

60. The NAO finds that the implementation of basic measures and the minimisation of point source pollution are necessary and contribute to the improvement of the status of Lake Peipus and the water bodies in its

RBMPs are neglected in the funding of measures

Did you know?

The aggregate table on the activities of all river basins, the so-called catalogue of measures, commissioned by the Ministry of the Environment in 2008, included over 3000 activities. According to the Ministry, the action plans drawn up in 2012 will include more than 10 000 activities.

Wastewater discharge – polluted or purified water from point load source used by humans and then discharged into the nature.

catchment area. In a situation where about 80-90% of the pollution load on the territory of the Peipus sub-basin comes from diffuse load sources, point pollution have received too much attention given the actual breakdown of pollution sources.

61. The Ministry of the Environment argues that since the basic measures must be implemented anyway, there is no point in evaluating their importance. The WFD does not require ranking the measures by importance, but it is clearly necessary (also for basic measures), if the pressures from pollution sources differ, there aren't enough funds for implementing all measures concurrently and there are a large number of activities to be carried out.

62. A large share of RBMP projects are carried out by means of funds allocated by the Environmental Investment Centre (EIC). This means that the financing of measures is largely based on funding applications. Thus, the implementation of measures depends firstly on whether the project application is submitted, and secondly on the score attributed to the project in the light of the project evaluation requirements of the EIC.²⁴ However, these measures do not allow considering all the important circumstances related to the improvement of the status of water bodies set out in the RBMP. For example, there is no criterion for the reduction of phosphorus, nitrogen or hazardous substances; the status of the water body where the **wastewater** of the treatment plant applied for within the project is **discharged**, or the importance of the specific pressure factor are not used as a reference point. Hence, substantive decisions on the priority of measures are made in connection with determining whether a specific project will receive funding.

63. The NAO finds that the prioritisation of measures only in the project application phase does not provide assurance that priority is given to the financing and implementation of measures which best contribute to the achievement of the good status of water bodies.

64. NAO recommendation to the Minister of the Environment:

Since agricultural diffuse pollution is the major pressure factor in the Lake Peipus catchment area and its minimisation has received less attention than point source pollution, the following should be done:

- plan and implement supplementary measures for minimising the effect of diffuse pollution, for example by establishing water protection (buffer) zones and artificial wetlands / sediment basins, use of vegetation in winter period etc;
- make sure that the planning of water protection measures is aimed first and foremost at the resolution of important problems. Importance should be assessed in the course of drafting the programme of measures of the management plan as the Environmental Investment Centre (EIC) and other donors use this

²⁴ Regulation No. 13 of the Minister of the Environment of 17 February 2006 „Requirements for the application for an environmental protection project, terms and conditions, procedure and criteria for the evaluation of applications, procedure for decision-making, carrying out monitoring over the performance of contract and reporting“ and related Directive No. 1738 of the Minister of the Environment of 1 December 2010 „Procedure for review and evaluation of environmental projects“.

as a reference in making funding decisions. In this context, the EIC's financing criteria should be revised and aligned with the objectives of the management plan. The Environmental Board as the body coordinating the river basin management plans should make efforts to ensure that projects related to the resolution of important problems are drafted and submitted for financing as a matter of priority.

Reply from the Minister of the Environment: planning and implementation of measures is based on environmental objectives. To achieve or ensure compliance with environmental objectives it is necessary to limit or reduce the pressures from various pollution sources. Often, the cumulative impact of different sources must be taken into account. Further, the technical feasibility and cost of implementing the measures must be assessed. Indeed, agricultural diffuse pollution represents a considerable pressure in the Peipus catchment area, but its impact cannot be evaluated without the lake's internal load which also has a major impact on the nutrient content of the lake. In minimising the impact of pollution we have focused on all pressure sources and evaluated the measures in the light of technical feasibility and implementing costs. The obligation to reduce the impact of point loads is set out also in the Municipal Wastewater Purification Directive and the Nitrates Directive. Less attention has been paid to measures which, according to readily available information, are technically too complicated to implement or excessively costly compared to other similar load reduction measures.

Implementation of the rather complicated measures mentioned in the proposal shall require a longer period of preparation. To this end, the Ministry of the Environment intends to look into potential measures for reducing diffuse load. Previously, several studies have been carried out on the implementation of diffuse load measures on load sources (agricultural producers) or for the settlement of an existing problem (leak-tightness of manure and silage storage facilities). Last year, the possibility of implementing other potential diffuse load measures was studied for the first time, based on similar studies and results of international cooperation in the European Union. This year, the Ministry of the Environment, based on said study results, intends to continue specifying the measures needed to manage diffuse load in order to ensure implementation of river basin management plans and rural development plan.

To better consider the relevance of problems, river basin management plans provide assessments on the relevance of load on the aquatic environment. The beginning of this year saw the initiation of modernisation of river basin management plans. Characteristics of each river basin, overview of load and impact by human activity on the aquatic environment as well as the economic analysis of water use shall be updated. Among other things the list of evaluated and analysed loads shall be updated. This ensures more precise calculation of different types of diffuse load, and relevance. Updated overviews serve as a basis for the preparation of operational programmes which shall also be submitted for approval to the Government of the Republic by 2015 at the latest.

According to the Act amending the Water Act, entered into force on 17 July 2010, the implementation of operational programmes and river basin

management plans must begin on 22 December 2012 at the latest. We intend to specify Directive No. 494 of the Minister of the Environment of 5 April 2010, establishing the duties of the Ministry of the Environment in updating and implementation of river basin management plans so as to ensure more efficient implementation of river basin management plans and better results on the spot.

To ensure the implementation of river basin management plans it is also necessary to update the procedure of financing of the Environmental Investment Centre and regarding the river basin management programme it is advisable to take account of relevant loads mentioned in the river basin management plans, the impact of which on the aquatic environment must be reduced. Duties of the Environmental Board regarding the preparation of projects needed for the implementation of river basin management plans shall be specified in Directive No. 494 of the Minister of the Environment of 5 April 2010, establishing the duties of the Environmental Board in updating, implementation and adjusting of river basin management plans, and in updating the procedure of financing of the Environmental Investment Centre.

In addition to the measures in river basin management plans, minimum requirements for fertilizers and pesticides have been established with the agri-environment support measure of the 2007–2013 rural development plan for the recipients of said support. The requirements regarding the use of fertilizers established with the Water Act shall be monitored by the Environmental Inspectorate in compliance with the conformity system.

In the period in question there were 1967 applicants for the measure and the measure was implemented on 453 192 hectares. Buffer zones have already been established as a measure with Regulation No. 11 “Good agricultural and environmental conditions, specific procedure for conforming to the requirement of preserving the area of permanent grassland, bases and procedure for the transfer of the obligation to preserve the area of permanent grassland and specific procedure for the implementation of measures taken for the preservation of permanent grassland” of the Minister of Agriculture of 17 February 2010 pursuant to the requirements of the Water Act.

River basin management plans do not include all activities necessary for the attainment of water protection objectives

Did you know?

River basin management plans of Great Britain include an annex with the requirements, action plans and strategies of legislation on water protection.

65. River basin management plan as a framework document should include all relevant water protection activities contributing to the attainment of water protection objectives. It must not be forgotten that Lake Peipus is a transboundary water body and the attainment of objectives depends also on the activities of Russia which is why it is important for Estonia and Russia to cooperate in this matter.

66. Current river basin management plans pay little attention to reducing phosphates in detergents, hazardous substances, and diffuse pollution from forestry, mines and quarries, land reclamation, transport and precipitation. At the same time it is clear that management of those areas of activity is important for the attainment of water protection objectives. It is currently not known how other development and action plans and legislation contribute to the attainment of objectives of river basin management plans and the WFD. If water protection is addressed in other

documents, these should be referred to in the WFD. Estonia's river basin management plans include almost no information on the preparation of activities related to the pollution from the Russian side, and cooperation in the implementation of water protection measures which is necessary for the reduction of pollution.

Did you know?

Calculations related to the Danube river basin indicate that substitution of phosphates in detergents may decrease phosphorus content by 24% in point source pollution and 12% in all sources of pollution.

67. For example, in a situation where the eutrophication of Lake Peipus is mostly caused by phosphorus pollution, river basin management plans fail to address the limits on phosphate use in detergents (as a supplementary measure). Unlike other Baltic Sea countries Estonia has not established a plan to prohibit the use of phosphates in detergents although this would keep phosphorus from entering wastewater. This is even more necessary for the reason that most of Estonia's small water treatment plants are not able to remove phosphorus from wastewater. According to the evaluation of the European Commission, Estonia's activity in avoiding phosphates is very poor but its potential in improving the status of water is good.²⁵

RBMP contains little information on agricultural measures

68. River basin management plans contain little information on the water protection measures described in the rural development plan. Management of agricultural pollution is mostly the responsibility of the Ministry of Agriculture. Counties located on the catchment area of Lake Peipus²⁶ shall receive approximately EUR 200 million of direct aid from EU Common Agricultural Policy in 2007–2013, the allocation of which is related to the compliance with obligatory environmental requirements, incl. conformity of objects which may cause pollution to environmental requirements.²⁷ In the framework of the 2007–2013 rural development plan, manufacturers in the catchment area of Lake Peipus may apply, till the end of the period, for several aids which should directly or indirectly influence the status of water.

Recipient – water body (e.g. stream, river, lake, sea) or other location (e.g. bore hole) where effluent or drainage water is directed.

69. A positive example in harmonising river basin management plans and other plans are the management plans for land improvement systems which have been drawn up for the same sub-basins and river basins and are in compliance with river basin management plans (e.g. the same classification of water bodies and evaluation of status). Management plans for land improvement systems focus mostly on the maintenance of **recipients** but also include environmental protection measures.

Operational programmes are too general

70. Lake Peipus sub-basin management plan and East Estonian RBMP include the operational programme required by the water framework directive which lists the provided measures and their general description. However, there are no official detailed action plans which would help get a better overview of implemented activities and associate them with the improvement of the status of a specific body of water. According to the Ministry of the Environment the operational programmes did not include specific activities because the implementing bodies of said activities could have hoped that the state would ensure also funding.

²⁵ Commission report to the Council of the European Union and European Parliament on the use of phosphates pursuant to Article 16 of Regulation (EC) No. 648/2004 (on detergents) of the Parliament and the Council of 31 March 2004. Brussels, 04.05.2007, COM(2007) 234, pp. 11-12.

²⁶ Tartu, Põlva and Jõgeva County.

²⁷ Conformity is an EU code on agricultural production, adherence to which is related to area-related aid and other aid allocated through the ARIB.

71. One of the shortcomings of the too general operational programme is that it fails to clearly determine the persons responsible for the implementation of a measure or activity. It is common knowledge that, pursuant to legislation, in addition to the Ministry of the Environment and the Environmental Board, undertakings, other Ministries (e.g. Ministry of Agriculture and Ministry of Social Affairs), local governments, citizens, etc. play a part in the attainment of water protection objectives. River basin management plan, however, fails to clearly determine the areas of responsibility. As it does not determine detailed plans and responsible persons it is unclear who is responsible when and for the implementation of which activities.²⁸

72. NAO recommendation to the Minister of the Environment:

- Supplement river basin management plans so that they would provide an overview of all water protection measures ensuring the attainment of good status of water bodies, incl. the measures of the rural development plan and measures which are not funded by the state. Special attention should be paid to the development of supplementary measures (taking into consideration the recommendations of the European Commission) which shall help reduce the impact of significant pollution sources (e.g. agricultural diffuse pollution, prohibition of phosphates in detergents). Plans of measure must determine in greater detail the persons responsible for implementation and (interim) deadlines for the attainment of objectives.
- In the future, the river basin management plan should address the pressure factors of the entire Lake Peipus catchment area, pollution load and possibilities for its reduction as a whole, taking into account the information received from the Russian Federation.

Reply from the Minister of the Environment: Said supplements are mostly related to the specification of information describing the measures so as to facilitate the selection of measures and coordinated implementation between various authorities. These supplements shall be gradually added to updated river basin management plans. As to the plans of measure (incl. operational programmes and action plans for the implementation of operational programmes), their level of detail shall be determined with the Directive of the Minister of the Environment, regulating the procedure of implementation of river basin management plans.

Information received from the Russian Federation is essential in order to better address in the river basin management plans the pressure factors in Peipus catchment area as well as pollution load and possibilities for its reduction. To this end, we shall continue improving the exchange of relevant information with the Russian side.

²⁸ Ministry of the Environment has commissioned a study for the implementation of detailed action plans, to be completed by the end of 2012. This study shall determine responsible persons.

The state lacks a detailed overview of measures taken so far

Did you know?

Use and protection of water is organised and integrated with other areas by the **Water Management Committee** of the Ministry of the Environment.

The Environmental Board includes parties in the preparation of RBMPs and draws up an action plan for the implementation of the operational programme as well as an overview of its implementation.

Source: Water Act

Did you know?

In the period of 2007–2013 the state of Estonia shall receive EUR 400 million (EEK 6 billion) from the EU aids for the development of water management infrastructures.

Impact of the implementation of water protection measures is unknown

73. In order to evaluate the attainment of a good status of a water body it is necessary to have an overview of the implementation of water protection measures and the opportunity to associate the impact of implemented measures with the changes in the status of the environment. For this, in turn, it is necessary to aggregate and analyse various data from monitoring to funding. For example, it should be determined whether a specific activity helped reduce pollution load, improved the status of a water body and whether it was the most efficient (financially) means for attaining the objective.

74. On the state level the organisation of water management is the responsibility of the Water Management Committee of the Ministry of the Environment. Preparation of detailed plans of measure and reporting on their implementation is the duty of the Environmental Board.²⁹ Thus, the Environmental Board must have an overview of the water protection activities in the river basin.

75. Operational programmes of river basin management plans provide an assessment of the estimated cost of the implementation of all intended measures (see Table 5). Up to now, the European Commission has received reports on the implementation of individual directives (e.g. Urban Wastewater Directive) but the Ministry of the Environment and the Environmental Board do not know which activities and for which amount of money have actually been carried out in Lake Peipus sub-basin in 2006–2010. It is clear that both Structural Funds and the Estonian Environmental Investment Centre's water management programme have allocated substantial sums for water protection, and that the ARIB has allocated aids to farmers for environmental protection.

76. The National Audit Office tried to get an overview of the sum invested in water protection activities in Lake Peipus sub-basin in 2006–2011, and to compare the results with the planned sums. It is not possible to get an accurate overview of funding as planned measures and the data collected later cannot be compared. For example, the distribution of the plan of measures of the RBMP does not correspond to the subdivisions of the water management programme of the environmental programme of the Environmental Investment Centre³⁰; for the measures of the rural development plan the share of water protection is unclear; organisation of drinking water and sewerage systems is mostly done together and it is difficult to separate them. Data on the implementation of measures must be obtained from many different sources and it is unknown to what extent local governments and, for example, agricultural holdings, have funded water protection activities, etc.

77. Although according to the RBMP, the implementation of the plan for measures must begin at the beginning of 2013, the measures are already being implemented. The operational programme of the East Estonian river basin management plan is not the first plan to be organised for the organisation of water management and improvement of the status of

²⁹ Water Act, § 3¹⁶

³⁰ Environmental Investment Centre does not have subdivisions for coastal waters, organisation of river basin management plan, protection of groundwater, restriction of diffuse load.

Lack of co-operation between state authorities hinders evaluation of efficiency

water bodies. Money from Structural Funds has also been used since 2004 and this period will end already in 2013. Thus, by 2013, the more significant activities are already underway and funding decisions have been made. Lack of overview of both performed activities and funding indicates that the state does not have a clear understanding of what has been implemented and the funding of which activities should be observed more closely so as to attain set objectives.

78. The audit revealed that various agencies and undertakings collect, process and forward data differently. National environmental monitoring data are collected by the Environment Information Centre, data of undertakings' own monitoring remain in the Environmental Board, monitoring data of the Agricultural Research Centre remain with the Centre (published on their website), results of samples taken during supervision remain with the agencies who took them, funding decisions and funding overview is available at the Environmental Investment Centre or the ARIB, etc.

79. The Environmental Board, being the coordinator of the RBMPs, does not exchange information in a consistent manner with the Environmental Investment Centre and the Environment Information Centre which is why there is no overview of the activities funded in the river basin or of the impact of the implementation of measures, i.e. whether the pollution load has decreased and the status of water bodies improved. Likewise, communication with the ARIB and the Agricultural Board (implementation of agricultural measures) is insufficient and it is unclear what local governments or undertakings do without aid. There is no information because the Environmental Board has never asked the various parties for such data.

80. Ever since 2001, the Ministry of the Environment has tried to develop a common water management information system³¹ which would enable to aggregate various monitoring, assessment and other data (e.g. land use, bodies of water, pressure factors). This would facilitate the availability of data and providing an assessment of the status of water bodies, estimation of pollution load and issuing of environmental permits, and assessment of the efficiency of the implementation of measures. However, development activities have stopped and there are currently no such opportunities.³² It is not possible to associate the measure with the impact on the environment and change in the status of the water body.

81. The efficiency of the implementation of water protection measures has not yet been assessed in Estonia on a national level. In 2007, the Ministry of the Environment commissioned a study on the methods of assessing the efficiency of water protection measures.³³ This study indicates that it is impossible to assess efficiency as the objectives for the improvement of status of water bodies as well as the measures in the river basin management plans are too general, the state's overview of the water

³¹ Preliminary study of the information system of river basin management plans. OÜ Comptuur, 2001.

³² Ministry of the Environment is preparing a major project for modelling the status of inland surface water and of the sea, integrated in the funding mechanisms in Norway, and the decision-making process and creating information systems (probable beginning in the autumn of 2012).

³³ Assessment of the efficiency of measures of river basin management plans (commissioned by the Ministry of the Environment). ELLE, 2007.

protection activities on territory of the sub-basin is partial, the selection of measures is based rather on the requirements of legislation than on the status of the water body, and that data on the indicators of the status of a water body, sources of pollution and implementation of measures must improve significantly. According to the Ministry, however, the method cannot be used as there are not enough data of sufficient detail which would enable to assess the implementation of measures.

82. According to the NAO, the lack of overview of the activities of the river basin management plan and insufficient communication between agencies indicates that there are shortcomings in the organisation of management and coordination of river basin management plans. This opinion is supported by the fact that the Directives of the Minister of the Environment and of the Director General of the Environmental Board, on the preparation of river basin management plans and related organisation of work³⁴, and the Water Act have been amended several times since 2001. The Ministry has commissioned from the experts a study³⁵ so as to get an overview of the catalogue of water protection measures and activities, but this activity should be consistent, with reports concluded every year to evaluate success. It is likely that if there is no proper overview and cooperation is insufficient, the Ministry will not be able to assess the impact of performed activities on the aquatic environment by the end of 2012.

83. NAO recommendation to the Minister of the Environment:

Ministry of the Environment and the Environmental Board should ensure an overview of all implemented activities (measures) in the sub-basin so that it would be possible to assess the efficiency of the implementation of measures. To this end, it is necessary to aggregate and associate the following:

- Data on surveillance monitoring, water bodies and pollution load from the Environment Information Centre;
- Data on the undertakings' own monitoring and surveillance monitoring from the Environmental Board;
- Data on fertilizers and pesticides and on the implementation of the measures of the rural development plan from the Ministry of Agriculture;
- Data on the implementation and funding of projects from the Environmental Investment Centre.

³⁴ Prior to the establishment of the Environmental Board in 2009, environmental authorities in the scope of the Ministry of the Environment were directly responsible for the RBMPs. The distribution of the duties of the Ministry and the Environmental Board in the preparation and coordination of the RBMPs has not always been clear.

³⁵ Preparation of a catalogue of measures for the development and implementation of measures of river basin management plans (study commissioned by the Ministry of the Environment). OÜ ELLE, 2010.
Additional study of the catalogue of measures of AS Maves „Assessment of the implementation of measures of river basin management plans and preparation of interim report for the implementation of operational programmes, assessment of measures related to the improvement and organisation of water bodies“ is not yet completed.

Collect additional information on the water protection measures implemented by local governments and undertakings. Establish an information system in cooperation with listed parties so as to aggregate data and analyse its efficiency, to provide estimates and make decisions. Specify the role of the Environmental Board as the coordinator of river basin management plans in obtaining an overview of the implementation of measures and their impact.

Reply from the Minister of the Environment: Said supplements are mostly related to the specification of information describing the measures so as to facilitate the selection of measures and coordinated implementation between various authorities. These supplements shall be gradually added to updated river basin management plans. As to the plans of measure (incl. operational programmes and action plans for the implementation of operational programmes), their level of detail shall be determined with the Directive of the Minister of the Environment, regulating the procedure of implementation of river basin management plans. For the better use of various data (incl. monitoring, measures, etc.), the Ministry of the Environment intends to improve access to the information systems and databases related to water management. Use of monitoring data, incl. collection, analysis and presentation of monitoring data, shall be improved with the programme „Development of Environmental Monitoring and Data Acquisition“ (KESE) ending on 31.12.2015. To improve the use of data related to the organisation of water management, the Ministry of the Environment intends to launch a project with several cooperation partners which aims to improve the efficiency of decision-making processes related to the development and implementation of river basin management plans. To this end, we would like to update current water management databases and establish cross-usage of several databases partially related to water management so as to introduce models that would enable to evaluate and estimate the status of the aquatic environment, load of human activity on this environment and the impact of measures taken for the reduction of load. This project will begin at the end of 2012 and it will end in 2015.

Several performed activities do not have the desired impact

84. Water management project form the majority of projects funded in the field of environment. Most of the funding is invested in the reconstruction and construction of urban wastewater treatment plants and in drinking water and wastewater projects (over EUR 64.4 million in Estonia in 2010 and EUR 186 million in 2009). According to the Environmental Investment Centre, approximately EUR 150 million was invested in the reconstruction and construction of drinking water and wastewater treatment plants in Lake Peipus catchment area in 2004–2011.³⁶

Efficiency of wastewater treatment plants is insufficient

Did you know?

In 2010, water management projects formed ca 50% (EUR 20.7 million) of the total funding of the EIC environmental programme and water management infrastructure projects formed 1/3 (EUR 42 million) of the funding from the Cohesion Fund.

³⁶ Funding of the environmental programme in 2006–2010, funding of Structural Funds in 2004–2006 and 2007–2011. The sum only includes funding allocated through the EIC (does not include self-financing and funding received elsewhere).

Population equivalent (p.e.) – unit of potential water pollution load caused by one person on the average in 24 hours. P.e. value expressed via biochemical oxygen demand (BHT₇) is 60 grams of oxygen per 24 hours.

Water Act, § 2

Did you know?

In 2011, a Emajõgi-Võhandu water project (2004-2011) was completed, which ensured public water supply and wastewater treatment for 47 600 persons. Total cost of the project was EUR 65 million.

85. With the accession to the European Union Estonia undertook to ensure by the end of 2010 the conformity of wastewater treatment in all urban areas with the pollution load over 2000 population equivalent (p.e.). There are 10 wastewater treatment plants with p.e. over 2000 in the territory of Lake Peipus sub-basin management plan.³⁷ All these plants have received funding from the Environmental Investment Centre (see Table 6).

Table 6. Wastewater treatment plants with population equivalent of over 2000 in the territory of Lake Peipus sub-basin area and their funding from the Estonian Investment Centre (EIC) environmental programme and Structural Funds (2001–2013)

Wastewater treatment plant (over 2000 p.e.)	Funding, in EUR		Period of funding
	from EIC environmental programme	from Structural Fund	
Tartu	110 885	4 828 291	2005, 2009–2012
Põlva		2 057 107	2005–2011
Põltsamaa	411 694	798 894	2006; 2007; 2008–2013; 2009–12
Võru	276 765	2 018 977	2001, 2005–2011
Elva	411 852	1 597 787	2003, 2007; 2009–2013
Jõgeva	832 198	0	2000, 2001, 2011, 2009–2013
Tamsalu		766 938	2009–2011
Räpina		1 170 779	2005–2011, 2011–2012
Väike-Maarja	42 547	0	2007, 2008–2011
Koeru	3 835	270 982	2000, 2009–2013
TOTAL	2 089 776	13 509 753	

Source: Environmental Investment Centre

86. In 2008–2010, five of a total of ten treatment plants with p.e. over 2000 in Lake Peipus sub-basin exceeded the emission limit values determined with the permit for the special use of water. For example, the wastewater treatment plant of the City of Võru exceeded nitrogen emission limit values every year in the period of 2008–2010 (19–22 mg/l, permitted value: <15 mg/l). The wastewater treatment plant of Räpina exceeded phosphorus emission limit values in 2007–2010 (3.8–5.4 mg/l, required: 1.5 mg/l).³⁸

Small wastewater treatment plants have problems too

87. Not enough attention has been paid to solving the problems related to wastewater in smaller (p.e. under 2000) wastewater collection agglomerations.³⁹ According to the Environmental Register there are 228 small treatment plants in the territory of Lake Peipus sub-basin.⁴⁰ The NAO assessed the conformity of 20 small treatment plants in Lake Peipus

³⁷ Tartu, Põlva, Põltsamaa, Võru, Elva, Jõgeva, Tamsalu, Räpina, Väike-Maarja, Koeru.

³⁸ Wastewater treatment plants of Võru and Räpina were reconstructed in 2010 and they conformed to the norm in 2011.

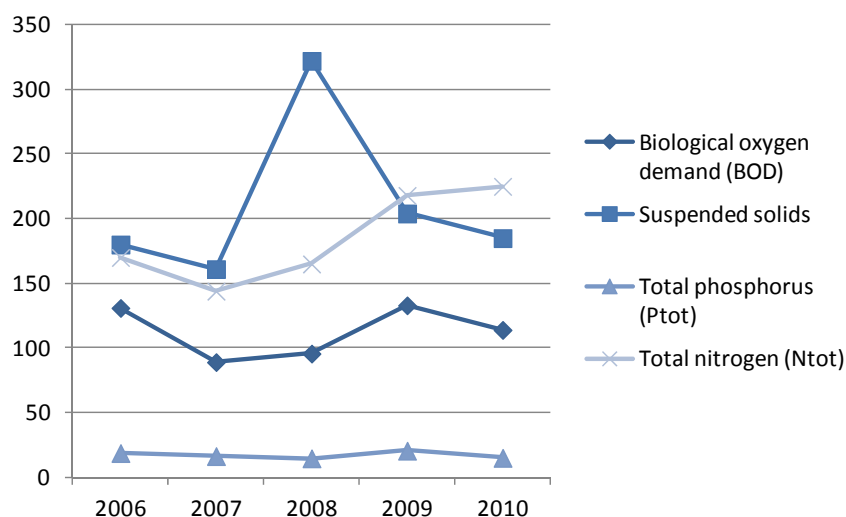
³⁹ Ministry of the Environment's development plan for 2011–2014. Ministry of the Environment, 2010.

⁴⁰ Wastewater treatment plants with population equivalent (p.e.) of under 2000.

sub-basin, for which shortcomings had been identified during surveillance monitoring in 2007. In 2010 there were five small treatment plants that did not conform to the requirements of the permit (in terms of BHT₇ and P). Studies show that small treatment plants are out of date; nearly half of them do not conform to the requirements set by the permit for the special use of water (first and foremost in terms of permitted content of phosphorus), inflow of wastewater is uneven, there is no equipment for removal of phosphorus and in many cases the use of wastewater sludge remains unsolved; knowledge of maintenance and keeping the treatment plants in working order is insufficient, etc.⁴¹ Over the years, wastewater lagoons have become full of mud and are the source of secondary pollution.

88. In spite of the state's contribution in wastewater treatment plants, total pollution load from wastewater outlets, especially nitrogen and phosphorus pollution in Lake Peipus sub-basin has not decreased significantly over the last five years (see Drawing 3). There are problems with the performance of both large and small treatment plants which is why a thorough assessment of funding and performance of point source pollution should be carried out.

Drawing 3. Pollution load from wastewater outlets (wastewater treatment plants, storm water outlets, etc.) in the territory of Lake Peipus sub-basin in 2006–2010 (tons per year)



Source: Environment Information Centre

Agricultural point source pollution has not been managed in a timely manner

89. In agriculture, also, the main focus has been on the elimination of point source pollution, i.e. renovation of manure and silage storage facilities. In terms of both stocking density⁴² and general agricultural intensity there are certain counties in the catchment area where the risk of agricultural pollution is high. The year 2010 was the final deadline for the elimination of pollution from manure management in nitrate vulnerable zones. In the rest of the country manure storage facilities must be up to date by 1 January 2013. In Jõgeva, Tartu and Põlva Counties the Ministry

⁴¹ Preparation of recommendations and instructions for local governments regarding technological and technical solutions of small wastewater treatment plants. Interim report. TUT, 2010.

⁴² Stocking density – number of animals per unit of area in a certain period of time.

of Agriculture has supported the construction and reconstruction of manure storage facilities with *ca* EUR 9 million.

90. On the example of a nitrate sensitive area it can be said that despite all requirements and the allocation of aids there are manure storage facilities that do not conform to the requirements and thus have a negative impact on groundwater and surface water which in turn influences the status of Lake Peipus. In terms of non-conformity it can be said that leaking storage facilities were identified in 15–19% of farms.⁴³ 21% of manure storage facilities are not of the required size. As an emergency solution, manure is stored on the territory of the farm or on other registered immovables without required conditions.

Agricultural holdings are also having problems with conformity

Integrated pollution prevention and control (IPPC) permit – document which regulates the activity of undertakings of great environmental impact so that impact on the environment would be minimal and transfer of pollution from one environmental medium (water, air, soil) to another would be prevented.

Integrated Pollution Prevention and Control Act §6

There are not enough measures for preventing agricultural diffuse pollution Did you know?

Improvement of water status has been clearly indicated in the four objectives of the measure of the rural development plan or in impact indicators:

2.3. „Agri-environment support“ (submeasures 2.3.1 „Environment-friendly management“ and 2.3.2 „Support for organic production“);

2.6. „Support for the establishment of protection forest“;

2.7. „Natura 2000 support for private forest land“;

1.8. „Infrastructure of agriculture and forestry“.

91. Undertakings with **integrated pollution prevention and control (IPPC) permits** must use the best available techniques (BAT) and thus prevent pollution. The majority (up to 90%) of large agricultural plants with integrated permits in the counties of Peipus catchment area are animal husbandry facilities as Estonia is one of the few EU Member States that has established the requirement of integrated environmental permit for bovine animal farms. Pursuant to the audit reports of integrated environmental permits the NAO assessed that in 2010 about a third of large farms in Jõgeva and Põlva counties had silage, manure and fuel storage facilities that did not comply with requirements. The condition was more or less satisfactory only in the large farms in Tartu County.

92. Much less is known about measures for the management of agricultural diffuse pollution. As the management of agricultural diffuse load seems to belong to the area of responsibility of the Ministry of Agriculture, the river basin management plans prepared by the Ministry of the Environment include little information on measures that would help reduce diffuse pollution. Several measures of the 2007–2013 Rural Development Plan help limit diffuse pollution⁴⁴. To reduce the spread of diffuse pollution, extensions of water protection zones, sediment pools and treatment wetlands are planned under the measure („Infrastructure of agriculture and forestry“) of the 2007–2013: in 2008, the share of environmental constructions was only 0.5% of the total amount of support but in 2010, the same figure was 7%.⁴⁵ Thus it can be said that environmental protection measures have received more attention over the last few years.

⁴³ Heinma, K. Results of the inventory of manure management of farms with stocking density over 10 in nitrate vulnerable zones. 2011.

⁴⁴ Under the second priority axis of the Rural Development Plan (RDP) – environmental support – , manufacturers shall receive support for less-favoured areas; Natura 2000 support for agricultural land and private forest land; agri-environment support (incl. support for environment-friendly management, organic production, maintenance of semi-natural biotic community, growing of local types of plants and keeping of animals of threatened breed); support for grazing; support for non-productive investments (incl. support for the creation of a green strip of several species, support for reconstruction of stone fence); support for establishing a protection forest on agricultural land.

⁴⁵ 460 structures; reference level of 180.

Did you know?

Among the studies of the Agricultural Research Centre, only the positive impact of organic farming can be observed where the average leaching of nitrogen in drainage water (2.6 kg/ha) was *ca* 1.5 times smaller than from the fields that had received support for environment-friendly management (4.2 kg/ha).

Despite the programmes of the rural development plan there are no signs of change in the status of Lake Peipus catchment area

93. As the improvement of water status is not the only objective of the measures of the Rural Development Plan and there are no indicators for measuring it, the impact shall depend on the specific supported project. For example, the potential impact on water of an animal farm or other object to be established shall depend on the protection level of groundwater, existence of bodies of surface water and other indicators related to location. Therefore, if the structure is constructed in a less-favoured area, impact on the status of water shall be negative. If the assessment of environmental impact is not carried out upon the construction of a new farm, or if the results of said assessment are not taken into consideration, it may lead to the increase in the number of animals and a great impact on groundwater and surface water, especially in regions with many farms (e.g. in the area of Pandivere).

94. The moderate water status has not improved in the agricultural regions in Lake Peipus catchment area, and it is unlikely to happen in the near future. According to the study of the Tallinn University of Technology⁴⁶ the use of mineral fertilisers may increase and production may become more specific which is why transfer of nutrients from agricultural lands may increase. Scope of impact of the measures improving the status of the environment is not yet known. To identify the scope of impact, it is necessary to obtain comprehensive monitoring data on the association between supports and the use of land and fertilisers.

95. The NAO is of the opinion that the state does not have a sufficient overview of implemented water protection measures and of their impact on water bodies. Lack of overview and scarce association of data and analysis is due to insufficient cooperation between state authorities in the exchange of information and use of said information for the provision of assessments and decision-making. In spite of large investments in the organisation of wastewater treatment plants, said plants are not functioning as required and there are problems with the prevention of agricultural point source and diffuse pollution as well as with the assessment of impact of measures implemented to this end.

96. NAO recommendation to the Minister of the Environment:

Assess as to what extent the pollution load in Lake Peipus catchment area has decreased after the construction and reconstruction of wastewater treatment plants, how efficient are the treatment plants (ratio of investments and results), why some treatment plants are not functioning although they received support and which is the need for funding for the required reconstruction of all wastewater treatment plants in Peipus catchment area.

Reply from the Minister of the Environment: Assessment on the change in pollution load, based on wastewater treatment facilities, can be found from the data published by the Environment Information Centre on the use of water. Such overview is drawn up every year and it will be accessible on the website of the Centre. The overview includes data on the pollution load from wastewater treatment plants. As a result of the interim assessment of water management plants, the measures implemented in the river basins of Estonia shall be mapped by the end of 2012 and an assessment is provided as to their impact.

⁴⁶ Study of the balance sheet of nutrients in Lake Peipus. External load. TUT, 2006, pp. 17–18.

Generally, the ratio of investments and results is not assessed as it is much more complicated to assess the efficiency of work of the treatment plant than to calculate the ratio of investments and results. Among other things, the efficiency of the treatment plant depends on operating costs, amount and nature of wastewater, condition of sewerage and technical solutions. Thus, each case should be assessed individually.

Ministry of the Environment is aware that not all treatment plants that received support are functioning in the required manner. This is why we have, due to §24(2) of the 2004–2006 Structural Aid Act (supervision over the activities of the final recipient shall be carried out by the Environmental Investment Centre, acting in the capacity of the final beneficiary) submitted a proposal to the Environmental Investment Centre in our letter No. 12-15/98-2 of 29 February 2012 to carry out additional follow-up inspection of the water management projects funded from the Cohesion Fund.

97. NAO recommendation to the Minister of the Environment and Minister of Agriculture: Reach an agreement as to the means that would enable to obtain a better overview of the agricultural pollution in the river basins, and of the impact of the support measures of the Rural Development Plan on the aquatic environment, and include this information in the river basin management plan.

Reply from the Minister of the Environment: For the better overview of agricultural pollution and the impact of the support measures of the Rural Development Plan on the aquatic environment, it is essential to implement the river basin management plan. This will enable to plan measures of the river basin management plan related to the diffuse load and coordinate the implementation of measures necessary for the management of diffuse load. In terms of the recommendation provided in the audit the Ministry of the Environment shall submit a written proposal and invitation to the Ministry of Agriculture to regularly provide, during future meetings of the water management committee, an overview of the impact of the support measures of the Rural Development Plan on the aquatic environment.

Reply from the Minister of Agriculture: Ministry of Agriculture is looking forward to cooperating with the Ministry of the Environment in supplementing the river basin management plans. Several support measures of the Rural Development Plan of Estonia have been included in the operational programmes of river basin management plans and the impact of measures should also be included. Impact of the environmental measures of the Development Plan (II axis measures) on the aquatic environment is assessed by the Agricultural Research Centre according to whom in the future the impact of environmental measures can also be assessed on the basis of river basin. Impact of the rest of the support measures on the aquatic environment has not been assessed during the monitoring and assessment of the development plan.

River basin management plans should include an overview of pollution of the aquatic environment, identified by the Environmental Inspectorate, incl. information on agricultural pollution and violation of water management requirements.

Supervision is mostly carried out over point source pollution as the inspection of diffuse pollution is too complicated

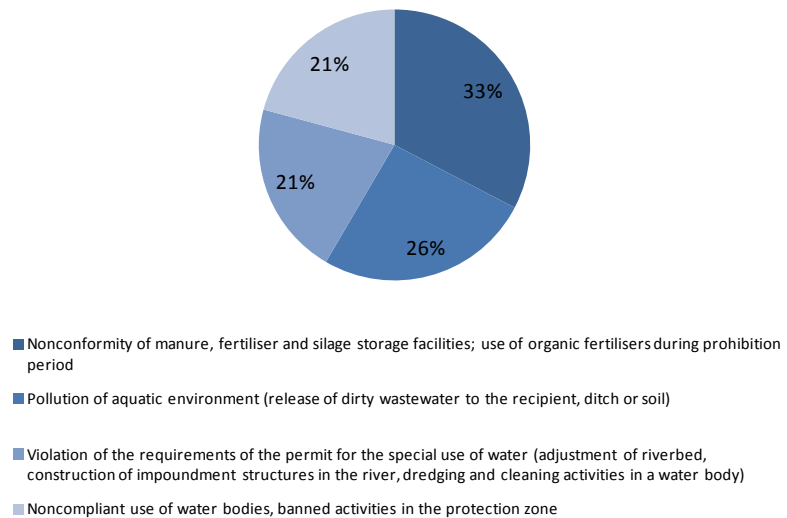
98. To prevent the pollution of Lake Peipus, supervision must focus on the inspection of areas and undertakings whose activity may result in the greatest environmental damage. Inspected entities must include the owners of environmental permits for whom the permits determine emission limit values, purification percentage of wastewater, etc., and agricultural producers who use fertilisers and pesticides. In planning monitoring activities it is important to draw up risk analysis and take into consideration both the need to inspect the compliance with requirements defined by legislation and the need to prevent violation of environmental requirements. Pursuant to the Environmental Supervision Act, the Environmental Inspectorate is the only state authority to carry out supervision in all areas of environmental protection. Other authorities carry out limited supervision over the handling of chemicals, fertilisers and pesticides.⁴⁷

99. The audit revealed that with all the obligatory monitoring objects the Environmental Inspectorate feels that it does not have enough employees to carry out supplementary supervision activities arising risk analyses. Owners of integrated permits are inspected once a year and in addition to this, follow-up inspection is carried out of undertakings with pending misdemeanour procedure or issued precept, as well as of problematic undertakings that need additional inspection. Pursuant to the risk assessments and sample prepared by the Agricultural Registers and Information Board, undertakings that have received EU agricultural support are also inspected.

100. In 2006–2010 the Environmental Inspectorate registered a total of 5686 violations in three counties – Jõgeva, Tartu and Põlva Counties – in Lake Peipus catchment area; the majority of said violations, i.e. 58%, was formed by violations of fishing requirements. The share of violations directly related to the aquatic environment was 2% (126 cases). Violations were identified during regular and irregular (responding to complaints) inspections and during inspections of conformity. In the last few years 46 violations of water protection requirements have been identified in Peipus catchment area (see Drawing 5).

⁴⁷ Technical Surveillance Authority, Health Board, Consumer Protection Board, Agricultural Board

Drawing 5. Division of violations of water protection requirements in Lake Peipus catchment area in 2010–2011 (n = 46)



Source: Environmental Inspectorate

Supervision does not employ all sources, incl. monitoring data, to identify violations of law

101. In order to inspect agricultural producers, the supervisory body should know the amount of nutrient and pesticide residue entering the environment. The audit revealed that supervisory bodies do not possess such information. Environmental Inspectorate does not employ monitoring data indicating the location of pollution; nor does it have access to reports by operators on the movement of chemicals and fertilisers which is why it is not able to identify all violators of law.

102. Supervisory bodies do not analyse the reports of national monitoring and does not take its results into account when planning monitoring activities. Monitoring plans do not include supplementary water samples for the identification of residue of pollutants. According to the Environmental Inspectorate, pollution can be identified only when water samples are taken from a direct emission from point source. In the case of diffuse pollution taking of water samples during supervision is not justified as the result of the analysis, i.e. nitrogen and phosphorus indicators cannot generally be associated with the activity of a specific agricultural producer, and it is not possible to identify the origin of dissolved nitrogen or phosphorus in the sample (natural or from agricultural production).

103. The NAO has already in its previous audit⁴⁸ recommended that in order to facilitate supervision over diffuse pollution, the information on the **field records** of all professional agricultural producers⁴⁹ should be aggregated in a single electronic database which would enable the supervisory body to check the use of fertilisers and pesticides by subjects and fields. Up to now the Ministry of Agriculture has been doubtful about the immediate establishment of the requirement for electronic field record, claiming that it is not yet possible for all producers but that it intends to find solutions in the long-term perspective.

Field record – Body of information kept by the agricultural producer, which includes information on arable land, soil samples and activities carried out on the field, incl. information on used fertilisers and pesticides as well as on seeds and other materials.

⁴⁸ NAO audit “Supervision over use of pesticides and mineral fertilisers” (2010).

⁴⁹ Pursuant to the farm accountancy data network a professional producer is a producer whose yearly standard total earnings amount to at least EUR 2400.

Supervision over diffuse pollution is complicated and impeded by the lack of norms and methods

Did you know?

Limitation of nitrogen fertilisers in nitrate vulnerable zones is relatively lenient as it allows to increase current level by at least three times. The permitted level has never been reached in the history of agriculture in Estonia.

104. In terms of agricultural diffuse pollution, the following is inspected: existence of fertilisation plans, adherence to limitations in the use of fertilisers (time; distance from the water body, sinkhole, etc.) in the fields of the producer. However, the actual use of fertilisers, which is the main reason of diffuse pollution, is not inspected. If the supervisory body does not happen to carry out its inspection at the moment of fertilisation, it is difficult to associate the activities described in the documents by the producer to actual events (single or divided use of fertilisers and pesticides, right dose, etc.) and without proving the accuracy of information it is not possible to impose sanctions on the polluter.

105. The Water Act establishes a nitrogen limit of 170 kg only for nitrate vulnerable zones⁵⁰ but not for one hectare of a crop or fertilised area but for the average of area under cultivation which is why it is not possible to monitor adherence to said requirement in the course of supervision. There are no methods for the inspection of the use of fertilisers; the respective regulation of the Minister of Agriculture of 2003 does not properly reflect the current situation and is not therefore usable in actual situations.

106. In Estonia such amounts of nitrogen that are currently permitted in nitrate vulnerable zones have never been used as the average of the land under cultivation. At the peak of large farms, in 1981–1985, the amount of nitrogen spread on one hectare of arable land was a third less than permitted today (an average of 111 kg).⁵¹ As a comparison, in 2010 only an average of 48 kg of nitrogen was used per one hectare. As nitrate vulnerable zones are already partially polluted by nitrates, the reduction of limit value should be taken into consideration to protect the water.

107. The state could use environmental support measures to limit the excessive use of fertilisers. Initially, one of the requirements for the support for environment-friendly management was that the applicant had to undertake to not spread more than 155 kg of nitrogen per one hectare of arable crop, and not more than 140 kg in nitrate vulnerable zones. This requirement was later changed into a recommendation. According to the explanation of the Ministry of Agriculture, the so-called Nitrates Directive permits the use of fertilisers as a requirement the adherence to which is very hard to check, only if the current limit is reduced by at least 30%. The Ministry feels that it is not sensible to reduce the limit established by the Water Act by a third which is why a proposal was made to exclude the requirement from the conditions for the support.

108. All in all, the NAO is of the opinion that sufficient supervision is carried out over the adherence to requirements established in environmental permits, safe admission to the market of chemicals and fertilisers and conformity to the requirements for their handling as well as over the inspection of producers during the allocation of EU support. To limit diffuse pollution, legislation must first be amended so that a legal basis would be established for the supervision of diffuse pollution in terms of norms, database and methods. Only then it will be possible to actually improve administrative inspection.

⁵⁰ In nitrate vulnerable zones, it is permitted to spread an average of 170 kg of nitrogen per year with manure and mineral fertilisers per one hectare of land under cultivation. Water Act, § 26³(3)

⁵¹ Agriculture in Estonia in XX century. Ministry of Agriculture, 2007, II ed., Table 2.11.

Good agricultural practice – generally recognised production techniques and methods the adherence to which does not pose a threat to the environment.

Source: Directive 91/676 (Protection of water bodies from agricultural pollution)

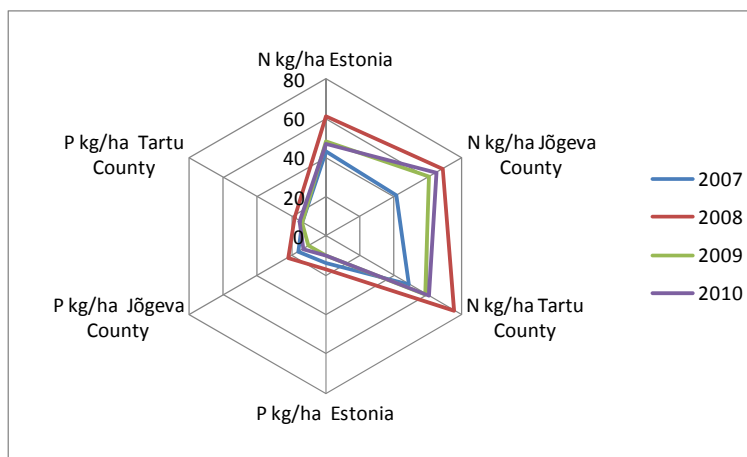
Good agricultural practice is being violated

109. According to the **good agricultural practice**, the optimal dose of nitrogen fertiliser for cereals (no norms have been given for rape) is 100 kg/ha as it is accompanied by the risk of washing nitrogen compounds out of the soil.⁵² Phosphorus may be given as a mineral fertiliser in up to 30 kg/ha. The aim of fertilisation is to use the fertilisers so that in addition to an increase in crops and the quality of harvest, soil fertility would also improve and pollution of the environment would be prevented.

110. The Ministry of Agriculture feels it is not sensible to establish limits on the use of fertilisers as the producers must voluntarily adhere to the good agricultural practice. The NAO inspected in the 30 structures with the biggest land use in Jõgeva and Tartu Counties whether the good practice is actually adhered to. Audited structures form 40% of cultivated agricultural land in Jõgeva County and 25% in Tartu County.⁵³

111. Agricultural pressure on the environment is more intensive in the catchment area of Lake Peipus. Drawing 6 shows that in all observed years (2007–2010) the use of fertilisers was bigger in Jõgeva and Tartu Counties than elsewhere in Estonia. The use of fertilisers was the biggest in 2008, after which it decreased and started to increase again in 2010.

Drawing 6. Use of mineral fertilisers (nitrogen N, phosphorus P) in 2007–2010



Source: NAO pursuant to the data of Statistics Estonia

Pressure of fertilisers on the aquatic environment is 1.5 times bigger in Lake Peipus catchment area than elsewhere in Estonia

112. As a result of the NAO analysis it was revealed that in 2010 the amount of mineral nitrogen used by large producers of Jõgeva and Tartu Counties on cereal and rape fields formed an average of 87–113 kg/ha. This corresponds to the optimal amount recommended in the good agricultural practice. Comparing it to the Estonian average (59 kg/ha on cereal fields and 72 kg/ha on rape fields), it becomes clear that the amount of fertiliser used in Lake Peipus catchment area is 1.5 times bigger than elsewhere in Estonia. The amount of phosphorus in Lake Peipus catchment area was 15 kg/ha on cereal fields and 22 kg/ha on rape fields while the respective number in the rest of the country was 13–18 kg/ha.

⁵² Water Act also allows larger quantities of mineral nitrogen than 100 kg per hectare but these should be spread gradually not all at once.

⁵³ Data from Statistics Estonia.

113. As organic fertilisers are given in addition to mineral nitrogen, the amount of nitrogen increased to 150–180 kg/ha on certain fields (in some fields the respective figure was more than 200 kg/ha). This significantly exceeds the amount recommended in the good agricultural practice. Rape is the most over-fertilised crop; the current harvest level of rape – 1.5 tons of seed from one hectare⁵⁴ – would be ensured by 80 kg of nitrogen.

114. Another circumstance disregarded during fertilisation is the principle of even spread of nutrients: nitrogen is not the only thing plants need for growth, they need several nutritive elements which ensure mutual influence of their efficiency. Thus, one large producer in Jõgeva County failed to spread phosphorus and potassium-based fertiliser on a cereals field of 703 ha while spreading a double dose of mineral nitrogen: 178 kg/ha. Studies show that for every 10 kg of nitrogen that is not used in the harvest, the nitrate content in the water increases by 3–6 mg/l⁵⁵, and nutrient residue reaches Lake Peipus.

115. The NAO is of the opinion that the measure for the adherence to the good agricultural practice is efficient both economically and in terms of environmental protection but that its supervision is currently not ensured. Large producers are oriented to large harvests and they use an excessive amount of fertilisers which is why their residue leaches into surface water and groundwater. Due to the weakness of legal basis, diffuse pollution turns into an anonymous, i.e. collective pollution and no one is responsible for it. However, sufficient regulation and supervision help prevent diffuse pollution and identify polluters. Such organisation of supervision is currently nonexistent.

116. NAO recommendations to the Minister of the Environment:

- Issuer of permit should establish additional environmental requirements for the owners of environmentally hazardous objects if the concentration of pollutant has increased to 75% of the quality norms of water. This would hinder the increase in the concentration of pollutants.
- In nitrate vulnerable zones establish a limit of 170 kg of nitrogen per one hectare of crop (in the current wording of the Act the limit of the average of cultivated land). For water protection, consider the implementation of such limit in the entire Peipus catchment area or the extension of the nitrate vulnerable zone to include the entire Peipus catchment area as it would be a more efficient means of limiting the excessive use of fertilisers.

Reply from the Minister of the Environment: Minister of the Environment shall consider the necessity for amending legislation and shall review the requirements established in the Water Act upon the application of respective limits.

Draft Act to amend the Water Act, prepared by the Ministry of the Environment and ready for approval, shall include a provision which shall ensure the calculation of the use of fertilisers on the basis of

⁵⁴ In 2010, rape harvest amounted to 1.3 t/ha in Jõgeva County and 1.4 t/ha in Tartu County.

⁵⁵ Viru-Peipus river basin management plan. Ministry of the Environment, 2005.

fertilised land or one hectare of pasture both in and outside nitrate vulnerable zones.

117. NAO recommendations to the Minister of Agriculture:

- Establish for the recipients of the support for environment-friendly management the obligation to adhere to the limit of use of fertilisers upon fertilising crops; said limits must not exceed the dose recommended in the good agricultural practice. Upon implementing the measure gather information on its potential impact on the status of water.
- Consider the introduction of electronic field record as a condition for the allocation of support to professional producers. This would increase the availability of data, facilitate supervision over compliance with requirements and increase the awareness of agricultural producers. As an alternative, anticipate the preparation of nutrient balance for the fields of agricultural producer in order to minimise the impact of diffuse pollution as it would enable to assess the excessive occurrence of fertiliser residue in the environment.

Reply from the Minister of Agriculture: The support measure for environment-friendly management is a five-year commitment and new requirements cannot be added to it during the current commitment period. New requirements could be added for the new persons joining the commitments but the budget for the support measure does not allow to further increase the number of final recipients, and new commitments will not be accepted in this support scheme. NAO recommendations can be taken into account upon the preparation of the development plan for the new programme period.

Agri-environment support can be paid for claims that exceed the requirements laid down in legislation. Adherence to the fertilisation norms given in the good agricultural practice could be made into a claim compensated with support if the legislation would clearly determine the requirements that would allow fertilisation in significantly bigger amounts than recommended in the good agricultural practice. While in the good agricultural practice the need for nitrogen of crops is given depending on the crop in question, intended harvest and level of need for fertilisation of the soil, the legislation establishes nitrogen quantities on the basis of grown crops and intended harvest only for nitrogen given with mineral fertilisers which exceed the limit established in the Act. Other limit values for the use of fertilisers are established on the average per one hectare of cultivated land. Flexibility established in the legislation does not enable to specify how different the actual limit values are for fertilisers provided in the legislation and good agricultural practice.

The Ministry of Agriculture feels that it is important to ensure balanced fertilisation and has, through the environmental measure of the development plan, supported the preparation of fertilisation plans, sampling of soil and manure analysis, training courses, etc. which would enable the producer to use fertilisers more economically and in an environmentally sustainable manner.

Introduction of electronic field record as a condition for the allocation of support for producers requires the development of software aggregating

the data on the field records of agricultural producers, and further maintenance of said database. We shall consider the recommendation of the NAO during the preparation of the development plan for the new programme period. Preparation of balance for nutritive elements in the fields of agricultural producers could be one of the measures of environmental support the implementation of which could be taken into consideration upon the preparation of Estonian Rural Development Plan for 2014–2020. Up to now, balance of nutritive elements have been prepared in the course of the assessment of the environmental measures of the development plan.

Cooperation between Estonia and Russia in the protection and use of Lake Peipus

Water and pollution know nothing of state borders

118. The improvement of Lake Peipus as a transboundary body of water can be achieved only by the efforts of all border states. To improve the ecological status of transboundary bodies of water it is very important to ensure cooperation between neighbours in the approval of monitoring and research programmes as well as various action plans and protective measures, planning of joint activities and implementation of management principles on the basis of catchment area. Importance of diverse cooperation is also stressed in the UN Convention of International Transboundary Watercourses, European Union Water Framework Directive⁵⁶ and the cooperation agreement concluded between Estonia and Russia. Efficient cooperation is essential for the improvement of the status of a water body like Lake Peipus.

Transboundary cooperation for the protection of Lake Peipus is carried out by Estonia and Russia's joint committee

119. For the coordination of the cooperation agreement, a joint committee of Estonia and Russia on the protection and sustainable use of transboundary water bodies was established in 1998. To address the relevant areas of cooperation of the cooperation agreement the joint committee established two working groups: one for the complex management of water resources and another for monitoring, assessment and applied research.

120. Pursuant to the cooperation agreement between Estonia and Russia the main duties of the committee are as follows:

- Approval of monitoring, scientific research and other plans, projects and programmes related to the activities regarding transboundary water bodies;
- Organisation of the development of normative indicators of water quality and of the approval of analysis methods;
- Preparation of proposals for the supplementation of national legislation on transboundary water bodies of the parties;
- Organisation of exchange of current and immediate information on the status of transboundary water bodies;
- Establishment of the procedure for cooperation in emergency situations;

⁵⁶ WFD, Art. 12, Art. 13.

- Inclusion of executive power and local governments as well as research and non-profit organisations and other authorities, and facilitation of cooperation in the field of protection and sustainable use of transboundary water bodies.

Efficiency of bilateral cooperation has not been assessed

121. The aim of the joint committee established under the cooperation agreement on the protection and sustainable use of transboundary water bodies of Estonia and Russia is to organise the cooperation of parties in the protection of transboundary water bodies and their ecosystems, and their sustainable use. To this end, it is necessary to carry out tasks agreed upon in the agreement (see Clause 119) and regularly assess whether the adopted decisions and implemented activities have contributed to the protection and sustainable use of transboundary water bodies.

122. In yearly joint meetings both states shall provide an overview of the situation of water management in the territory of their state but the efficiency of the 14 years of work of the joint committee has not been assessed on the performance of the cooperation agreement between Estonia and Russia. Assessment of the activity of the cooperation committee would be easier if the data presented at the meetings over the 14 years were aggregated and the performance of decisions of the joint committee analysed.

123. Joint expeditions, sittings of the cooperation committee and meetings of working groups have contributed significantly to the cooperation. However, the minutes show that several adopted decisions have not been carried out or that their deadlines have been extended many times although there is no justification for this. At times it is difficult to identify the content of a certain document or approval paper (annexes to some minutes are missing) and what has followed the coordination or approval.

Performance of the tasks of the cooperation agreement must be improved

124. Pursuant to the cooperation agreements the duties of the Estonia and Russia's joint committee include the approval of scientific research, monitoring and other plans, projects and programmes related to the activities regarding transboundary water bodies.

125. For the approved organisation of applied research, in 2007 the joint committee established **four priority directions** that should be addressed before any others. Likewise, the joint committee proposed to organise joint seminars on certain topics so as to encourage active informal discussion. To this end, two research seminars have been organised (in Haapsalu in 2010 and in Valдай in 2011).

126. The minutes of the sitting of the joint committee indicate that there are several topics that must be addressed, and the need for which has been mentioned many times over the years, but nothing has been done yet (e.g. nutrient balance studies in Lake Peipus). According to the Ministry of the Environment the volume of applied research is currently insufficient due to the limited budget. For both Lake Peipus and Narva reservoir there are problems with the calculation of water balance, assessment of the load of natural nutrients, etc.

Performance of duties arising from the cooperation agreement between Estonia and Russia have not been assessed

The amount of applied research is not sufficient

Four priority directions of applied research – Balance of biogenic substances in Lake Peipus; water balance in Lake Peipus and Narva reservoir; hydromorphological status of the Narva River and transport of sediments; spread of macrophytes and filling up of the banks of Lake Peipus, River Narva and Narva reservoir.

Estonia and Russia's joint expeditions provide comparable monitoring data

127. Since 2001, Estonia and Russia's joint expeditions have been carried out on Lake Peipus and Narva reservoir on the initiative of the joint committee; these provide comparable monitoring data for both sides. As of 2004 the joint expeditions of hydrobiological and hydrochemical monitoring have been organised three times a year.

128. During winter and summer joint expeditions samples of hydrobiological and hydrochemical monitoring are taken from the 15 monitoring stations on Lake Peipus (northern part), Lake Lämmijärv and Lake Pihkva (6 of the stations are located on the Estonian side and 9 on the Russian side). Joint monitoring has generally been carried out from Estonia's ships and hovercrafts; the expenses of joint expeditions have been covered by the Estonian side. Although there have been certain glitches in joint monitoring in some years, e.g. summer monitoring was postponed till autumn or another monitoring could not be carried out on the Russian side (e.g. in 2004 summer monitoring on Lake Pihkva could not be carried out for technical reasons and in winter expedition of 2005 was cancelled on the Russian side), the joint expeditions have been an essential part of the cooperation between Estonia and Russia.

Joint monitoring on Lake Peipus lacks a long-term approved monitoring programme

129. The Convention of Transboundary Watercourses⁵⁷ establishes that neighbouring countries shall prepare and implement joint monitoring programmes for the monitoring of the status of transboundary water body and of cross-border impact. Likewise, the cooperation agreement between Estonia and Russia establishes that neighbours shall carry out monitoring pursuant to the monitoring programmes approved by the joint committee. Joint monitoring programme, under which both the monitored parameters and methods of monitoring have been agreed upon, is essential for gathering comprehensive, reliable and comparable information on important water bodies, based on which it is possible to assess the status of the body of water.

130. Up to now the Estonian and the Russian side have not agreed upon a long-term comprehensive water monitoring programme for the entire Lake Peipus catchment area although it has been tried several times in the joint committee. More recently, in 2011 the joint committee asked the monitoring working group to prepare a monitoring programme for the Narva River basin, incl. the transboundary water objects of Lake Peipus (northern part) and Lake Pihkva, for the period of 2012–2013 and submit it for approval to the joint chairmen of the committee by December 2011. As at the end of 2011, the joint monitoring programme of Estonia and Russia of the Lake Peipus catchment area was still being prepared by the monitoring and applied research working group.

131. According to the NAO it is essential for the better organisation of joint monitoring between Estonia and Russia to agree on a long-term comprehensive joint monitoring programme of at least 6 years. The joint monitoring programme of Lake Peipus that was being prepared at the end of 2011 is once again a short-term programme and does not enable to plan for a monitoring of a longer interval. For example, the Ministry of the Environment feels it is sensible to carry out monitoring of macroflora with the interval of three years. Likewise, it would be sensible to carry

⁵⁷ International Convention on the Protection and Use of Transboundary Watercourses and International Lakes, ratified by Estonia on 3 May 1995.

out phosphorus analysis of sediments and monitoring of hazardous substances as interval monitoring.

Estonian and Russian side use different indicators for the assessment of water quality

132. Pursuant to the Convention on the Protection of Transboundary Watercourses and Estonia and Russia's cooperation agreement, the states lying on the banks of the water body must carry out joint or coordinated monitoring and assessment of the status of the body of water. In order to gather comparable results and assessments it is important to agree on monitored pollutants, joint parameters for the assessment of water quality and methods for water sampling and analysis. The cooperation agreement mentions that if norms and standards should differ, the stricter norm or available analysis method with more precise results shall serve as a basis, or a new, stricter norm shall be developed when compared to those established in the national legislation of the parties. The duty of the Estonian and Russian joint committee is to harmonise water quality indicators and approve analysis methods.

133. However, in reality the methods for assessment of the status and water quality of Lake Peipus have not been harmonised. On the assessment of the status of water the neighbouring countries continue to rely on the water quality indicators established in their respective national legislation, methods for the establishment of said indicators and standards that have not been harmonised. Thus, the neighbours' assessment of the status of Lake Peipus may be similar but the content of assessment is not the same due to differences in the methodological basis. Likewise, neither the Estonian nor the Russian side have properly harmonised the analysis methods used for monitoring which is why there are still cases where the laboratories obtain significantly different results for the analysis of the same water samples (see Clause 44 and Table 3).

134. For years the joint committee's monitoring and applied research working group has addressed the issue of development of joint criteria for the assessment of water quality but has not achieved the approval of joint normative indicators and joint methodology for the assessment of status. The Ministry of the Environment is of the opinion that neither side feels it is possible for them to change their norms. Water quality indicators of the Estonian side are connected to quality indicators of the WFD. On the initiative of the joint committee laboratories carrying out chemical analysis have spent a lot of time on the harmonisation of sampling and analysis methods but differences can still be found in methodology (see Clause 42–44).

Exchange of monitoring data between the two states has not been consistent

135. Pursuant to the Estonian and Russian cooperation agreement, monitoring data shall be made available for both sides and both side shall exchange data on monitoring carried out pursuant to the approved programme. For the observation and comprehensive assessment of the status of the transboundary water body, it is essential for both sides to be consistent in the exchange of monitoring data.



Winter expedition of the Estonian and Russian joint committee in March 2010 on Lake Peipus, and summer expedition in August 2009.

Photos by: Külli Kangur

Procedure for the exchange of data has not been agreed upon

Water protection objectives and activities have not been approved

136. Monitoring data of different sides has not been made available to the other side in a consistent and comprehensive manner, and there have been serious gaps in the exchange of data. In the first years of the activity of the Estonian and Russian joint committee, exchange of monitoring data gathered during joint expeditions was carried out every year pursuant to the agreement concluded in the previous year. Later, regular exchange of data stopped for several years and according to the Ministry of the Environment it was partially due to the reorganisation of work in the Environment Information Centre. In 2005 it was mentioned in the minutes of the joint committee that the exchange of monitoring data has been irregular for technical reasons.

137. In 2010, an inventory of monitoring data was carried out on the Estonian and the Russian side to identify shortcomings in the database. As a result of the inventory the Estonian side identified shortcomings in the hydrochemical and hydrological data on the Russian side for the period of 2006–2010 (monitoring data on the Narva River and rivers in Russia). The Russian side lacked data on the hydrochemical monitoring of Lake Peipus and Lake Pihkva and Narva reservoir for the period of 2001–2005. Problems with data exchange have been discussed in the sittings of the Estonian and Russian joint committee (more recently in August 2011) and the meetings of the committee's working groups. According to the Ministry of the Environment, the missing information identified in the course of inventories has been forwarded to both sides.

138. Up to now the joint committee has not agreed upon the procedure for the exchange of monitoring data, establishing which data, in which format and how often shall be exchanged and with whom. Work schedule of the monitoring and applied research working group, approved by the joint committee in 2011, establishes that the exchange of monitoring data shall be carried out in the II quarter of the year following the accounting year. Ministry of the Environment has not seen the need for a separate procedure for the exchange of monitoring data and finds that consistent exchange of information in the future shall be ensured by reliable relations between both sides and current agreements.

139. The Convention on the Protection and Use of Transboundary Watercourses does not establish that neighbouring countries are required to prepare a joint water management plan but it has set an objective to develop approved action programmes to reduce pollution load from sources of pollution. Likewise, the Water Framework Directive establishes a substantial objective for the Member States to prepare water management plans:

In the case of an international river basin district extending beyond the boundaries of the Community, Member States shall endeavour to produce a single river basin management plan, and, where this is not possible, the plan shall at least cover the portion of the international river basin district lying within the territory of the Member State concerned.

Source: Article 13(3) of the Water Framework Directive

140. Although the Estonian and Russian cooperation agreement does not clearly establish the need for the objectives of water quality and status of water, the Convention of Transboundary Watercourses establishes that the parties occupying the banks of said water bodies develop joint water

quality objectives and criteria. Lake Peipus sub-basin management plan establishes that transboundary cooperation is organised by the Estonian and Russian joint committee and that by the end of 2005 it hopes to develop, in cooperation with Russia, the joint transboundary environmental objectives for Lake Peipus.⁵⁸ Minutes of the sittings of the joint committee do not indicate that it has been done.

141. So far there is no jointly approved water management plan for Estonia and Russia. The Estonian side felt (minutes from 2006) that it was not sensible to prepare a joint water management programme for Lake Peipus river basin in the form of a single document. It becomes clear from the minutes of the sittings of the joint committee that either side has informed the other of the preparation of water river basin management plans and investments in water protection but the objectives and activities for the protection of Lake Peipus have not been officially approved. The minutes of the sittings do not indicate that the sides have discussed the content of water management plans and implemented measures. In a sitting in 2008 the committee asked the working group for the complex management of water resources to develop the rules and regulations for the approval of river basin management plans (administration programmes of transboundary watercourses) prior to the end of the first quarter of 2009 but the minutes of the joint sitting of 2009 do not contain information on the work of the water resources working group or said rules and regulations. According to the Ministry of the Environment there are no such rules and regulations.

142. Joint water management programme for Lake Peipus was completed in 2005 under an international project.⁵⁹ The overview of activities implemented under this river basin management programme of Lake Peipus catchment area, commissioned in 2008,⁶⁰ claims that on the Russian side the river basin management plan has unfortunately not reached the executive power of St. Petersburg and Pihkva Oblasts and thus, measures arising from the programme have not been implemented. The Estonian side used the data from the programme in the preparation of Viru and Lake Peipus sub-basin management plans and shall implement measures through these RBMPs, not by adhering directly to the joint water management plan.

143. The Lake Peipus sub-basin management plan and East Estonian basin management plan contain only little information on the impact of the Russian side on the catchment area of the lake and the status of the water body. At the same time it is common knowledge that the main reason behind the poor status of the lake is phosphorus. Rivers on the Russian side bring in more than 60% of the total phosphorus load of Lake Peipus and the concentration of phosphorus in Lake Pihkva is five times the

⁵⁸ Peipus sub-basin management plan, p. 90

⁵⁹ Project of the UN development programme and Global Environmental Facility „Development and implementation of the river basin management plan of the catchment area of Lake Peipus” (2003–2005). Prepared water management plan included common objectives and coordinated water protection activities (measures). The programme was approved by the joint chairmen of the Estonian and the Russian side of the joint committee and the Ministry of the Environment of the Republic of Estonia and the Ministry of Natural Resources and the Environment of the Russian Federation were made responsible for implementation of the programme.

⁶⁰ Overview of the implementation of the transboundary water management plan of Peipus catchment area, 2006–2007. Peipus Centre for Transboundary Cooperation, 2008.

concentration in the northern part of Lake Peipus (northern part).⁶¹ It is clear that (anthropogenic) nutrient load from the Russian side has a great impact on eutrophication which is why, to improve the status of the lake, it is necessary to implement water protection measures also on the Russian side. Status of Lake Peipus cannot be improved without cooperation and national plans should address it better.

144. The NAO is of the opinion that the Estonian and Russian joint committee on transboundary watercourses has carried out long-term and consistent activities with border countries in the exchange of information and organisation of joint monitoring expeditions and research seminars, and it is clear that the activities of the joint commission have been essential for the development of the cooperation between Estonia and Russia. At the same time, the joint committee has not managed to agree upon several relevant issues. If there is no common understanding on the objectives to be achieved upon the protection of the lake (e.g. how much should pollution load be reduced), and no common water management plan, and water protection measures have not been officially approved, it may lead to a situation where the most significant activities for the improvement of the status of Lake Peipus will not be carried out. It would be difficult to assess the efficiency of the implementation of measures and impact on the change in the status of the lake, as well as the extent of necessary cooperation between countries so as to improve the status of the lake. Therefore, the status of Lake Peipus may not improve at all.

145. NAO recommendations to the Minister of the Environment:

- Draw up a joint river basin management plan for the states or approve water protection activities; first and foremost, agree on common objectives for water quality and status of the water body and their assessment criteria as well as their relevant pressure factors and alleviation measures.
- Prepare and agree on a long-term joint monitoring programme (for at least 6 years) which would enable to plan for monitoring of long intervals and the period of which would be comparable to the evaluation period of the EU Water Framework Directive.
- Draw up and agree with the Russian Federation on the procedure for the exchange of monitoring data which would clearly establish which data shall be exchange in which format and with whom.
- Agree on a long-term cooperation programme for the joint committee and regularly assess the success of the joint committee in the implementation of the cooperation agreement.
- Adhere to the agreement on the equal division of expenses.
- Commission applied research to supplement river basin management plans (e.g. nutrient balance studies).

⁶¹ Peipus. Institute of Agricultural and Environmental Sciences of the Estonian University of Life Sciences, 2008.

Reply from the Minister of the Environment: Use and protection of transboundary water bodies and the organisation of water management in transboundary river basins is regulated by the international agreements of the Republic of Estonia. Pursuant to the European Union legislation, the Republic of Estonia shall try to ensure the implementation of approval activities so as to ensure the attainment of water management plan objectives on the Estonian side of the river basin. To this end, we have forwarded information on the activities planned or implemented for the attainment of river basin objectives, and harmonised monitoring methods. To prepare a joint water management plan or water protection activities we shall continue to increase the efficiency of the exchange of information and establishment of common objectives.

Second recommendation: Long-term water monitoring programme for the Estonian river basins for 2010–2015 has already been prepared and approved by Directive No. 1085 of the Minister of the Environment of 15.07.2011. Water monitoring programme for 2010–2015 includes both surveillance monitoring and operational monitoring. Investigative monitoring shall be carried out as the need for it arises. To this end, it must be possible to respond to a deteriorated situation even without changing the long-term monitoring programme.

Draft joint water monitoring programme for transboundary water bodies for the period of 2012–2013 has been prepared and approved and shall be submitted for approval at the next sitting of the joint committee. It is basically a long-term monitoring programme which shall be reviewed and supplemented periodically and implemented also during future periods.

Third recommendation: Procedure for the exchange of monitoring data, volume of data, relevant authorities and responsible persons have been established in the draft joint monitoring programme for 2012–2013, completed at the end of 2011.

Fourth recommendation: Existence of a long-term cooperation programme is essential in the transboundary cooperation of Estonia and Russia, and this issue has been addressed in the joint committee. Ministry of the Environment and the Russian side shall continue to prepare a cooperation programme for the period of 2013–2015.

Fifth recommendation: In the future, in joint monitoring activities, we shall try to achieve the proportional division of expenses on ships and hovercraft.

Sixth recommendation: Upon planning research activities, the Ministry of the Environment shall take into account the perspective research directions approved by the joint committee on transboundary watercourses in 2005, and the priorities established in 2007–2009.

/Signed digitally/

Tarmo Olgo
Audit Director, Performance Audit Department

NAO recommendations and replies from the Ministers of the Environment and Agriculture

Based on the audit the NAO made several recommendations to the Ministry of the Environment and the Ministry of Agriculture. The Minister of Agriculture replied to NAO recommendations on 16.03.2012 and the Minister of the Environment on 20.03.2012

NAO recommendations	Replies from auditees
Improvement of water monitoring 46. NAO recommendations to the Minister of the Environment: - Develop sub-schemes for surveillance, operational and investigative monitoring and integrate these into a single long-term water monitoring scheme. In developing these sub-schemes, take account of the need to evaluate the effectiveness of implementing the measures of river basin management plans. - Consolidate aquatic environment monitoring data and results of all ministries so that the necessary information would be readily available and analysable for the entire basin (e.g. the Environment Information Centre should develop a comprehensive information system). - Include monitoring of hazardous substances in the long-term national monitoring scheme. In the monitoring scheme, specify the hazardous substances monitoring points on Lake Peipus and on river discharging therein, and monitoring frequency and methods. Include the detection of priority hazardous substances in living organisms in the monitoring of hazardous substances. - Include fish fauna monitoring in the national hydrobiological monitoring to allow evaluating the status of Lake Peipus fish populations and their relationship with the lake's ecosystem in entirety. To this end, develop the fish fauna monitoring methods first. - Provide for monitoring methods (frequency, analytical determination methods) also in transboundary cooperation documents. (Par. 32–45)	Reply from the Minister of the Environment: the long-term water monitoring program in Estonian river basins for 2010-2015 has already been drafted and approved by Directive No. 1085 of 15.07.2011 of Minister of the Environment. The said program includes surveillance and operational monitoring. Investigative monitoring is carried out as investigation needs arise. To this end, there must be capacity to respond to adverse developments without modifying the long-term monitoring program. The draft program for joint water monitoring of transboundary water bodies for 2012-2013 has been developed and approved and will be submitted for adoption at the next meeting of the Joint Committee. In principle, it is a long-term monitoring program which is reviewed and modified periodically and implemented over the following periods too. Second recommendation: to improve the accessibility of environmental monitoring data collected within the government area of the Ministry of the Environment, the program „Development of Environmental Monitoring and Data Acquisition“ (KESE) financed from the European Regional Development Fund and ending on 31.12.2015 has been launched. The program is used to renew the monitoring data system to improve data acquisition and meet the information needs of users as regards monitoring data. The consolidation of the records of the Environmental Register and the results of environmental monitoring carried out within the government areas of other ministries can be done on output level (not information system, namely this database), considering: - limitations on databases maintained by public authorities set out in the Public Information Act (it is prohibited to establish separate databases for collecting the same data, i.e. data must be physically consolidated into a database of a certain authority); - legislative (e.g. Spatial Information Act, Environmental Register Act, etc) and technical issues related to the cross-usage of databases of relevant authorities to avoid the above situation; - the complexity, labour intensity and cost of developing IT solutions for consolidating the records of databases with different software platforms and different structures. In view of the above, we find it reasonable that the records of different authorities are made available (cross-usage of data) by data stewards themselves, not consolidated into a single database. These aspects are considered also in the development of the environmental monitoring information system within the KESE program. Third recommendation: the long-term water monitoring program in Estonian river basins for 2010-2015 has been drafted and approved by Directive No. 1085 of 15.07.2011 of Minister of the Environment. The program specifies monitoring points on the Estonian side where hazardous substances must be monitored to determine the chemical status of surface water. Where necessary, the monitoring program is adjusted according to the analysis results of samples taken in points specified in the program. The next adjustment is planned in 2014 once the inventory results for all hazardous substances are available. Then, the need for constant monitoring of hazardous substances will be considered. Currently, the results of special surveys for detecting hazardous substances (incl. in biota and sediments) have not implied the need for constant monitoring since the concentrations of hazardous substances in transboundary water bodies have remained below the limits of analytical determination of labs and/or limit values. According to the Estonia-Russia joint monitoring program, hazardous substances are monitored 1 (heavy metals) to 4 (petroleum products,

NAO recommendations	Replies from auditees
	phenols) times per year, depending on the substance. Fourth recommendation: each year, the stocks of managed fish species are monitored, but specific fish fauna monitoring to evaluate the ecological status of water bodies is not carried out. To improve the assessment of the ecological status of Lake Peipus the Ministry of the Environment plans to outsource the development of fish fauna monitoring methods and the analysis of the cost of monitoring. These methods and analysis should be complete in 2014 at the latest. Monitoring based on these methods will start in 2016 provided that funds will be made available to this end. The details of fish fauna monitoring will be negotiated with the Russian counterparts. Fifth recommendation: the Estonia-Russia Joint Committee took note of the information on EU monitoring methods. For hydrochemical indicators the Estonian and Russian counterparts have agreed on the choice of methods and monitoring frequencies. The choice of methods and need for harmonisation for the remaining indicators will be decided in connection with subsequent modification and updating of monitoring programs.
Detailed description of water protection measure 53. NAO recommendation to the Minister of the Environment: Describe in the RBMP and its programme of measures in greater detail the supplementary measures to be taken by 2015 which improve the status of water bodies with unsatisfactory status, incl. Lake Peipus and Lake Pihkva, and which would ensure the attainment of objectives by 2021 at the latest. Make sure that the implementing plans for the programmes of measures of the RBMPs specify the timetable and bodies for implementing the measures. (Par. 48–52)	Reply from the Minister of the Environment: rendering the envisaged measures more detailed is inevitable and no measures could be implemented otherwise. The Ministry of the Environment is preparing the draft Government Regulation „Procedure for Preparing River Basin Management Plans“ which provides that information included in the programmes of measures of river basin management plans must be much more detailed. By the end of 2012, an interim evaluation of the RBMP will be carried out to collect additional information on measures, cost, technical feasibility, implementing possibilities and bodies, interconnection with objectives, etc. The results of interim evaluation will be considered in preparing and updating the implementing plan of the RBMP. In April 2012, the action plans for implementing the programmes of measures will be submitted for review to the Water Management Committee set up by the Minister of the Environment which allows immediate consideration of the recommendations on the timetable and bodies for implementing the revised measures. Once endorsed by the said Committee, the action plans will be submitted for approval to the Minister of the Environment.
Drawing attention to relevant problems, especially to diffuse pollution from agricultural activities 64. NAO recommendation to the Minister of the Environment: Since agricultural diffuse pollution is the major pressure factor in the Peipus catchment area and its minimisation has received less attention than point loads, the following should be done: - plan and implement supplementary measures for minimising the effect of diffuse pollution, for example by establishing water protection (buffer) zones and artificial wetlands / sediment basins, use of evergreen vegetation etc; - make sure that the planning of water protection measures is aimed first and foremost at the resolution of important problems. Importance should be assessed in the course of drafting the programme of measures of the management plan as the Environmental Investment Centre (EIC) and other donors use this as a reference in making funding decisions. In this context, the EIC's financing criteria should be revised and aligned with the objectives of the management plan. The Environmental Board as the body coordinating the river basin	Reply from the Minister of the Environment: planning and implementation of measures is based on environmental objectives. To achieve or ensure compliance with environmental objectives it is necessary to limit or reduce the pressures from various pollution sources. Often, the cumulative impact of different sources must be taken into account. Further, the technical feasibility and cost of implementing the measures must be assessed. Indeed, agricultural diffuse pollution represents a considerable pressure in the Peipus catchment area, but its impact cannot be evaluated without the lake's internal load which also has a major impact on the nutrient content of the lake. In minimising the impact of pollution we have focused on all pressure sources and evaluated the measures in the light of technical feasibility and implementing costs. The obligation to reduce the impact of point loads is set out also in the Municipal Wastewater Purification Directive and the Nitrates Directive. Less attention has been paid to measures which, according to readily available information, are technically too complicated to implement or excessively costly compared to other similar load reduction measures. Implementation of the rather complicated measures mentioned in the proposal shall require a longer period of preparation. To this end, the Ministry of the Environment intends to look into potential measures for reducing diffuse load. Previously, several studies have been carried out on the implementation of diffuse load measures on load sources (agricultural producers) or for the settlement of an existing problem (leak-tightness of manure and silage storage facilities). Last year, the possibility of implementing other potential diffuse load measures was studied for the first time, based on similar studies and results of international cooperation in the European Union. This year, the Ministry of the Environment, based on said study results, intends to continue specifying the measures needed to manage diffuse load in order to ensure implementation of river basin management

NAO recommendations	Replies from auditees
management plans should make efforts to ensure that projects related to the resolution of important problems are drafted and submitted for financing as a matter of priority. (Par. 54–63)	plans and rural development plan. To better consider the relevance of problems, river basin management plans provide assessments on the relevance of load on the aquatic environment. The beginning of this year saw the initiation of modernisation of river basin management plans. Characteristics of each river basin, overview of load and impact by human activity on the aquatic environment as well as the economic analysis of water use shall be updated. Among other things the list of evaluated and analysed loads shall be updated. This ensures more precise calculation of different types of diffuse load, and relevance. Updated overviews serve as a basis for the preparation of operational programmes which shall also be submitted for approval to the Government of the Republic by 2015 at the latest. According to the Act amending the Water Act, entered into force on 17 July 2010, the implementation of operational programmes and river basin management plans must begin on 22 December 2012 at the latest. We intend to specify Directive No. 494 of the Minister of the Environment of 5 April 2010, establishing the duties of the Ministry of the Environment in updating and implementation of river basin management plans so as to ensure more efficient implementation of river basin management plans and better results on the spot. To ensure the implementation of river basin management plans it is also necessary to update the procedure of financing of the Environmental Investment Centre and regarding the river basin management programme it is advisable to take account of relevant loads mentioned in the river basin management plans, the impact of which on the aquatic environment must be reduced. Duties of the Environmental Board regarding the preparation of projects needed for the implementation of river basin management plans shall be specified in Directive No. 494 of the Minister of the Environment of 5 April 2010, establishing the duties of the Environmental Board in updating, implementation and adjusting of river basin management plans, and in updating the procedure of financing of the Environmental Investment Centre. In addition to the measures in river basin management plans, minimum requirements for fertilizers and pesticides have been established with the agri-environment support measure of the 2007–2013 rural development plan for the recipients of said support. The requirements regarding the use of fertilizers established with the Water Act shall be monitored by the Environmental Inspectorate in compliance with the conformity system. In the period in question there were 1967 applicants for the measure and the measure was implemented on 453 192 hectares. Buffer zones have already been established as a measure with Regulation No. 11 “Good agricultural and environmental conditions, specific procedure for conforming to the requirement of preserving the area of permanent grassland, bases and procedure for the transfer of the obligation to preserve the area of permanent grassland and specific procedure for the implementation of measures taken for the preservation of permanent grassland” of the Minister of Agriculture of 17 February 2010 pursuant to the requirements of the Water Act”.
Supplementation of river basin management plans 72. NAO recommendation to the Minister of the Environment: Supplement river basin management plans so that they would provide an overview of all water protection measures ensuring the attainment of good status of water bodies, incl. the measures of the rural development plan and measures which are not funded by the state. Special attention should be paid to the development of supplementary measures (taking into consideration the recommendations of the European Commission) which shall help reduce the impact of significant pollution sources (e.g. agricultural diffuse pollution, prohibition of phosphates in detergents). Plans of measure must determine in greater detail the persons responsible for implementation and (interim)	Reply from the Minister of the Environment: Said supplements are mostly related to the specification of information describing the measures so as to facilitate the selection of measures and coordinated implementation between various authorities. These supplements shall be gradually added to updated river basin management plans. As to the plans of measure (incl. operational programmes and action plans for the implementation of operational programmes), their level of detail shall be determined with the Directive of the Minister of the Environment, regulating the procedure of implementation of river basin management plans. Information received from the Russian Federation is essential in order to better address in the river basin management plans the pressure factors in Peipus catchment area as well as pollution load and possibilities for its reduction. To this end, we shall continue improving the exchange of relevant information with the Russian side.

NAO recommendations	Replies from auditees
deadlines for the attainment of objectives. ■ In the future, the river basin management plan should address the pressure factors of the entire Peipus catchment area, pollution load and possibilities for its reduction as a whole, taking into account the information received from the Russian Federation. (Par. 65–71)	
Obtaining an overview of implemented water protection measures and assessment of their efficiency 83. NAO recommendation to the Minister of the Environment: Ministry of the Environment and the Environmental Board should ensure an overview of all implemented activities (measures) in the sub-basin so that it would be possible to assess the efficiency of the implementation of measures. To this end, it is necessary to aggregate and associate the following: ■ Data on surveillance monitoring, water bodies and pollution load from the Environment Information Centre; ■ Data on the undertakings' own monitoring and surveillance monitoring from the Environmental Board; ■ Data on fertilizers and pesticides and on the implementation of the measures of the rural development plan from the Ministry of Agriculture; ■ Data on the implementation and funding of projects from the Environmental Investment Centred. Collect additional information on the water protection measures implemented by local governments and undertakings. Establish an information system in cooperation with listed parties so as to aggregate data and analyse its efficiency, to provide estimates and make decisions. Specify the role of the Environmental Board as the coordinator of river basin management plans in obtaining an overview of the implementation of measures and their impact. (Par. 73–82)	Reply from the Minister of the Environment: Said supplements are mostly related to the specification of information describing the measures so as to facilitate the selection of measures and coordinated implementation between various authorities. These supplements shall be gradually added to updated river basin management plans. As to the plans of measure (incl. operational programmes and action plans for the implementation of operational programmes), their level of detail shall be determined with the Directive of the Minister of the Environment, regulating the procedure of implementation of river basin management plans. For the better use of various data (incl. monitoring, measures, etc.), the Ministry of the Environment intends to improve access to the information systems and databases related to water management. Use of monitoring data, incl. collection, analysis and presentation of monitoring data, shall be improved with the programme „Development of Environmental Monitoring and Data Acquisition“ (KESE) ending on 31.12.2015. To improve the use of data related to the organisation of water management, the Ministry of the Environment intends to launch a project with several cooperation partners which aims to improve the efficiency of decision-making processes related to the development and implementation of river basin management plans. To this end, we would like to update current water management databases and establish cross-usage of several databases partially related to water management so as to introduce models that would enable to evaluate and estimate the status of the aquatic environment, load of human activity on this environment and the impact of measures taken for the reduction of load. This project will begin at the end of 2012 and it will end in 2015.
Assessment of the performance of wastewater treatment plants 96. NAO recommendation to the Minister of the Environment: Assess as to what extent the pollution load in Peipus catchment area has decreased after the construction and reconstruction of wastewater treatment plants, how efficient are the treatment plants (ratio of investments and results), why some treatment plants are not functioning although they received support and which is the need for funding for the required reconstruction of all wastewater treatment plants in Peipus catchment area. (Par. 84–88)	Reply from the Minister of the Environment: Assessment on the change in pollution load, based on wastewater treatment facilities, can be found from the data published by the Environment Information Centre on the use of water. Such overview is drawn up every year and it will be accessible on the website of the Centre. The overview includes data on the pollution load from wastewater treatment plants. As a result of the interim assessment of water management plants, the measures implemented in the river basins of Estonia shall be mapped by the end of 2012 and an assessment is provided as to their impact. Generally, the ratio of investments and results is not assessed as it is much more complicated to assess the efficiency of work of the treatment plant than to calculate the ratio of investments and results. Among other things, the efficiency of the treatment plant depends on operating costs, amount and nature of wastewater, condition of sewerage and technical solutions. Thus, each case should be assessed individually. Ministry of the Environment is aware that not all treatment plants that received support are functioning in the required manner. This is why we

NAO recommendations	Replies from auditees
	have, due to §24(2) of the 2004–2006 Structural Aid Act (supervision over the activities of the final recipient shall be carried out by the Environmental Investment Centre, acting in the capacity of the final beneficiary) submitted a proposal to the Environmental Investment Centre in our letter No. 12-15/98-2 of 29 February 2012 to carry out additional follow-up inspection of the water management projects funded from the Cohesion Fund.
Assessment of the impact of agricultural support on the aquatic environment 97. NAO recommendation to the Minister of the Environment and Minister of Agriculture: Reach an agreement as to the means that would enable to obtain a better overview of the agricultural pollution in the river basins, and of the impact of the support measures of the Rural Development Plan on the aquatic environment, and include this information in the river basin management plan. (Par. 89–95)	Reply from the Minister of the Environment: For the better overview of agricultural pollution and the impact of the support measures of the Rural Development Plan on the aquatic environment, it is essential to implement the river basin management plan. This will enable to plan measures of the river basin management plan related to the diffuse load and coordinate the implementation of measures necessary for the management of diffuse load. In terms of the recommendation provided in the audit the Ministry of the Environment shall submit a written proposal and invitation to the Ministry of Agriculture to regularly provide, during future meetings of the water management committee, an overview of the impact of the support measures of the Rural Development Plan on the aquatic environment. Reply from the Minister of Agriculture: Ministry of Agriculture is looking forward to cooperating with the Ministry of the Environment in supplementing the river basin management plans. Several support measures of the Rural Development Plan of Estonia have been included in the operational programmes of river basin management plans and the impact of measures should also be included. Impact of the environmental measures of the Development Plan (II axis measures) on the aquatic environment is assessed by the Agricultural Research Centre according to whom in the future the impact of environmental measures can also be assessed on the basis of river basin. Impact of the rest of the support measures on the aquatic environment has not been assessed during the monitoring and assessment of the development plan. River basin management plans should include an overview of pollution of the aquatic environment, identified by the Environmental Inspectorate, incl. information on agricultural pollution and violation of water management requirements.
Inclusion of supplementary environmental protection requirements in legislation 116. NAO recommendations to the Minister of the Environment: ▪ Issuer of permit should establish additional environmental requirements for the owners of environmentally hazardous objects if the concentration of pollutant has increased to 75% of the quality norms of water. This would hinder the increase in the concentration of pollutants. ▪ In nitrate vulnerable zones establish a limit of 170 kg of nitrogen per one hectare of crop (in the current wording of the Act the limit of the average of cultivated land). For water protection, consider the implementation of such limit in the entire Peipus catchment area or the extension of the nitrate vulnerable zone to include the entire Peipus catchment area as it would be a more efficient means of limiting the excessive use of fertilisers. (Par. 98–108)	Reply from the Minister of the Environment: Minister of the Environment shall consider the necessity for amending legislation and shall review the requirements established in the Water Act upon the application of respective limits. Draft Act to amend the Water Act, prepared by the Ministry of the Environment and ready for approval, shall include a provision which shall ensure the calculation of the use of fertilisers on the basis of fertilised land or one hectare of pasture both in and outside nitrate vulnerable zones.
Limiting agricultural diffuse pollution 117. NAO recommendations to the Minister of Agriculture: ▪ Establish for the recipients of the support for environment-friendly management the obligation to adhere to the limit of use of fertilisers upon fertilising crops; said limits	Reply from the Minister of Agriculture: The support measure for environment-friendly management is a five-year commitment and new requirements cannot be added to it during the current commitment period. New requirements could be added for the new persons joining the commitments but the budget for the support measure does not allow to further increase the number of final recipients, and new commitments will not be accepted in this support scheme. NAO recommendations can be taken

NAO recommendations	Replies from auditees
must not exceed the dose recommended in the good agricultural practice. Upon implementing the measure gather information on its potential impact on the status of water. Consider the introduction of electronic field record as a condition for the allocation of support to professional producers. This would increase the availability of data, facilitate supervision over compliance with requirements and increase the awareness of agricultural producers. As an alternative, anticipate the preparation of nutrient balance for the fields of agricultural producer in order to minimise the impact of diffuse pollution as it would enable to assess the excessive occurrence of fertiliser residue in the environment. (Par. 103–104, 109–115)	into account upon the preparation of the development plan for the new programme period. Agri-environment support can be paid for claims that exceed the requirements laid down in legislation. Adherence to the fertilisation norms given in the good agricultural practice could be made into a claim compensated with support if the legislation would clearly determine the requirements that would allow fertilisation in significantly bigger amounts than recommended in the good agricultural practice. While in the good agricultural practice the need for nitrogen of crops is given depending on the crop in question, intended harvest and level of need for fertilisation of the soil, the legislation establishes nitrogen quantities on the basis of grown crops and intended harvest only for nitrogen given with mineral fertilisers which exceed the limit established in the Act. Other limit values for the use of fertilisers are established on the average per one hectare of cultivated land. Flexibility established in the legislation does not enable to specify how different the actual limit values are for fertilisers provided in the legislation and good agricultural practice. The Ministry of Agriculture feels that it is important to ensure balanced fertilisation and has, through the environmental measure of the development plan, supported the preparation of fertilisation plans, sampling of soil and manure analysis, training courses, etc. which would enable the producer to use fertilisers more economically and in an environmentally sustainable manner. Introduction of electronic field record as a condition for the allocation of support for producers requires the development of software aggregating the data on the field records of agricultural producers, and further maintenance of said database. We shall consider the recommendation of the NAO during the preparation of the development plan for the new programme period. Preparation of balance for nutritive elements in the fields of agricultural producers could be one of the measures of environmental support the implementation of which could be taken into consideration upon the preparation of Estonian Rural Development Plan for 2014–2020. Up to now balance of nutritive elements have been prepared in the course of the assessment of the environmental measures of the development plan.
Improving the cooperation between Estonia and Russia in the protection of Lake Peipus 145. NAO recommendations to the Minister of the Environment: - Draw up a joint river basin management plan for the states or approve water protection activities; first and foremost, agree on common objectives for water quality and status of the water body and their assessment criteria as well as their relevant pressure factors and alleviation measures. - Prepare and agree on a long-term joint monitoring programme (for at least 6 years) which would enable to plan for monitoring of long intervals and the period of which would be comparable to the evaluation period of the EU Water Framework Directive. - Draw up and agree with the Russian Federation on the procedure for the exchange of monitoring data which would clearly establish which data shall be exchange in which format and with whom. - Agree on a long-term cooperation programme for the joint committee and regularly assess the success of the joint committee in the implementation of the cooperation agreement. - Adhere to the agreement on the equal division of expenses. - Commission applied research to supplement	Reply from the Minister of the Environment: Use and protection of transboundary water bodies and the organisation of water management in transboundary river basins is regulated by the international agreements of the Republic of Estonia. Pursuant to the European Union legislation, the Republic of Estonia shall try to ensure the implementation of approval activities so as to ensure the attainment of water management plan objectives on the Estonian side of the river basin. To this end, we have forwarded information on the activities planned or implemented for the attainment of river basin objectives, and harmonised monitoring methods. To prepare a joint water management plan or water protection activities we shall continue to increase the efficiency of the exchange of information and establishment of common objectives. Second recommendation: Long-term water monitoring programme for the Estonian river basins for 2010–2015 has already been prepared and approved by Directive No. 1085 of the Minister of the Environment of 15.07.2011. Water monitoring programme for 2010–2015 includes both surveillance monitoring and operational monitoring. Investigative monitoring shall be carried out as the need for it arises. To this end, it must be possible to respond to a deteriorated situation even without changing the long-term monitoring programme. Draft joint water monitoring programme for transboundary water bodies for the period of 2012–2013 has been prepared and approved and shall be submitted for approval at the next sitting of the joint committee. It is basically a long-term monitoring programme which shall be reviewed and supplemented periodically and implemented also during future periods. Third recommendation: Procedure for the exchange of monitoring data, volume of data, relevant authorities and responsible persons have been established in the draft joint monitoring programme for 2012–2013, completed at the end of 2011. Fourth recommendation: Existence of a long-term cooperation programme is

NAO recommendations	Replies from auditees
river basin management plans (e.g. nutrient balance studies) (Par. 121–144)	essential in the transboundary cooperation of Estonia and Russia, and this issue has been addressed in the joint committee. Ministry of the Environment and the Russian side shall continue to prepare a cooperation programme for the period of 2013–2015. Fifth recommendation: In the future, in joint monitoring activities, we shall try to achieve the proportional division of expenses on ships and hovercraft. Sixth recommendation: Upon planning research activities, the Ministry of the Environment shall take into account the perspective research directions approved by the joint committee on transboundary watercourses in 2005, and the priorities established in 2007–2009.

Characterization of audit

Objective of audit

The objective of the audit was to assess whether the measures implemented by the state have helped to reduce the pollution load of Lake Peipus and the achievement of the good status of the lake. Attention was especially paid to the inspection of activities influencing the pollution load of Lake Peipus (point source and diffuse pollution) as well as Estonian-Russian cooperation in this area.

Assessment criteria

Upon giving its assessment the National Audit Office proceeded from the following criteria:

1. Major pollution sources have been identified (point source and diffuse pollution, incl. natural background) as well as the division of pollution load between them.
2. It is the objective of the state to improve the status of Lake Peipus; it has prepared new measures for the reduction of the amount of pollutants and determined the persons carrying out environmental protection activities.
3. Activities included in the plans for measures have been listed by relevance (problems with the greatest impact are addressed first so as to ensure quick and cost-efficient attainment of environmental objectives) and this serves as a basis for the funding of activities and projects.
4. To assess the status of Lake Peipus, Estonia and Russia have agreed on joint objectives, joint methods and standards for monitoring.
5. Data on the changes in the status of Lake Peipus are available for both the Estonian and the Russian side and information is being exchanged.
6. The state shall ensure timely performance of activities preventing pollution.
7. The state shall facilitate the reduction of pollution with support and alleviating measures.
8. Polluters of the aquatic environment of Lake Peipus shall be identified and sanctions shall be imposed.
9. Estonia and Russia's joint committee shall organise the implementation of measures for the improvement of Lake Peipus as a transboundary water body, and shall assess the efficiency of the implementation of said measures.
10. Cooperation between Estonia and Russia shall improve the status of Lake Peipus.

Criteria 1–4 are the most relevant as it is very important to identify sources of pollution, prevent pollution and take measures to reduce pollution. Here it is important to ensure that both states will address such problems together.

Scope and method of audit

The audit includes the assessment of efficiency of programmes, measures, projects and cooperation implemented for the improvement of the aquatic environment of Lake Peipus.

The audit addresses several issues related to the organisation, monitoring and surveillance of water management in the whole of Estonia but focuses first and foremost on the catchment area of Lake Peipus,

its East Estonian river basin and Peipus sub-basin. The audit mostly focused on the activities reducing the pollution load on Lake Peipus (i.e. monitoring of point source and diffuse pollution) and improving the status of the lake. The audit did not inspect the supply of drinking water to inhabitants, protection of groundwater, use of water resources, etc. The issue of fish stocks and that of Narva reservoir and the Narva River was not directly addressed in the audit.

The audit focused on the following main issues:

1. Is the quality of water in and the status of the ecosystem of Lake Peipus being assessed?
2. Are there any measures taken to reduce pollution in and to protect Lake Peipus?
3. Is supervision carried out over the conformity to environmental requirements of the sources of pollution in Lake Peipus?
4. Is the co-operation between Estonia and Russia contributing to the preservation and improvement of the status of Lake Peipus?

The main questions of the audit were agreed on with the Accounts Chamber of the Russian Federation.

The scope of audit was the period of 2006–2011. Generally, the audit observed the programme periods of the EU, the previous of which ended in 2006 and the latest began in 2007 and will end in 2013. Data on the changes in the status of Lake Peipus and on the cooperation of the joint committee of Estonia and Russia were observed since 1998.

To find answers to the main questions, the NAO analysed the objectives set for the improvement of the status of Lake Peipus, whether performance of analyses and development of measures takes into consideration monitoring data, assesses activities carried out during the audited period and analyses the problems identified during the organisation of activities.

The NAO audited the Ministry of the Environment, Ministry of Agriculture, Environment Information Centre, Environmental Investment Centre, Environmental Board, Environmental Inspectorate, Agricultural Registers and Information Board and the Agricultural Board.

The following activities were carried out in order to answer the main questions of the audit:

The following documents were analysed: EU Water Framework Directive, International Convention on the Protection and Use of Transboundary Watercourses, Baltic Sea Convention, river basin management plans (East Estonian RBMP, Peipus sub-basin management plan) as well as instructions and studies commissioned for the preparation of the RBMPs, studies related to the implementation of the EU Water Framework Directive, water management plans of other countries, regulations and directives regulating the preparation, coordination and funding of water management plans, Estonia and Russia's cooperation agreement for the protection and use of Lake Peipus, minutes of the meetings of Estonia and Russia's joint committee on the protection and use of Lake Peipus, monitoring programmes.

The following inquiries were made:

- Environment Information Centre was asked to present data on the conformity of water quality indicators to the requirements of environmental permits (in 2006–2010) for the 10 wastewater treatment plants in the Peipus sub-basin with the population equivalent (p.e.) of over 2000 (overall sample) and for the 20 small treatment plants (p.e. under 2000; the sample included small treatment plants where the surveillance monitoring in 2007 had identified failure to conform to the permit for the special use of water).

- Environment Information Centre was asked to present data on the pollution load of all wastewater outlets in the Peipus sub-basin in 2006–2010.
- Environment Information Centre was asked to present calculations on the pollution load on Lake Peipus as well as data on monitoring methods and results.
- Environmental Investment Centre was asked about projects that had received funding from the environmental programme's water management programme and from the Cohesion Fund's programme for the development of water management infrastructure, elimination of residual pollution and improvement of watercourses in the territory of Peipus sub-basin in 2006–2011.
- Ministry of the Environment was asked about the performance of duties determined with the cooperation agreement between Estonia and Russia on the use and protection of Lake Peipus.
- Ministry of Agriculture was asked to explain which aids and compensation mechanisms have been applied to alleviate point source and diffuse pollution, and how the measures of the rural development plan correspond to the water management plan. The Ministry and the Agricultural Board also provided explanations on land improvement investments and monitoring.
- Statistics Estonia was asked to present data on the use of fertilisers in Jõgeva, Tartu and Põlva Counties, incl. in 30 plants with the most land use, in order to identify their conformity to good agricultural practice in 2010.

Interviews were conducted with and explanations requested from the following persons:

- Harry Liiv, Ministry of the Environment, Deputy Secretary General;
- Ago Jaani, Ministry of the Environment, Adviser in Water Department;
- Karin Kroon, Ministry of the Environment, Head of Water Department;
- René Reisner, Ministry of the Environment, Water Department Senior Specialist;
- Milvi Aun, Environmental Board, Water Management Coordinator in Environmental Department;
- Mariina Hiiob, Environmental Board, Senior Specialist/Coordinator of Water Management in Environmental Department;
- Peeter Marksoo, Environment Information Centre, Water Department Senior Specialist in water management;
- Andre Zahharov, Environment Information Centre, Head of Water Department;
- Heiko Põdersalu, Environmental Investment Centre, Head of Environmental Programmes Unit;
- Hannes Aarma, Environmental Investment Centre, Deputy Head of Structural Funds Unit;
- Enn Loigu, Tallinn University of Technology, Professor at the Institute of Environmental Engineering;
- Madis Metsur, Executive Director of AS Maves;
- Külli Kangur, Estonian University of Life Sciences, Senior Research Fellow;
- Katrin Rannik, Ministry of Agriculture, Head of Agri-Environment Bureau;

- Tiiu Valdmaa, Agricultural Board, Head of Land Improvement Department;
- Sigrid Saluri, ARIB, Head of Internal Audit Department;
- Olav Roots; Environmental Research Centre, Leading Researcher;
- Hille Allemann, Environmental Research Centre, Head of laboratory;
- Andres Aruhein, Head of AS Emajõe Veevärk;
- Gennadi Filippov, Executive Director of OÜ Pandivere Vesi;
- Pavel Ojava, Environmental Inspectorate, Leading Inspector;
- Aili Maanso, Statistics Estonia, Head of Agricultural Statistics Department.

Conclusions and recommendations of the audit were discussed at the meeting of a focus group on 15 February 2012 with the following participants:

- Harry Liiv, Rene Reisner, Reet Talkop, Eda Andresmaa from the Ministry of the Environment;
- Milvi Aun, Mariina Hiiob from the Environmental Board;
- Peeter Marksoo, Andre Zahharov from the Environment Information Centre;
- Pavel Ojava from the Environmental Inspectorate;
- Katrin Rannik from the Ministry of Agriculture;
- Livi Rooma from the Agricultural Research Centre;
- Enn Loigu from Tallinn University of Technology;
- Külli Kangur from the Estonian University of Life Sciences.

Time of completion of audit

Audit activities were carried out from April to September 2011.

Audit team

The audit team consisted of Airi Andresson (Audit Manager), and Maidu Lääne, Matis Mägi and Viire Viss (Senior Auditors).

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An electronic copy (pdf) of the audit report is available on the NAO's website www.riigikontroll.ee.

Summary of the audit report is also available in English.

The audit report has been registered in the documentation system of the National Audit Office under No. 2-1.7/12/70050/18.

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18.05.2007 – **The efficiency of the organisation of environmental monitoring**

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Annex A. Status of Lake Peipus and its evaluation

Principles of assessment of the status of the bodies of surface water

In Estonia, the status of water bodies is assessed pursuant to the principles of the EU Water Framework Directive, using biological, physicochemical and hydromorphological data obtained from monitoring or studies.

Assessment of the status of water bodies includes a separate assessment of the **ecological status** of the water body on a five-level scale (very good, good, moderate, poor, very poor) and of the **chemical status** on a two-level scale (good or poor). **Status of a body of surface water is determined** as an **aggregate assessment** of the ecological status and chemical status on the basis of the worst indicator. For example, if the biological status is “moderate” and the chemical status is “poor”, the aggregate assessment of the status of the water body would be “poor”.

The status of Lake Peipus is assessed on the basis of quality elements and indicators used for the assessment of inland bodies of standing water which are as follows:

- **Biological quality elements:** phytoplankton, macroflora, large invertebrates. Quality indicators are, for example, the existence, diversity and abundance of plant and animal species characterising the status of the body of water.
- **Physicochemical quality elements:** transparency of water, oxygen content, content of total phosphorus and total nitrogen and acidification of water (pH) (see Table 1).
- **Hydromorphological** indicators such as the water regime of the water body (quality indicators: changes in water level), morphological conditions (quality indicators: status of the water protection zone, structure of the banks of the lake, changes in the depth of lake, sediments).

For example, in the case of a **good ecological status**, the values of biological quality indicators characteristic of the type of water body allow small abnormalities from reference conditions (reference condition is the natural status of the body of water and lack of any impact of human activity). In the case of a good status the watercourse is not blocked and other hydromorphological characteristics in the body of surface water have not been changed in the manner that would significantly influence the biological quality indicators of the body of surface water. If the water body's **ecological status is moderate**, the values of biological quality indicators characteristic of the type shall differ somewhat from the reference conditions, the hydromorphological characteristics in the body of surface water have been changed so that they significantly influence the biological quality indicators of the body of surface water. These values indicate moderate human influence and greater disturbance than in the case of a good status. If the water body's **ecological status is bad**, the values of biological quality indicators differ significantly from the reference conditions or the body of surface water lacks the majority of biological communities generally associated with this type of water body in the undisturbed state.

Water body's **chemical status is good** if the yearly average in samples for a quality indicator of any chemical status of the surface water does not exceed the quality limit value determined by the Water Act, and the status is **poor** if said limit values are exceeded (see Table 2).

Table 1. Ecological status class limits for Lake Peipus by physicochemical quality indicators established by the Regulation of the Minister of the Environment⁶²

Quality indicator, unit	Class				
	High	Good	Moderate	Poor	Bad
Nitrogen content (N_{tot}), micrograms/l	≤ 300 Peipus s.s.* ≤ 490 Lämmijärv and Lake Pihkva	> 300 – 510 Peipus s.s. > 490 – 720 Lämmijärv and Lake Pihkva	> 510 – 890 Peipus s.s. > 720 – 1200 Lämmijärv and Lake Pihkva	> 890 – 1300 Peipus s.s. > 1200 – 1600 Lämmijärv and Lake Pihkva	> 1300 Peipus s.s. > 1600 Lämmijärv and Lake Pihkva
Phosphorus content (P_{tot}) micrograms/l	< 17 Peipus s.s. < 30 Lämmijärv and Lake Pihkva	17 – 25 Peipus s.s. 30 – 50 Lämmijärv and Lake Pihkva	> 25 – 49 Peipus s.s. > 50 – 85 Lämmijärv and Lake Pihkva	> 49 – 79 Peipus s.s. > 85 – 135 Lämmijärv and Lake Pihkva	> 79 Peipus s.s. > 135 Lämmijärv and Lake Pihkva
N/P ratio, micrograms/micrograms	≤ 50 Peipus s.s. ≤ 38 Lämmijärv and Lake Pihkva	< 50 – 28 Peipus s.s. < 38 – 19 Lämmijärv and Lake Pihkva	< 28 – 13 Peipus s.s. < 19 – 10 Lämmijärv and Lake Pihkva	< 13 – 7 Peipus s.s. < 10 – $6,5$ Lämmijärv and Lake Pihkva	< 7 Peipus s.s. $< 6,5$ Lämmijärv and Lake Pihkva
Acidity, pH	7.7 – 7.0 Peipus s.s. 7.0 – 7.6 Lämmijärv and Lake Pihkva	> 7.7 – 8.1 Peipus s.s. > 7.6 – 8.0 Lämmijärv and Lake Pihkva	> 8.1 – 8.3 Peipus s.s. > 8.0 – 8.3 Lämmijärv and Lake Pihkva	> 8.3 – 8.6 Peipus s.s. > 8.3 – 8.8 Lämmijärv and Lake Pihkva	> 8.6 Peipus s.s. > 8.8 Lämmijärv and Lake Pihkva
Water transparency (visibility of Secchi disk, m)	≤ 3.5 Peipus s.s. ≤ 2.0 Lämmijärv and Lake Pihkva	< 3.5 – 2.5 Peipus s.s. < 2.0 – 1.5 Lämmijärv and Lake Pihkva	< 2.5 – 1.5 Peipus s.s. < 1.5 – 1.0 Lämmijärv and Lake Pihkva	< 1.5 – 1.0 Peipus s.s. < 1.0 – 0.7 Lämmijärv and Lake Pihkva	< 1.0 Peipus s.s. < 0.7 Lämmijärv and Lake Pihkva

* Lake Peipus Suurjärv

Status of Lake Peipus (the northern part), Lake Lämmijärv and Lake Pihkva

According to the average indicators of monitoring data for 2006–2010, the aggregate assessment for the status of Lake Peipus (northern part) and Lake Lämmijärv is moderate, and for Lake Pihkva, poor (see Table 2).

Table 2. Assessment of the status of different parts of Lake Peipus on the basis of physicochemical and biological quality indicators, based on the average data of 2006–2010 vegetation period

Part of lake	Physicochemical quality indicator					Biological quality indicator (phytoplankton)			Aggregated assessment
	pH	P_{tot} , $\mu\text{g/l}$	N_{tot} , $\mu\text{g/l}$	N/P	Secchi, m	Chl <i>a</i> content, $\mu\text{g/l}$	Phytoplankton biomass, mg/l	% of blue-green algae in biomass, (VII–IX)	
Peipus s.s.	8.4	37	704	19	1.8	17.9	5.4	59	moderate
	poor	moderate	moderate	moderate	moderate	moderate	moderate	moderate	
Lämmijärv	8.3	67	896	13	0.95	33.3	11.3	69	moderate
	poor	moderate	moderate	moderate	poor	moderate	moderate	moderate	

⁶² Regulation No. 44 „Procedure for the establishment of bodies of surface water and the list of bodies of surface water for which the status class must be determined, status classes of bodies of surface water and values of quality indicators corresponding to the status classes as well as the procedure for the assessment of status classes“ of the Minister of the Environment of 28 July 2009.

Lake Pihkva	8.9	115	1144	9.9	0.68	62.7	19.7	62	poor
	bad	poor	moderate	poor	bad	poor	poor	moderate	

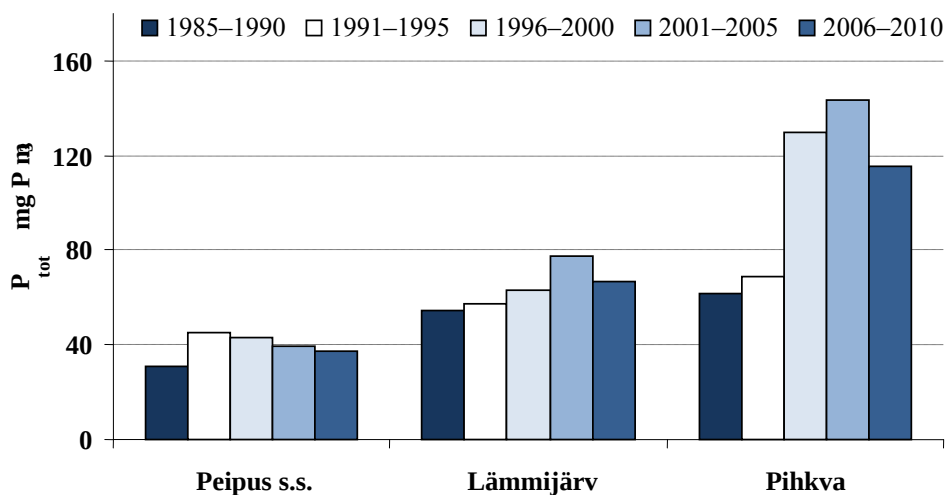
Changes in the ecological status of Lake Peipus

According to the long-term monitoring data of Lake Peipus⁶³, the ecological balance of Lake Peipus has been stable for a long time but over the last few years there have been negative changes in the entire ecosystem. Studies conducted in 2010 revealed that the ecosystem of Lake Peipus is unstable; loss of balance in the ecosystem will be potentially hazardous for biodiversity and the functioning of the ecosystem as well as for the fish stock and freshwater resources, both important for humans.

The reason for such changes in biota groups and the ecosystem as a whole are first and foremost the eutrophication of Lake Peipus (nutrient saturation, especially of phosphorus and nitrogen). Critical level of phosphorus has been exceeded in Lake Peipus: even the addition of a small amount of phosphorus from external sources, plus its release from sediments, contributes to the further eutrophication of the lake. The pollution loads of rivers, changing every year, are not immediately reflected in the water quality of the lake as a whole. The residence time of Lake Peipus's phosphorus content in sediment and in the water is long, which means that the reduction of the external load of phosphorus may not become apparent in the decrease of the lake's concentrations until several decades later.

The main indication of long-term human influence is the **increased total phosphorus content (P_{tot}) in the waters of Lake Pihkva and Lake Lämmijärv** (see Drawing 1). In 2010, total phosphorus content (P_{tot}) in surface water was 40 µg/l in Lake Peipus Suurjärv, 61 µg/l in Lake Lämmijärv and 97 µg/l in Lake Pihkva. As a long-term trend, phosphorus content has become stable in Lake Peipus Suurjärv but the average level of the last five years is still higher in all parts of the lake than it was in the 1980s.

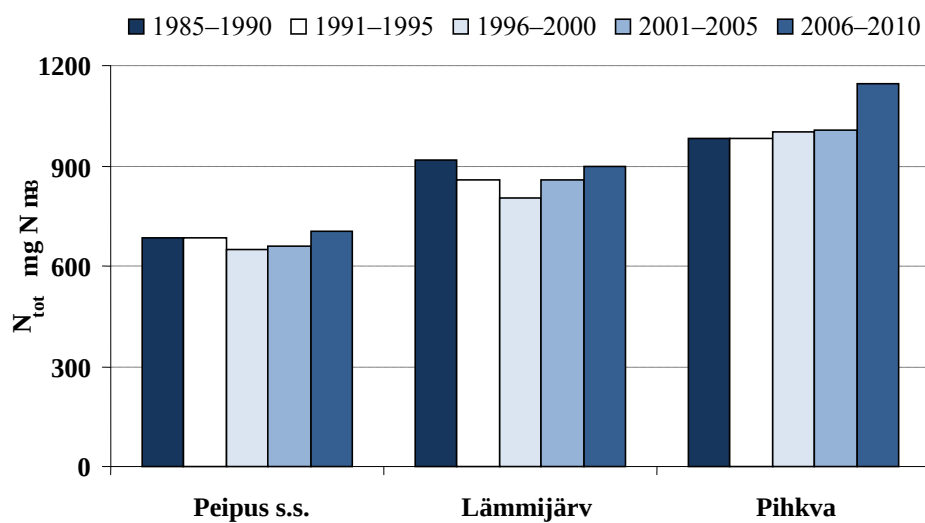
Drawing 1. Change in total phosphorus content in Lake Peipus (northern part), Lake Lämmijärv and Lake Pihkva



Over the last 20 years, **total nitrogen (N_{tot}) content** in the entire Lake Peipus has remained more stable than total phosphorus content (see Drawing 2). However, in the last five years, total nitrogen content has increased in all parts of the lake. In 2010, the N_{tot} content in surface water was 644 µg/l in Lake Peipus (northern part), 805 µg/l in Lake Lämmijärv and 1033 µg/l in Lake Pihkva.

⁶³ Hydrobiological monitoring and inspection of transboundary water bodies (Lake Peipus and Narva reservoir) in 2010. Institute of Agriculture and Environment of the Estonian University of Life Sciences, 2011

Drawing 2. Dynamics of total phosphorus content in Lake Peipus (northern part), Lake Lämmijärv and Lake Pihkva



Annex B. Monitoring stations on Lake Peipus

Drawing 1. Biological and hydrochemical monitoring stations on Lake Peipus Suurjärv (northern part), Lake Lämmijärv and Lake Pihkva

