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Order No. 118

KOIVA RIVER BASIN DISTRICT MANAGEMENT PLAN

MINISTRY OF THE ENVIRONMENT

Information about the Management Plan

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3. State and government authorities and local governments that participated in the development of management plans:	In connection with participation in the work of the committee for organisation of water management, established by the Minister of the Environment: Ministry of the Environment Ministry of Agriculture Ministry of Social Affairs Environmental Inspectorate Estonian Environment Information Centre Environmental authorities/Environmental Board In connection with participation in the work of the working groups on sub-districts: Regional units of state and government authorities County governments Local governments
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Abbreviations

ENIS – Estonian Nature Information System

MP – management plan

EEIC – Estonian Environment Information Centre

ARIB – Agricultural Registers and Information Board

HMWB – heavily modified surface water body, heavily modified water body

AWB – artificial water body

WFD – Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (Water Framework Directive)

HELCOM – intergovernmental commission established for implementation of the Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Commission or Baltic Marine Environment Protection Commission)

EU – European Union

PWSS – public water supply and sewerage system

PWSSA – Public Water Supply and Sewerage Act

LU – livestock unit

REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC (Official Journal of the European Union L 396, 30.12.2006, p. 1-850) (***R****egistration,* ***E****valuation and* ***A****uthorisation of* ***Ch****emicals*)

NSA – nitrate sensitive area

RDP – rural development plan

CF – Cohesion Fund of the European Union

EIC – Environmental Investment Centre foundation

ACP – asphalt concrete plant

ER – Estonian Railways

TA – technical assistance

SAR – artificial recipients maintained by the state

p.e. – population equivalent

BOD – biological oxygen demand

P – phosphor

N – nitrogen

PLC – pollution load compilation

1 INTRODUCTION

The Koiva Management Plan is drafted for the purpose of planning water protection and water use measures in the Koiva river basin district. Development of the management plan was based on the Water Act and the EU Water Framework Directive (2000/60/EC). In order to implement[1] the Water Framework Directive, Member States have to control their water economy through development of management plans for solving major water problems and achieving a good water status.

The source materials for the Koiva River Basin District Management Plan include the draft of the Mustjõgi Water Basin Sub-District Management Plan[2] as well as studies and reports[3] prepared in the course of developing the management plans[4].

The documents of the Estonian Environment Information Centre (EEIC), the database of the Estonian Nature Information System (ENIS), the databases of the Land Board, the ARIB database of livestock farms and the Ministry of Agriculture database of land reclamation objects and artificial recipients were used for updating the information and generating figures. Written comments and additions that were sent to Rene Reisner, rene.reisner@envir.ee, in the Water Department of the Ministry of the Environment, were considered during preparation of the final draft of the Management Plan.

The Koiva River Basin District Management Plan covers the Estonian part of the trans-boundary Koiva River and its basin. A management plan has also been drafted for the Koiva River basin located on the territory of the Republic of Latvia. Additional information on the Latvian part of Koiva River is available on the website of the Latvian Environment, Geology and Meteorology Centre (http://www.meteo.lv/public/30299.html).

Location. The Estonian part of the Koiva trans-boundary river basin district is located in Southern Estonia and continues in the Republic of Latvia. The majority of the Estonian part of the river basin district is located in Võru County, with a small part in Valga County (Figure 1).

The draft of the Koiva River Basin District Management Plan is a national level management plan, generalised on the basis of the Mustjõgi River Basin Sub-District Management Plan, and it includes an assessment of the status of water bodies, objectives of the MP, and a programme of measures for achieving a good status of surface water bodies and groundwater.

Pursuant to § 38^2 of the Water Act, the MP was developed in open proceedings. Development of management plans is regulated by the Minister of the Environment directives no. 269[5] (appointment of coordinators of management plans and

[1] http://www.envir.ee/vmk/vpr
[2] http://www.envir.ee/orb.aw/class=file/action=preview/id=1085027/Mustj%F5e+VMK+03.03.2008.pdf
[3] http://www.envir.ee/89749
[4] http://www.envir.ee/vmk
[5] http://www.envir.ee/380956

establishment of a committee for water management regulation) and no. 270[6] (approval of the schedule and work programme for drafting management plans, decision to initiate drafting of management plans).

The Koiva River Basin District MP will be submitted to the Government of the Republic for approval.

[6] http://www.envir.ee/381047

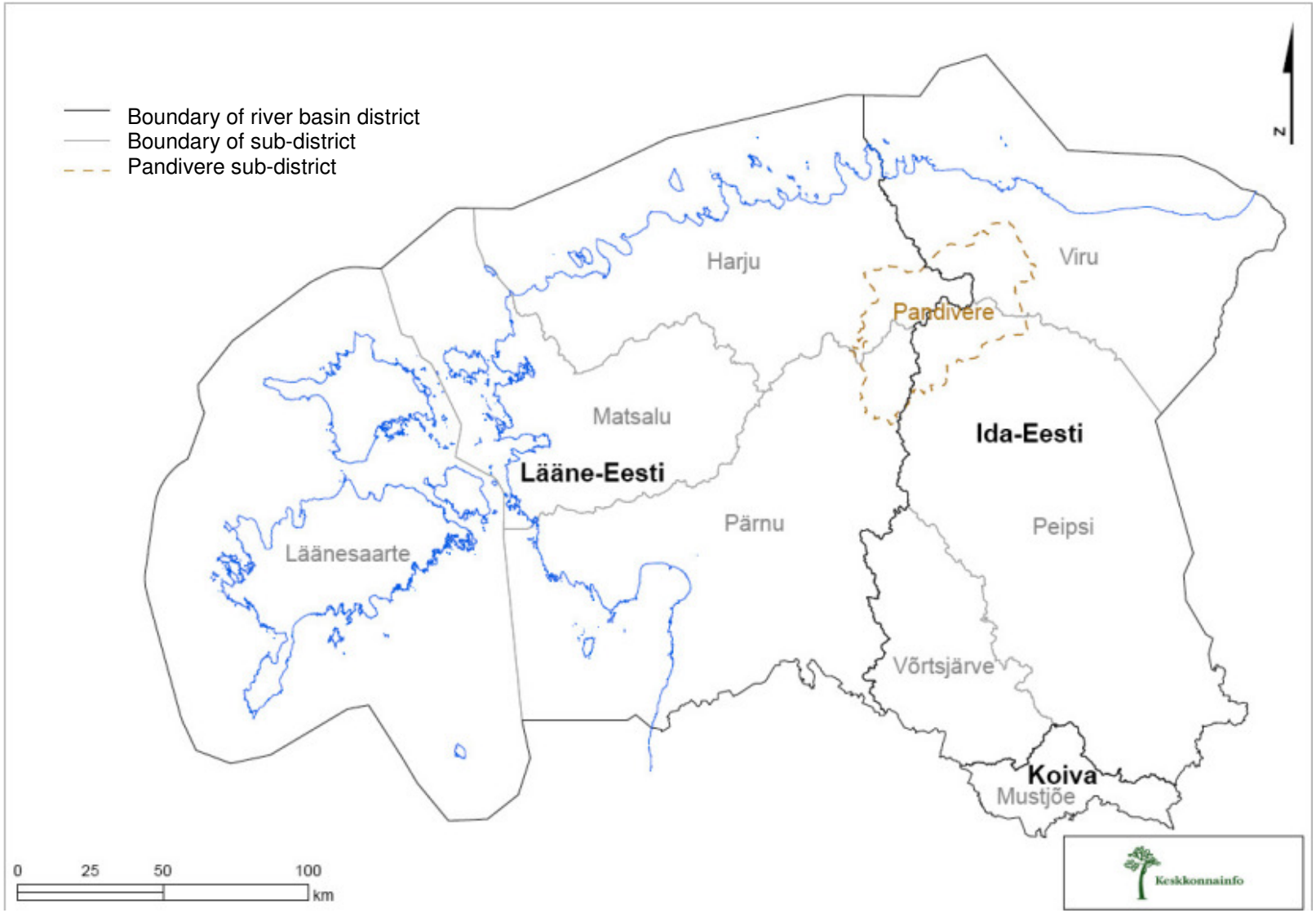

Figure 1 Locations of Estonian river basin sub-districts and river basin districts

2 INFORMATION ON SURFACE WATER

Surface water means all water located on inland territories, as well as sea water. According to the Environmental Register, the Koiva river basin district includes 88 registered watercourses (rivers, streams, ditches) and 181 inland bodies of standing water (lakes, ponds).

The MP covers all inland water bodies. For the purpose of assessing the water status and planning and implementing measures, water bodies have been divided into discrete volumes, or bodies of surface water. All surface water bodies have been listed in the Minister of the Environment Regulation no. 44[7].

2.1 Locations and boundaries of surface water bodies

Surface water bodies are classified into natural, heavily modified and artificial water bodies. Determination of surface water bodies, heavily modified water bodies (HMWB) and artificial water bodies (AWB) is based on several guidelines and an agreed methodology, described below.

20 river water bodies, including 19 natural river water bodies and 1 heavily modified river water body, have been identified on the rivers of the Koiva river basin district.

Table 1 Number and total length[8] of river water bodies of the Koiva river basin district

Natural river bodies		**Heavily modified water bodies**	
Number	Length, km	Number	Length, km
19	322	1	18.7

Eight lakes in the Koiva river basin district have been identified as surface water bodies. The Koiva river basin district does not include any heavily modified or artificial water bodies.

Table 2 Number and total area of lake water bodies in the Koiva river basin district

Natural lakes		**Heavily modified water bodies**		Artificial water bodies	
Number	Area, ha	Number	Area, ha	Number	Area, ha
8	916	-	-	-	-

A list of all surface water bodies is provided in Annex 1 and they are shown on the maps in Figures 2 and 3.

[7] https://www.riigiteataja.ee/ert/act.jsp?replstring=33&dyn=13198942&id=13210253
[8] http://www.keskkonnainfo.ee/index.php?lan=EE&sid=95&tid=91&l1=5

Table 3 The largest and smallest surface water bodies in the Koiva river basin district

River water bodies		**Lake water bodies**	
Max length, km	**Min length, km**	**Max area, ha**	**Min area, ha**
9.7	2.1	232.5	11.5

Additional information: Ecological status of Estonian surface water bodies, 2004-2008[9], incl. annexes.

[9] http://www.keskkonnainfo.ee/failid/vesi/pinnaveeseisund.doc

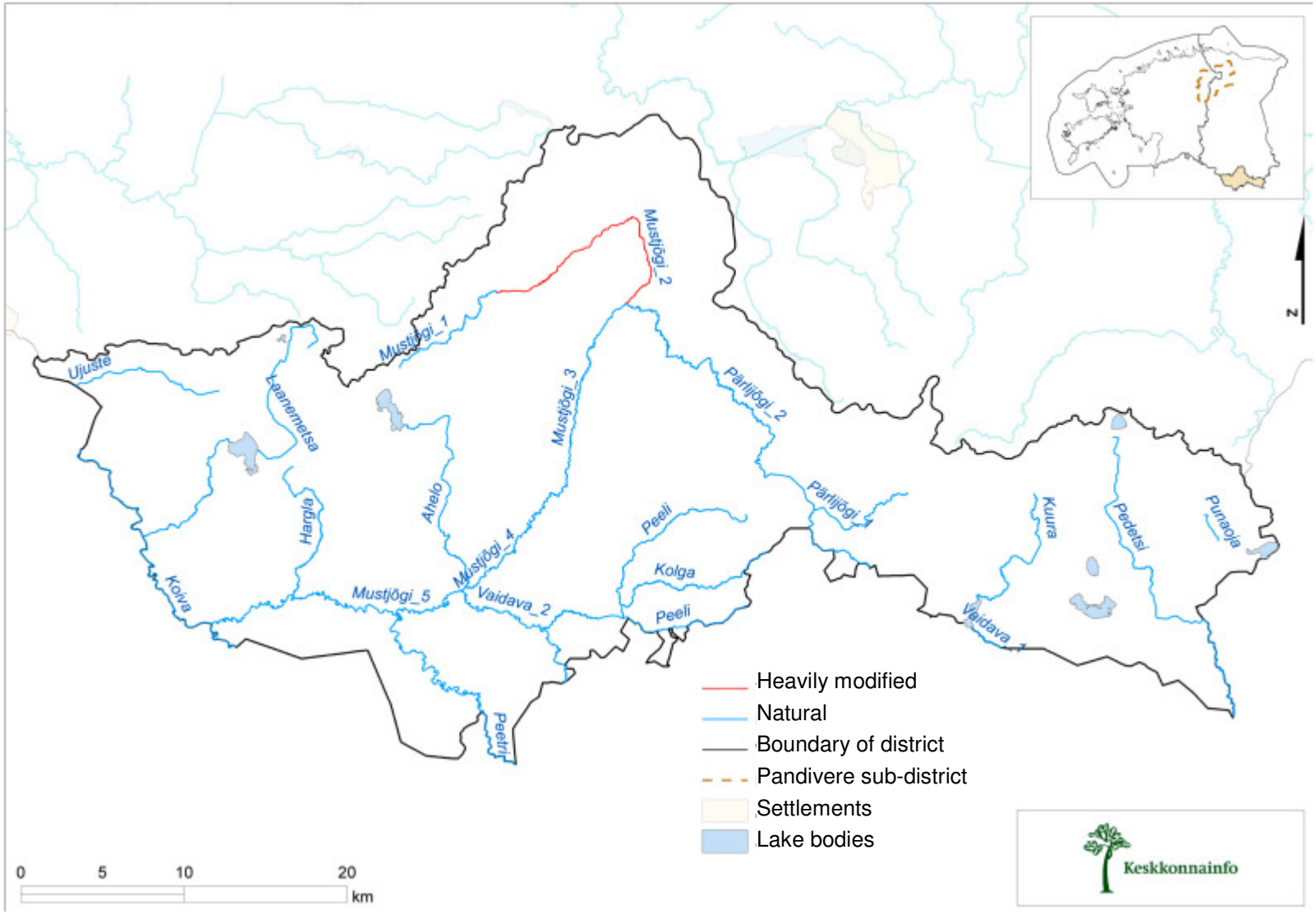

Figure 2 River water bodies in the Koiva river basin district

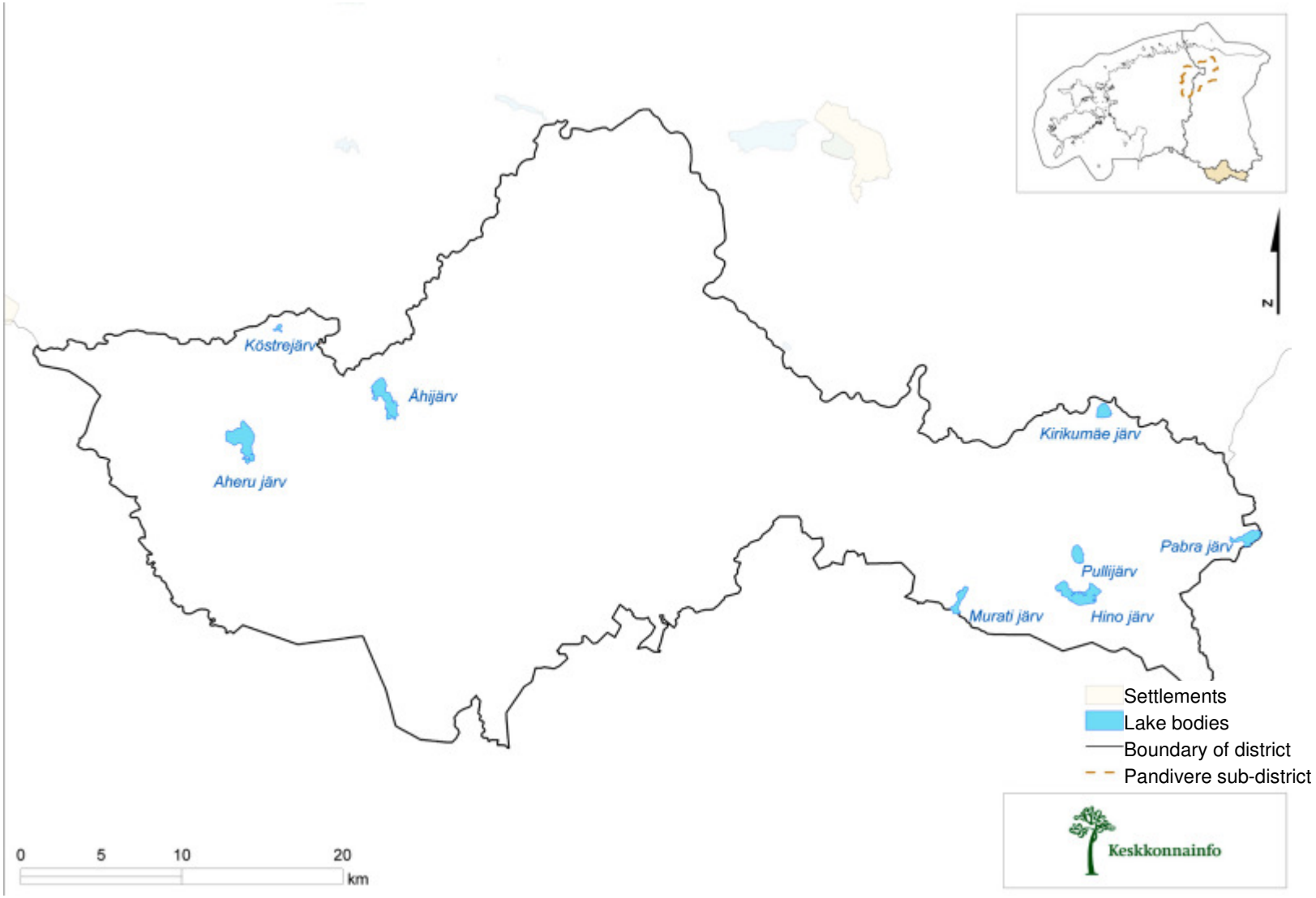

Figure 3 Lake water bodies in the Koiva river basin district

2.2 Summary of the methodology for identifying surface water bodies

Surface water bodies are discrete sections or parts of water bodies, which differ from each other in specific natural characteristics, the nature of the impact of human activity, or any other significant and distinguishable parameters. The process of establishing and identifying surface water bodies consisted of division of water bodies into sections and parts according to agreed parameters and criteria. Each surface water body is subject to regular assessment of status and measures for improving and maintaining the status of water bodies.

All rivers with a river basin over 10 km^2 and lakes with an area over 50 ha were considered for the purpose of establishing and identifying surface water bodies. Smaller water bodies were designated as surface water bodies only if they were significant water bodies. The list of surface water bodies has been approved by the Minister of the Environment Regulation no. 44.

Establishment of surface water bodies was based on natural types of water bodies. The natural type of the water body was identified for each surface water body. The types of natural water bodies included seven types of rivers and eight types of lakes. Other criteria included:

- Natural differences between water bodies, such as flow rates;
- Human-induced pollution load and its extent;
- Human influence on the physical status of water bodies;
- Stricter protection requirements established for protected areas.

Water bodies belonging to the same natural type or being subjected to similar loads or influences were treated as one aggregated surface water body to facilitate planning of measures and assessment of status. The rivers with river basin over 10 km^2, where the required assessment of status could not be performed due to low water levels, were generally not designated as surface water bodies. A methodological problem for water management regulation is the large number of identified river bodies and the consequent large volume of work required for studies, monitoring and surveillance. Aggregating and grouping river bodies, in particular, should be considered in the future to reduce administrative burden.

Small water bodies not designated as surface water bodies

The use and protection of small water bodies is regulated by the Water Act and other relevant legal provisions. Activities on protected areas with small water bodies are regulated by the protection rules of the respective protected area, with particular attention being paid to ensuring a favourable status for water-dependent protected species. The use of rivers, which are part of drainage systems, incl. artificial recipients maintained by the state, is governed by land reclamation regulations and the management plans for land reclamation systems, to be completed in the near future.

The status of rivers with a river basin under 10 km^2, lakes with an area under 50 ha and any other surface water bodies not designated as surface water bodies is

assessed, as necessary, on the basis of expert assessments.

Small water bodies are included in the objectives of management plans in the framework of each particular river basin. Consequently, the required measures for status improvement and monitoring of small water bodies are developed on the basis of the surface water body, on the river basin of which the small water body is located.

Establishment and identification of surface water bodies was based on the guidelines for establishing surface water bodies. Additional information: List of surface water bodies and guidelines for establishing surface water bodies[10].

Wetlands (bogs, coastal grasslands, flooded meadows) constitute nearly 30 % of Estonia's territory. Several large bogs have been preserved in Estonia; wetlands often expand to discarded agricultural land (in particular, polders and flooded river areas). In addition to that, there are highly humid forest lands. The groundwater reserves develop in higher interfluvial areas, not in bogs and wetlands. Classification of wetlands as water bodies is not necessary for the purposes of regulating Estonian water management. The need to protect wetlands is associated primarily with the objectives of nature conservation.

2.3 Summary of establishment of heavily modified water bodies and artificial water bodies

Heavily modified water body and artificial water body are sub-categories of surface water bodies. Initial establishment of heavily modified surface water bodies and artificial water bodies was based on the existing and easily available information on water bodies. Firstly, rivers with a river basin over 10 km^2, designated in the Environmental Register as main ditches, were included in the category of heavily modified surface water bodies. Additionally, rivers on the list of artificial recipients maintained by the state, established pursuant to the Government of the Republic Order no. 1 of 3 January 2006, were considered in the next stage. A further consideration concerned the results of status monitoring of water bodies, which could indicate significant hydromorphological (physical) changes in the status of water bodies. The initial establishment of artificial water bodies included the surface water bodies with a river basin over 10 km^2, which were designated as ditches in the Environmental Register. Additional considerations included geographic data on the location of water bodies and hydromorphological data on the natural shape or tortuosity of water bodies.

Following initial establishment of heavily modified surface water bodies and artificial water bodies, the final establishment was conducted. The final establishment consisted of verification of the validity of the criteria used to qualify a water body as a heavily modified surface water body or an artificial water body. A water body can be designated as a heavily modified surface water body or artificial water body only if it meets the following criteria:

1) Changes in the hydromorphological properties of the water body, which

[10] http://www.envir.ee/vmk/veemajanduskava

would be required to achieve a good ecological status, would have a significant negative impact on:
   a. the environment in general;
   b. navigation, port facilities, recreational opportunities;
   c. activities for which the water is abstracted, such as drinking water reserves, electricity production or irrigation;
   d. water regulation, protection against floods, or drainage;
   e. other equally significant permanent human development activities.
2) Due to limited technical resources or excessive costs, the benefits resulting from the artificial or modified nature of the water body would not be achievable through alternative methods, which would be more favourable for the environment.

For the purposes of final establishment, all initially established heavily modified surface water bodies or artificial water bodies were divided into three groups depending on the cause of modification or artificial nature of the water body: impounding, land reclamation, or infrastructure. The validity of the criteria for qualification as a heavily modified surface water body or an artificial water body was verified in each of these groups. The final list of heavily modified surface water bodies and artificial water bodies comprises the water bodies that meet all the required criteria. The environmental objective of achieving good ecological potential by 22 December 2015 at the latest applies to all such water bodies.

It was discovered in the course of consultations with the public that, in the case of small river bodies, the qualification of heavily modified and artificial water bodies needs to be more specific with regard to artificial recipients of drainage systems. Many artificial water bodies and dredged water bodies are designated in the Environmental Register as streams and rivers and, consequently, they were qualified as natural water bodies due to the lack of criteria and methods for consideration of geomorphological parameters. It is likely that the share of water bodies with a river basin under 100 km^2 in the category of natural water bodies will decrease significantly in the course of future specification.

Additional information:

- Study for final establishment of heavily modified surface water bodies and artificial water bodies: http://www.envir.ee/1083938
- List of artificial recipients maintained by the state: https://www.riigiteataja.ee/ert/act.jsp?id=12857238
- Register of land reclamation systems: www.mpb.ee

2.4 Description of the types and classification of water bodies for status assessment of surface water bodies

Assessment of the status of surface water bodies is based on natural characteristics of water bodies. All water bodies belong to a defined natural type. The type of a water body depends on the set of natural properties of the water body or a part thereof, which distinguishes the relevant river or standing water body or a part thereof from the remaining water body or its parts, or from other water bodies or their parts.

Development of the typology for all categories of water bodies was based on the type description criteria agreed at the EU level. Characterisation of the types of water bodies is based on System B specified in Annex II to the Water Framework Directive. Pursuant to the Minister of the Environment Regulation no. 44, there are 21 types of water bodies in Estonia – 7 types of rivers, 8 types of lakes, and 6 types of coastal waters.

Identification of the types of rivers is based mainly on hydrochemical and morphological properties. The following is a list of the types of rivers in the Koiva river basin district.

Table 4 Types of rivers in the Koiva river basin district

Type	Description	Number of surface water bodies
IA	rivers with dark water and high humin matter content, with river basin size 10–100 km^2	9
IB	rivers with light water and low organic matter content, with river basin size 10–100 km^2	2
IIB	rivers with light water and low organic matter content, with river basin size 100–1 000 km^2	7
IIB	rivers with light water and low organic matter content, with river basin size 1 000–10 000 km^2	1

Three types of lakes were identified in the Koiva river basin district, based on hydrochemical and morphological properties of lakes.

Table 5 Types of lakes in the Koiva river basin district

Type	Description	Number of surface water bodies
II	non-stratified lakes with medium water hardness	2
III	stratified lakes with medium water hardness	3
V	non-stratified lakes with light and soft water	3

2.5 Coordination of surface water bodies in the Koiva river basin district

Cooperation with the Republic of Latvia has been ongoing since 2001, in the framework of expert meetings. Cooperation on managing the Koiva international river basin district is based on an agreement between the Ministry of the Environment of the Republic of Estonia and the Ministry of the Environment of the Republic of Latvia.[11]

Establishment and identification of surface water bodies in the Estonian and Latvian parts of the Koiva river basin district has been based on the same principles, particularly EU level guidelines. Both Estonia and Latvia have used minimum thresholds for the size of surface water bodies, specifically a river basin of at least 10 km^2 for rivers or an area of at least 50 ha for lakes. Further coordination activities with regard to surface water bodies include information exchange between Estonia and Latvia, as well as bilateral meetings in connection with drafting the management plan for the Koiva international river basin district. The joint discussions have led to the conclusion that the established surface water bodies, the described pollution loads and measures, and the methodologies used enable to establish equivalent objectives for surface water protection and to achieve an equivalent level of protection from human-induced load in the Estonian and Latvian parts of the Koiva international river basin district.

The parties have submitted to each other an overview of the established surface water bodies for information and for addition to their separate management plans of both parts of the Koiva river basin district.

[11] http://www.envir.ee/orb.aw/class=file/action=preview/id=204601/Art5report.pdf

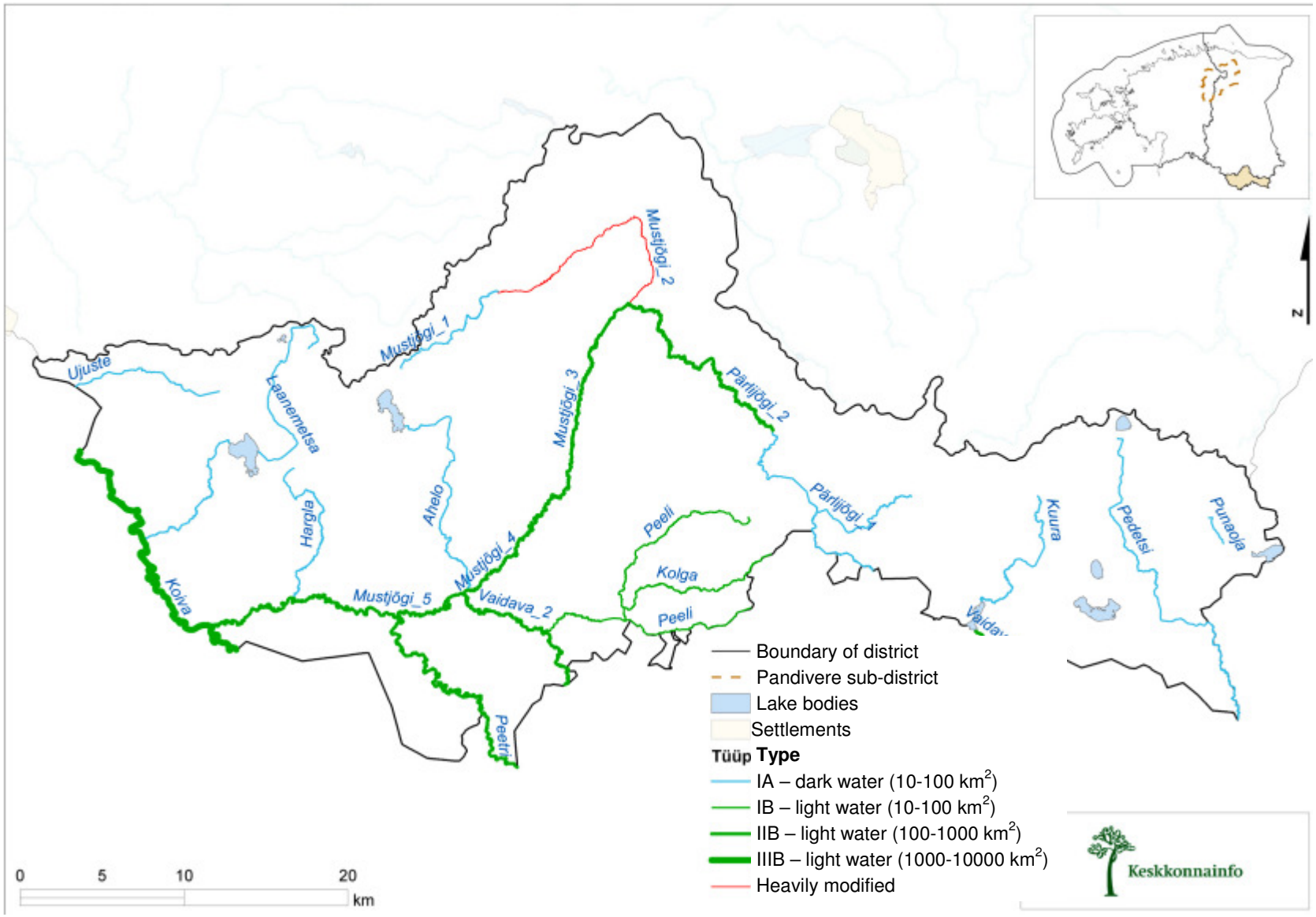

Figure 4 Types of river bodies

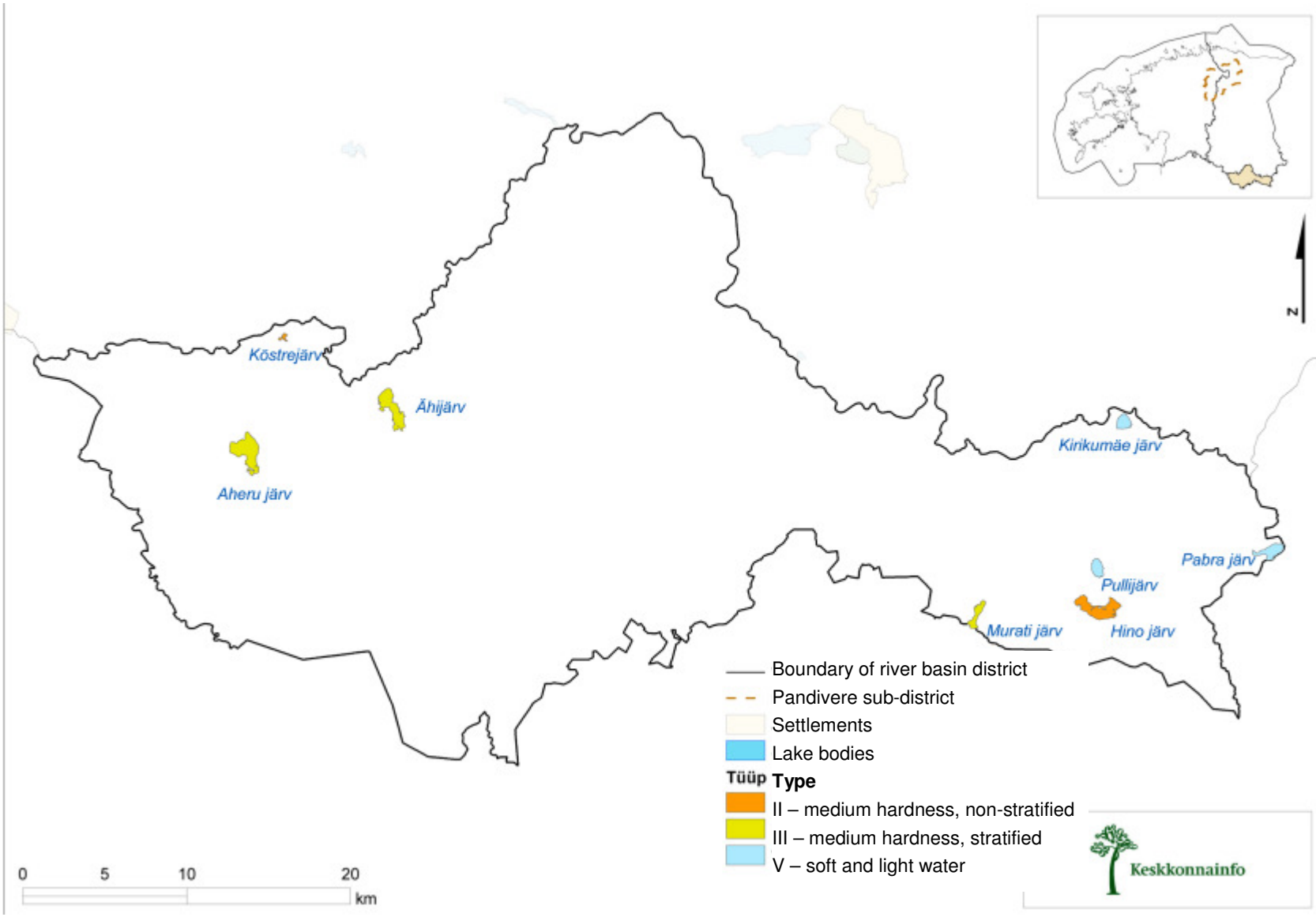

Figure 5 Types of lakes

3 INFORMATION ON GROUNDWATER

Designation of bodies of groundwater was based on hydrogeological conditions, volume of water abstraction, and water economy considerations. Due to the southern inclination of bedrock layers, there are areas with only one body of groundwater or with several overlapping bodies of groundwater. Groundwater is the main source of drinking water in Estonia.

Estonian bodies of groundwater are listed in the Minister of the Environment Regulation no. 75 of 29 December 2010, "Procedure for designation of bodies of groundwater and the list of bodies of groundwater subject to determination of a status class, groundwater status classes, the values of chemical properties and criteria of volume properties corresponding to status classes of groundwater bodies, groundwater quality limit values, groundwater pollutant content threshold values, and procedure for establishing the status class of a groundwater body".

The hydrogeological conditions depend primarily on the distribution of sandstone and limestone aquifers of different ages throughout the Estonian territory. All bedrock aquifers with natural fresh water, which can be used for water supply, were designated as groundwater bodies. In addition, surface layer aquifers with higher productivity levels, which are used or could potentially be used for water supply, were also designated as groundwater bodies.

Table 6 and Figure 6 present the bodies of groundwater in the Koiva river basin district

Table 6 Bodies of groundwater in the Koiva river basin district

No	Name	Area in the river basin district, km^2	Actual groundwater resources, m^3/d	Natural groundwater constituents, which cause problems for use as a source of drinking water
11	Middle Devonian groundwater body	1 330	50 000	Iron, manganese, ammonium
12	Upper Devonian groundwater body	447	50 000	

In addition to the aforementioned groundwater bodies, water from the Quaternary aquifer is also used through dug wells and a few bore wells (there are about ten known bore wells). The thickness of Quaternary sediments is 2-100 m, being highest under basal primeval valleys. However, it was not designated as a distinct groundwater body, because the sand deposits are distributed in a mosaic pattern and the water abstraction potential is limited. The use of the Quaternary aquifer could be feasible in the region of primeval valleys.

In case of the Upper Devonian groundwater body, water is abstracted from the karstic and cracked dolomites and dolomitic limestone of the Upper Devonian Dubniki (D_3db) and Plavinas (D_3pl) stages with total thickness of 15-45 m. Groundwater

moves in the fractures of water-producing rock; there are local karstic phenomena and the filtration coefficient varies, due to karstic developments, from 1 to 50 m/d. Depending on relief, groundwater can be unconfined and unprotected from pollution or it can be pressurised under thick Quaternary sediments and protected from pollution. The water-producing rocks of the Upper Devonian groundwater body are covered in the recharge area by a surface cover of mainly glacial origin, with a thickness between 4 and 10 meters (often also much thicker). The groundwater body is recharged through precipitation and groundwater infiltrates through the local confining bed (composed of aleurolites interspersed with marly clay layers in the lower part of the Plavinas stage – Snetnaya Gora substage) into the Middle Devonian groundwater body (11) below. Groundwater is discharged through surface water bodies and, in the lower parts of relief, through fens. In a few places (Rõuge Ööbikuorg), groundwater is discharged on the surface through springs. The actual groundwater reserves of this groundwater body are approximately 50 000 m^3/d. The water is used principally for supplying drinking water. The use as drinking water is complicated by the presence of iron, occasionally also ammonium and manganese, as natural constituents of groundwater, but the amount of available information on chemical composition of the water is limited (only 9 information points).

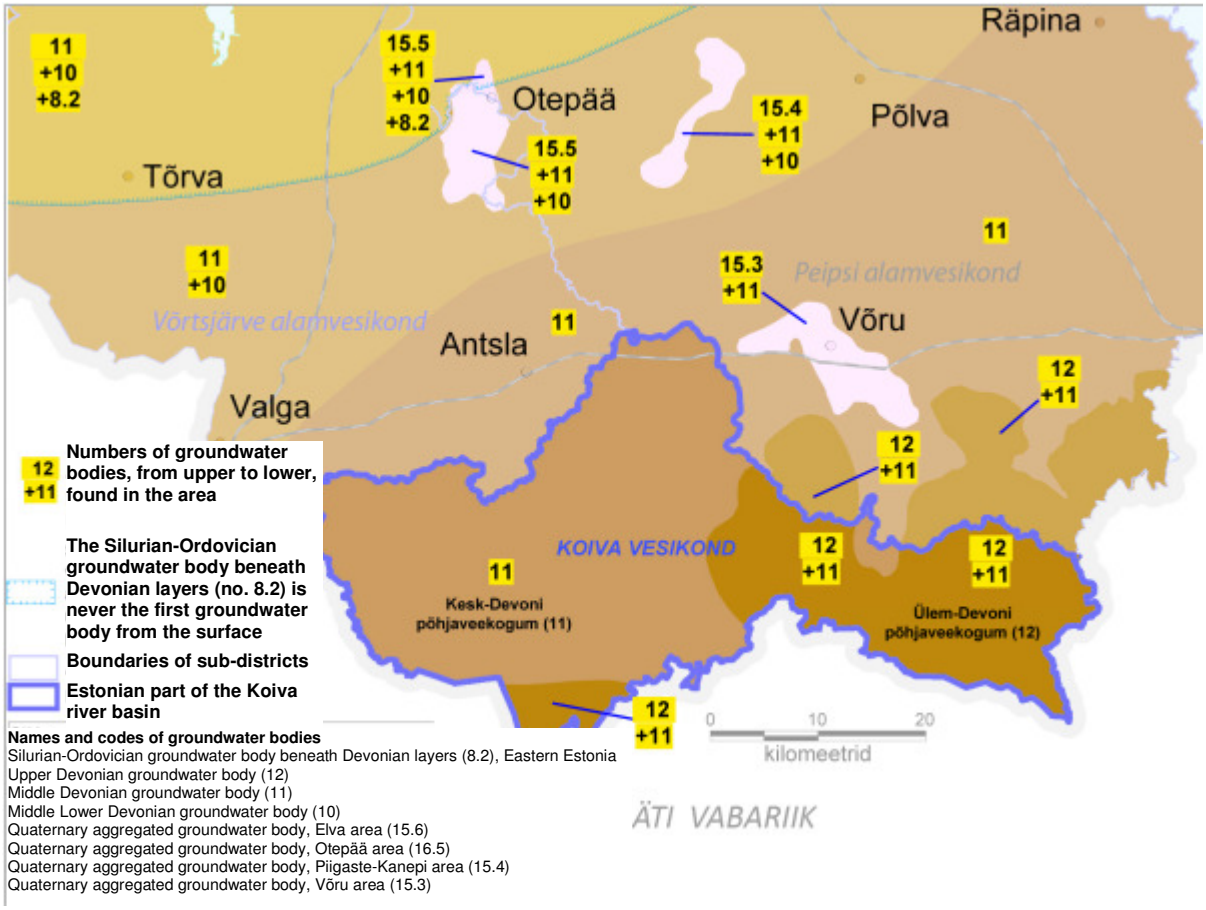

Figure 6 Bodies of groundwater in the Koiva river basin district

In case of the Middle Devonian groundwater body (11), water is abstracted in the Koiva river basin district from sandstones and aleurolites with interspersed clay layers and lenses of the Gauja (D_2gj), Burtniek (D_2br) and Aruküla (D_2ar) stages of the Middle Devonian division, thickness 100-200 m. Groundwater moves mainly in the pores of water-producing rock and only occasionally in fractures; there are no

karstic phenomena. The filtration coefficient of the water-producing sandstones and aleurolites of the groundwater body is 1…3 m/d. The groundwater body is fed in the recharge area through precipitation and in the southern part also through water infiltrating from the Upper Devonian groundwater body. For the most part, Middle Devonian groundwater is unconfined (not pressurised) and unprotected from pollution. The water is protected from pollution in the region of the Snetnaya Gora substage of the Upper Devonian Plavinas stage and under thick Quaternary sediments; in these regions, Middle Devonian groundwater is pressurised.

The water-producing rocks of the Middle Devonian groundwater body are covered in the recharge area by a surface cover of mainly glacial origin, with a thickness between 4 and 20 meters (often also much thicker); in the southern part, they are also covered by the Upper Devonian layers. Groundwater infiltrates into the Middle Lower Devonian groundwater body below, with surface water bodes and fens in lower parts of the relief also serving as discharge areas. The actual groundwater reserves of this groundwater body in this river basin district are approximately 50 000 m^3/d. Use of this groundwater as drinking water is complicated by the presence of iron, occasionally also ammonium and manganese, as natural groundwater constituents. High concentrations of hydrogen sulphide have been detected in several bore wells. The water is characterised by a natural anaerobic environment.

Considering the limited local impact of small water abstraction and the hydrogeological properties of groundwater layers, it would not be feasible to treat the Upper Devonian and Middle Devonian groundwater bodies as trans-boundary groundwater bodies.

4 OVERVIEW OF SIGNIFICANT HUMAN IMPACTS ON THE STATUS OF SURFACE WATER AND GROUNDWATER

4.1 Significant human impacts

Initial identification of the human impact on surface water and groundwater was carried out, for the purposes of developing the management plan, in 2005. The potential impact of human activities was assessed in terms of individual pressure factors. A summary of this assessment is available in a report[12] prepared by the Ministry of the Environment. Screening of pressure factors was based on the list of 57 pressure factors, recommended at the EU level, characterising various types of human activities.

An additional study, focusing on the Estonian context, investigated the areas of human impact or sources of impact, which cause major problems for water management and, consequently, complicate achievement of a good status of surface water or groundwater by the end of 2015.

The principal water management problems in river basin districts were identified in 2007, using the existing assessments of the status of surface water or groundwater and analysing the past, present and projected human impact on surface water and groundwater. According to a review[13] published by the Ministry of the Environment, significant human impact on water is caused by those pressure factors that can lead to pollution of the water and reduce the status class of surface water or groundwater bodies.

A summary assessment of the significance of pressure factors is presented in Tables 7, 8 and 9.

The main water management issues (human impacts) in Estonia include the following:

- collection and treatment of wastewater and rain water;
- release of pollutants from landfills and other areas contaminated with hazardous substances;
- agricultural diffuse source and point source pollution load;
- accidents at sea;
- physical modifications of water bodies (drainage, impoundments, extraction of bed soil from water bodies, dredging of waterways, dams);
- abstraction of water for human and industrial consumption;
- emission into water, drainage, loss of existing water bodies and creation of new water bodies in connection with extraction of mineral resources.

Table 7 lists the main water management issues and the underlying pressure factors in the Koiva river basin district. The significance of individual pressure factors for the status of surface water and groundwater was determined through an expert assessment. Rating was based on a four-point scale (- insignificant, + minor significance, ++ significant, and +++ very significant). Significant and very significant

[12] http://www.envir.ee/204601
[13] http://www.envir.ee/1076062

pressure factors are highlighted in grey.

Further issues, which could become significant in the future, include spread of introduced species and the impacts of fish farming and urbanisation on the status of water bodies. A specific issue for Estonia is the negative impact on water bodies caused by overabundance of beavers due to changes in land use and insufficient control of beaver numbers.

The projections for 2015 enable to predict a possibility of increased negative impact of agriculture (both from diffuse source load and livestock farming) on the aquatic environment and a potential increased negative impact of impoundments on water bodies (Table 7).

Table 7 Significant water management issues and pressure factors in the Koiva river basin district

Water management issue (human impact)	**Rivers**	**Lakes**	**Ground-water**	**Pressure factor**
Point source load	++	++	+	Effluent (wastewater and rain water)
	++	++	+	Livestock farming (particularly large farming facilities)
Diffuse source load	++	+++	++	Agricultural diffuse source load
	+	++	+	Population without a sewerage system
	+	+	-	Forestry, clear cutting
	-	+	-	Transport, incl. waterway transport (accidents, snow control, air emissions)
	+	++	-	Internal load (previously settled nutrients in water bodies)
Physical changes in water bodies	+++	++	+	Land reclamation (drainage)
	+++	-	-	Impoundments
	++	+	-	Overabundance of beavers, caused by changes in land use and inability to control the animal numbers
Impacts of mineral extraction on the aquatic environment				
Diffuse source load	++	-	-	Peat fields, suspended solids

Table 8 Trends of significant water management issues and pressure factors[14]

Pressure factor or a group of factors	**Projection for the pressure factor**
Wastewater	↓
Residual pollution	↓
Agriculture	↑

[14] http://www.envir.ee/1084423

Population without a sewerage system	↔
Land reclamation (drainage)	↔
Impoundments	↑
Extraction of mineral resources	↑
Internal load	↔

4.2 Assessment of load from point sources

Assessment of the load from point source pollution is based on the pollution load on the environment caused by urban and industrial wastewater, as well as by agricultural point source pollution. The significance of point sources is determined on the basis of the significance criteria specified in Table 9.

Table 9 Criteria of the significance of point sources of pollution

Description of the criteria of significance	Very significant	Significant	Minor significance
Wastewater treatment plants dealing with pollution load over 2 000 p.e. (population equivalent)	+		
Wastewater treatment plants dealing with pollution load under 2 000 p.e.		+	
Wastewater treatment plants dealing with pollution load under 2 000 p.e. but causing unsatisfactory status of the recipient water body	+		
Pollution source or human-induced impact, which is covered by an integrated environmental permit issued under the Integrated Pollution Prevention and Control Act	+		
Pollution source or human-induced impact, which is included in the list of enterprises liable to be affected by major accident if an accident could pose a risk for the aquatic environment	+		
Polluted areas with liquid or water soluble chemicals, incl. hazardous substances, which have not been removed	+		
Unmanaged and non-compliant landfills		+	
Unmanaged polluted areas		+	
Livestock farming facility with 100-300 livestock units		+	
Livestock farming facility with 10-100 livestock units			+
Fish farms with over one tonne of annual growth, affecting the status class of a water body	+		
Fish farms with over one tonne of annual growth		+	
Fish farms with less than one tonne of annual growth			+

4.2.1 Load from wastewater treatment plants

The pollution loads from larger point sources (over 2 000 p.e.) have been determined on the basis of monitoring. In the case of smaller point sources (under 2 000 p.e.), effluent flow rates have been determined on the basis of measured water consumption of the population and the load has been calculated using the results of control sampling. As the pollution released to the aquatic environment in Estonia is subject to a pollution charge, control samples are particularly important to ensure accuracy of load figures. The methodology used for load calculation complies with the PLC methodology[15] approved by HELCOM. Changes in pollution loads from wastewater treatment plants in Estonia from 1992 to 2007, according to the data of the EEIC, are shown on Chart 1.

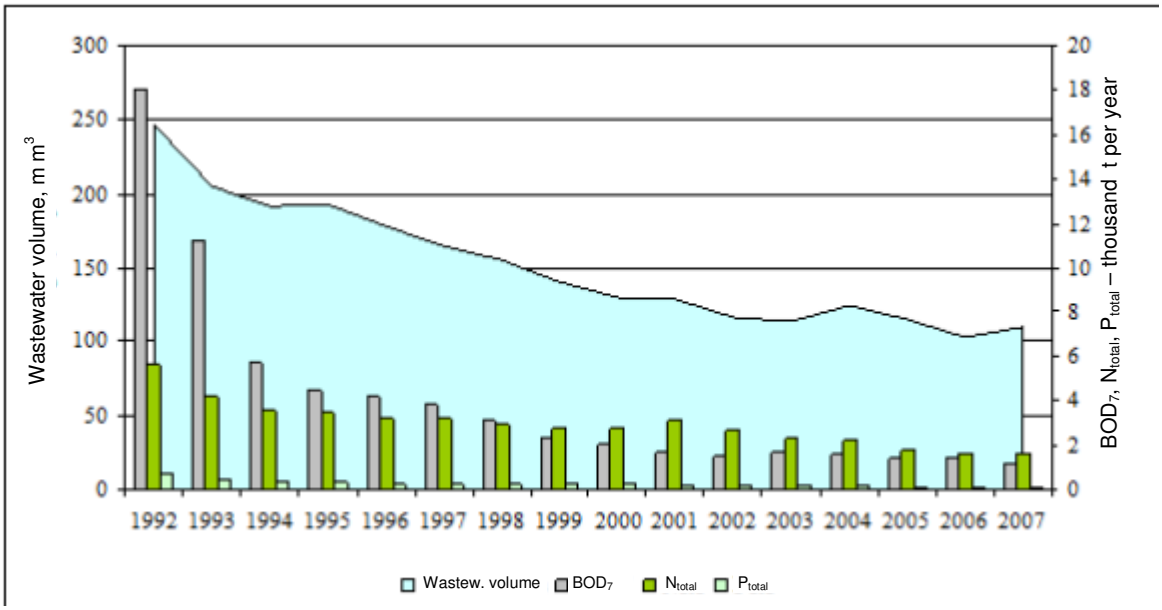

Chart 1 Point source pollution load in Estonia by the volume of wastewater and by pollutants, 1992-2007 (EEIC)

In comparison to 1992, the annual BOD_7 load has decreased by 94 % and the decrease with regard to phosphor and nitrogen in the same period has been 79 % and 71 %, respectively. The load has decreased as a result of restructuring of the economy and considerable investments in the construction and modernisation of several wastewater treatment plants. The decrease in pollution load has also been facilitated by increased rates of pollution charges and stricter requirements for wastewater treatment. The trend of decrease in effluent pollutant concentration halted in 2007, remaining at the level of 2006.

Table 10 presents the point source pollution load in the Koiva river basin district during the period 2005-2007 with regard to principal pollution indicators (BOD, P and N).

Table 10 Load from point source pollution (wastewater treatment plants) in the Koiva river basin district from 2005 to 2007 (EEIC)

[15] http://www.helcom.fi/stc/files/Guidelines/PLC5/PLC5%20guidelinesFINAL_7april.pdf

River basin district/ sub-district	BOD_7			P_{total}			N_{total}		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
Koiva river basin district	1.6	2.2	2.3	0.3	0.4	0.5	1.6	1.8	1.9

4.2.2 Significant urban wastewater treatment plants

All urban settlements with a pollution load over 2 000 population equivalent (p.e.) are very significant point sources of pollution. The Koiva river basin district does not include any settlements with pollution load over 2 000 p.e. The larger wastewater collection areas are located near the settlements of Varstu and Misso, with 600 and 500 p.e., respectively.

The Baltic Sea Action Plan pays great attention to wastewater collection areas with pollution load under 2 000 p.e. and, consequently, the pollution from such areas is an important consideration for prevention of water management problems. The output of nearly half of the wastewater treatment plants dealing with a pollution load under 2 000 p.e. does not comply with the requirements established in the water permit. A list of non-compliant treatment plants is included in the draft of the Mustjõgi River Basin Sub-District Management Plan[16]. The main cause of non-compliance is the high total phosphor content in the discharged effluent.

According to the EEIC report on "Water Use", the total release to water from the wastewater treatment plants in the Koiva river basin district in 2007 amounted to 92.47K m^3/year

4.2.3 Livestock farming facilities

The impact of livestock farming as point source pollution is caused by manure storage and silage storage facilities, domestic wastewater and wastewater from production, as well as by rain water, polluted on the territory of a farm. The point load from livestock farming facilities is difficult to measure and, as a result, some studies consider the load from agriculture in aggregate terms. HELCOM treats large livestock farming facilities as point sources of pollution[17].

While elsewhere in Estonia, livestock farming is increasingly converging in large farm complexes, the Koiva river basin district does not include very large livestock farming facilities. The river basin district includes four livestock farming buildings with over 300 livestock units of farm animals. The total load from livestock farming is 0.5 livestock units per hectare.

The table below shows the number of animals by species.

[16] http://www.envir.ee/orb.aw/class=file/action=preview/id=1085027/Mustj%F5e+VMK+03.03.2008.pdf
[17] HELCOM Baltic Sea Action Plan. HELCOM Ministerial Meeting in Kraków, Poland, 15 November 2007

Table 11 Number of farm animals in the Koiva river basin district (ARIB 2006)

Bovine animals	Sheep	Goats	Pigs	Laying hens
5 395	2 926	65	9 962	0

The manure produced by such a number of animals contains 520 t of nitrogen and 95 t of phosphor. Recalculated into livestock units, the distribution of animals between farms by size is as follows:

- 5 100 livestock units in farms with size over 300 LU;
- 800 livestock units in farms with size 100-300 LU;
- 1 900 livestock units in farms with size 10-100 LU.

The above size classes have been used in the management plans of the sub-districts to assess the significance of livestock farms as point sources of pollution.

The main problems arising from livestock farming are related to manure handling. According to the ARIB data from 2008, the river basin district includes 69 livestock farming buildings with over 10 livestock units of farm animals. Livestock buildings with over 10 LU are required to have a manure storage facility, which should meet all water protection requirements. All manure storage facilities located near larger livestock farming complexes (over 300 LU) should by now satisfy the criteria of best available technique (incl. water protection requirements). However, there is no adequate information on the status of all manure storage facilities. According to an assessment by producers (2008), 1/3 of the manure storage facilities are non-compliant. It is believed that the majority of non-compliant manure storage facilities are located at farms with 100-300 livestock units.

Often, manure is still stacked on the field; the level of discarding manure piles or failing to spread the manure has decreased compared to earlier times. There has been no systematic renovation of silage storage facilities. Information on the handling of wastewater generated in livestock buildings is not available (discharge of the wastewater into manure storage facilities has become a customary practice in recent times).

A decrease in the status of surface water bodies as a result of pollution solely from a livestock farming complex or a manure storage facility has not been detected in the course of monitoring and surveillance.

4.2.4 Enterprises liable to be affected by major accident and holding an integrated environmental permit

Only one installation in the Koiva river basin district requires an integrated environmental permit. The permit (renewed in 2007) has been issued to the Tsooru pig farm of OÜ Põlva Peekon. Pursuant to the integrated permit, the annual production capacity of the installation is 54 000 weaners and 4 500 fattening pigs. Production complies with the requirements of best available technique.

There are no enterprises liable to be affected by major accident in the Koiva river

basin district.

4.2.5 Other potential sources of pollution

A more detailed overview of landfills, fuel storages (filling stations), fertilizer and chemicals storage facilities and polluted areas is included in the draft of the Mustjõgi River Basin Sub-District Management Plan[18].

The majority of former landfills in the river basin district have been closed. The Saru landfill, which was used in recent years for storage of timber waste, was closed in the summer of 2009. Most of the waste generated is taken to the Räpo (Võru) landfill. The only waste treatment plant is located in the rural municipality of Rõuge. Another waste treatment plant should be established in 2009 in Varstu. Hazardous waste collection points are currently located in Misso, Taheva, Lüllemäe and Varstu.

The river basin district includes 13 former fertilizer storage facilities. Two of them have been liquidated – the Tikuti fertilizer storage in 2000 and the Muraski storage in 1995. The building of a former fertilizer storage facility in Krabi, Varstu rural municipality, is in order but is not used for storing fertilizer. However, several fertilizer storage facilities still contain fertilizer, which is occasionally stored in faulty packaging or even outdoors.

Former pesticide storage facilities have now been liquidated.

The aforementioned point sources of pollution are liable to cause, in particular, local pollution of groundwater. Neglected fertilizer storage facilities could also cause a decrease in the status of surface water bodies, particularly lakes. It is assumed in this case that the chemical storage facilities will be liquidated or properly renovated by their owners or by the owners of respective land.

The river basin district does not include hazardous or extremely hazardous polluted areas.

On three occasions over the past seven years, the Environmental Investment Centre has granted support for elimination of pollution on areas contaminated with hazardous substances in the Koiva river basin district.

4.3 Assessment of diffuse source pollution load

Diffuse source pollution is caused by agriculture and forestry, extraction of mineral resources, peat production, transport (e.g., use of salt for snow control on roads), modification of natural drainage regimes, rain water drained from the territories of settlements, industrial facilities, farms and roads, as well as by pollution from population without a sewerage system in low density areas.

The diffuse pollution load has been assessed in several studies:

[18] http://www.envir.ee/orb.aw/class=file/action=preview/id=1085027/Mustj%F5e+VMK+03.03.2008.pdf

- Report on river basin districts by the Ministry of the Environment[19]
- Assessment of diffuse load in sub-districts using a single calculation model[20]
- Development of a baseline scenario of diffuse load on Estonian sub-districts[21]
- Specification of entrainment coefficients for nutrient load[22]

Agricultural diffuse source pollution is a very significant pressure factor for the Baltic Sea and a significant pressure factor for both surface water and groundwater.

Determination of the significance of diffuse source pollution load is based on the following criteria.

Table 12 Criteria for determination of significant diffuse source pollution load

1) Share of crop cultivation area exceeds 25 % of the basin of a surface water body
2) Peat production on peat fields larger than 100 ha

Table 13 Total nitrogen and phosphor emissions in Estonia, 2004-2007 (EEIC, Report on implementation of the Nitrates Directive[23])

	Total nitrogen		**Total phosphor**	
	th. tonnes per year	**share in total emissions, %**	**th. tonnes per year**	**share in total emissions, %**
Estonia total	**31.1**	**100**	**0.874**	**100**
Agricultural diffuse source load	17.2	55	0.176	20
Forest, wetlands, precipitation	11.8	38	0.508	58
Total diffuse source load	**29.0**	**93**	**0.684**	**78**
Directly to the sea with urban and industrial effluent	0.9	3	0.069	8
To inland water bodies with urban and industrial effluent	0.6	2	0.074	9
Agricultural point source load (incl. fish farming)	0.6	2	0.047	5
Total point source load	**2.1**	**7**	**0.19**	**22**

Diffuse source load accounts for 93 % of the total nitrogen load and 78 % of the total phosphor load in Estonia. Agricultural diffuse source load constitutes, on average, 55 % of total nitrogen load and 20 % of total phosphor load on inland water bodies in Estonia (Table 13).

[19] http://www.envir.ee/1084660
[20] http://www.envir.ee/1085022
[21] http://www.envir.ee/1085015
[22] http://www.envir.ee/1075431
[23] http://www.envir.ee/1082378

Diffuse source load was estimated on the basis of the single calculation model of management plans. The potential load in the Koiva river basin district was 2 520 t of nitrogen and 645 t of phosphor. The net load in the Koiva river basin district in 2006 was 470 t of nitrogen and 27 t of phosphor. Consequently, 18 % of the potential nitrogen and 6 % of potential phosphor ends up in the aquatic environment.

Diffuse source pollution load is largely dependent on the volume of precipitation in any given year, the amount of fertilizers used in agriculture, and the size of the harvest.

One lake – Pulli Lake – is under significant influence of diffuse source pollution and its poor status is a result of historical internal pollution load.

Peat extraction has an influence on the quality of surface water during extraction and in cases when extraction is terminated without application of special measures. According to data from 2007, the Koiva river basin district includes 17 peat deposits. Three mining claims for peat extraction have been established in the Koiva river basin district – Kantsi production area, Põdrasoo peat production area, and Roosa peat production area. The combined area of mining claims is ~370 ha. The potential impact of peat production on Aheru Lake has been assessed and, as a result, the water permit required installation of sediment tanks to clean the water drained from the peat production area. According to latest assessments, peat extraction does not affect the status of Aheru Lake (the lake has a good state).

Diffuse source load does not cause decrease in the status class of groundwater bodies in the Koiva river basin district.

Other sources of diffuse source load are not significant in this river basin district.

4.3.1 Agricultural diffuse source load

The register of agricultural support and agricultural parcels at the ARIB contains information on fields and applications for support. According to this information, the aggregate area of maintained semi-natural biotic communities within the areas and agricultural parcels specified in the applications in 2008 was 941 391 ha (based on a response received from the ARIB on 2 April 2009); 23 550 ha of this area was located in the Koiva river basin district. This accounts for 18 % of the total area of the Koiva river basin district.

Table 14 Agricultural land use in the Koiva river basin district, 2008 (according to the register of agricultural support and agricultural parcels at the ARIB)

Agricultural parcels	**Land use of agricultural parcels, ha**			
	Growth area of crops	**Permanent grassland+ natural grassland**	**Mixed use (arable crops+ grassland+natural grassland+ permanent crops)**	**Land temporarily not used for agricultural purposes**
23 550	8 571	6 420	8 530	30

Fertility of the soil in the Koiva river basin district is average or slightly above Estonia's average. The landscape does not facilitate intensive cereal cultivation. The size of fields and the range of crops than can be cultivated is restricted by hilly landscape. The region includes a relatively high number of organic farmers (for instance, there are nearly 140 undertakings and farms engaged in organic farming in Võru County as a whole). Grasslands are used to farm beef animals and sheep. Many farms grow vegetables and fruits. The largest organic farming company is OÜ Lõunapiim (nearly 1 230 ha of area, which is eligible for organic farming support, including 317 ha of permanent grasslands).

Table 15 Calculated diffuse source load (2006) on surface water bodies in the Koiva river basin district [Baseline scenario of diffuse load on Estonian sub-districts[24]]

Diffuse emissions of N, t/y	**Diffuse emissions of P, t/y**
720	30

Diffuse source load affects two rivers in the Koiva river basin district: Mustjõgi River on the section from Antsla-Litsmetsa road to Pärlijõgi River, and Vaidava River up to the Vastse-Roosa impoundment. The latter section passes through the territory of the Republic of Latvia. Whey has been spread on the fields in the area surrounding smaller rivers that flow into Vaidava River. Similarly, OÜ Lõunapiim uses whey, previously mixed with liquid manure, as a fertilizer in the area around the Kuremäe large farm, on the lower course of Mustjõgi River.

4.4 Hydromorphological pressure factors

Criteria of significant hydromorphological impact:

Table 16 Criteria of significance of hydromorphological factors

Description of the criteria of significance	**Very significant**	**Significant**	**Minor significance**
Migration barriers on salmon rivers[25]	+		
Migration barriers on other rivers, causing a poor status class of water bodies		+	
Migration barriers on other rivers			+
Modification of water level by more than 30 cm		+	
Abstraction of more than $30m^3$ surface water per day			+

[24] http://www.envir.ee/1085015

[25] Pursuant to subsection 51(2) of the Nature Conservation Act, the bodies of water approved as spawning sites or habitats of salmon, brown trout, salmon trout or grayling.

Dredging and straightening of rivers	+		
Overabundance of beavers		+	

There is no significant abstraction of surface water in the Koiva river basin district.

There are also no known significant flood areas in the Koiva river basin district.

4.4.1 Impoundments

According EEIC, there are 21 impoundments in the Koiva river basin district. Six of them have been issued permits for the special use of water and one has a permit for electricity generation (self-employed person Jüri Vakk on Saarlasõ reservoir). The majority of these structures are old impoundments (age over 25 years). In the Koiva river basin district, impoundments are the main cause of poor status primarily on Pärlijõgi River and partially also on Vaidava River. Both rivers are partially or wholly on the list of salmonid habitats and, consequently, pursuant to § 40 (13) of the Water Act, free migration of fish must be ensured on these water bodies by the year 2013.

Impoundments hinder the upstream movement of fish towards breeding sites and habitats. All fish species are not able to survive in those parts of rivers that have been isolated with impoundments. Construction of impoundments reduces the number of rapid river sections, because rapids are flooded upstream of impoundments.

The main objectives of impounding are fishing and swimming and, more recently, also generation of electricity. In addition to the impact of impoundments as obstacles to migration, a pulsating use of hydropower means that the concerned section of the river regularly suffers from a lack of water.

Often, the water level of natural lakes has been regulated with dams in the past (e.g., Kirikumäe Lake) and disintegration of old impoundments at the outflow leads to a reduction of the water level together with faster vegetation growth in lower parts. The earlier natural state of the parts of the lake that have been filled by vegetation is difficult to restore afterwards.

Some artificial lakes are used as recreational water bodies. Maintenance of artificial lakes requires expenditure and the natural state of the river should be restored in places where an artificial lake is no longer used as a recreational water body and impoundment owners are not interested in maintaining the impoundment and the artificial lake. The growth of vegetation is particularly rapid on unmaintained artificial lakes, which are located downstream of effluent outlets of water treatment facilities.

4.4.2 Land reclamation

Land reclamation has been historically a major cause of redevelopment of water bodies: dredging and straightening of rivers, lowering the water level of lakes. A drainage network increases the rate of drainage of high water. Drainage has had a

major impact on the development of the hydrological network through utilisation of a large portion of water conduits as artificial recipients, causing significant physical changes in them. Many reservoirs and artificial water bodies have been created in the course of land reclamation.

Drainage works have significantly reduced the diversity of habitats. Disappearance of springtime flooded meadows and shortening of the flood periods has a negative impact on fish fauna, so that many spawning areas dry up before the larvae are hatched. In the Koiva river basin district, drainage has a significant impact on Mustjõgi River (Mustjõe_2), as its river basin includes relatively large areas with a forest drainage network. The entire section of the river (18.7 km) is on the list of artificial drainage recipients maintained by the state and, consequently, this section of the river was designated as heavily modified river body.

The Koiva river basin district includes 255 km^2 of areas with drainage, constituting 19 % of the total area of the river basin district. The length of artificial recipients maintained by the state is 73.5 km.

The purpose of maintaining the artificial recipients is to improve drainage conditions. Consequently, changes in water bodies as a result of drainage have to be considered when establishing environmental objectives and preparing measure programmes. A large portion of the drainage systems was built more than 25 years ago and they require reconditioning or renovation.

Maintenance of artificial recipients could create conflicts with other functions of use and protection of water bodies – especially protection of fish and crayfish habitats, but also protection of wetland vegetation. In the last decade, there have been attempts to give rivers a more natural appearance in the course of land reclamation works.

Table 17 General data of land reclamation systems in the Koiva river basin district according to the register of land reclamation systems, January 2010

Length of artificial recipients, km	Incl. grade 1 artificial recipients, km	Drained forest land, ha	Drained agricultural land, ha	Polder drainage, ha	Drained cultivated land area, ha	Irrigated land area, km^2
552	119	12 720	12 781	0.0	12 252	0.0

Five surface water bodies, which have been classified as natural surface water bodies, include sections used by the state as artificial recipients.

4.4.3 Overabundance of beavers

The optimal number of beavers (*Castor fiber*) has been far exceeded and beaver has become one of the main influencers of the status of our small and medium rivers.

Excessive increase in the number of beavers has been facilitated by the fact that many meadows near water have been abandoned and have developed undergrowth,

as well as by limited interest in hunting beavers. Beavers can significantly alter the appearance of rivers, transforming smaller rivers and their surrounding areas into “beaver rivers” and causing loss of more valuable fish species. Beaver dams on recipients cause flooding of forest and agricultural lands, while beavers also destroy ancient trees.

Beaver dams prevent access of migratory fish to spawning and breeding sites, which have been saved from previous drainage works. Occasionally, an invasion of beavers could endanger the habitats of protected species.

According to studies, overabundance of beavers increases the load on rivers from sediments and organic substances (Expert assessment by Nikolai Laanetu):

- creation of lodges and channels increases bank erosion and load from sediments;
- flooding of shallow bank areas could enrich the water with plant nutrients and gases, which are harmful for aquatic biota.

Considering the specific nature of beaver activity and its strong impact on forests, agricultural lands and other environmental resources, plans for restriction of beaver numbers are included in management plans for hunting grounds. Complete elimination of beavers is planned in case of drainage ditches and water bodies where their activities have taken on a large extent and are harmful for the envisaged principal functions of the water body.

Achieving a good status of many small rivers, which have a poor status, as spawning and breeding sites of migratory fish would be impossible without restricting the number of beavers. In the Koiva river basin district, beavers play a role in causing the poor status of the rivers Pärlijõgi and Mustjõgi.

4.5 Significant pressure factors for groundwater

The assessment of the significance of groundwater pressure factors is based on studies of local groundwater pollution cases and monitoring data on the increasing trends of pollutant concentration.

Table 18 Assessment of groundwater pressure factors in the Koiva river basin district

Pressure factors	**Assessment of pressure factors (minor significance, significant, very significant)**
Diffuse source load, incl.	
-agricultural activities (fertilizer use, pesticides, livestock farming)	A pressure factor of minor significance for the Upper Devonian groundwater body and the Middle Devonian groundwater body
-population not connected to sewerage collection systems	A pressure factor of minor significance for the Upper Devonian and the Middle Devonian groundwater bodies
Point source load, incl.	

Spills from polluted areas	A pressure factor of minor significance for the Upper Devonian and the Middle Devonian groundwater bodies
Spills from waste storage sites (landfills, agricultural waste)	A pressure factor of minor significance for the Upper Devonian and the Middle Devonian groundwater bodies

There are four instances in which a permit has been issued for discharging wastewater into soil on the territory of the Koiva river basin district. Their impact is not significant for the quality of the groundwater bodies within the river basin district. For the groundwater bodies in the Koiva sub-district, the main risk is a potential change in status in case of combined impact of all point sources of pollution.

The total volume of water abstracted from the Upper Devonian groundwater body is between 100 and 200 m^3/d. Due to limited occurrence, the Upper Devonian groundwater is not significant from the viewpoint of public water supply.

The total volume of water abstracted from the Middle Devonian groundwater body is between 500 and 700 m^3/d. The main users of groundwater are settlements and farms. Smaller villages and farms use dug wells to abstract drinking water. The area includes a total of 102 operational bore wells; for the most part, the volume of water abstracted through them is so small that a permit for the special use of water is not required and the amount of water used is not estimated. The chemical status of the groundwater body in the river basin district could be influenced by farming, but the small volume of water abstraction has no impact on quantitative status. Further potential risk factors for the chemical status of the groundwater body include population not connected to sewerage collection systems, spills from polluted areas, from waste storage sites and fuel storage facilities, as well as discarded waste. The impact of such factors is limited to the area close to the source of pollution and does not cause a poor chemical status of the groundwater body in the river basin district.

The existing groundwater reserves in the Koiva river basin district are sufficient and are several times larger than the needed volume of water. The total volume of groundwater reserves in the river basin district has not been determined, because of small volume of water abstraction and limited need for water.

Any rapid changes that would affect the status of the groundwater body are unlikely in the Koiva river basin district. Occurrence of negative trends and phenomena on particular groundwater intakes cannot be excluded. There are no risks for any surface water bodies or ecosystems from changes in the groundwater level of groundwater bodies.

The use of groundwater does not affect surface water bodies or inland ecosystems.

5 PROTECTED AREAS

For the purposes of the MP, protected areas are areas and regions that need additional protection and measures to achieve the associated objectives. The register of protected areas is based on the Environmental Register, established under the Environmental Register Act, and the associated database. The following areas are treated as protected areas in the Environmental Register:

1) Areas included in the Natura 2000 network, submitted to the European Commission pursuant to § 91 (6) of the Nature Conservation Act;[26]

2) Limited management zones of shores and banks, specified in § 37 of the Nature Conservation Act;[27]

3) Water bodies to be protected as habitats of salmonids and cyprinids, specified in § 38 (7) of the Water Act[28] and listed in the Minister of Environment Regulation no. 58[29];

4) Pandivere-Adavere nitrate sensitive area designated pursuant § 26^3 (2) of the Water Act;[30]

5) Sanitary protection zones of water intakes as defined in § 28 of the Water Act;[31]

6) Water protection zones[32] in the area of the banks of a water body as specified in § 29 of the Water Act;

7) bathing water and beaches referred to in § 7 (2) 8) of the Public Health Act[33] and the bathing sites specified in the Government of the Republic Regulation no. 74[34] and published on the website of the Health Board[35].

5.1 Nature conservation

Pursuant to the list to be submitted to the European Commission, approved by the Government of the Republic Order no. 615-k of 5 August 2004 (supplemented on 23 April 2009), the river basin district includes four sections of rivers included in the **Natura 2000** network – Vaidava River section (6.4 km) on the Mõisamõtsa Nature Reserve, Pärlijõgi River (24.8 km), Peetri River (4.1 km) and the meadow of Koiva-Mustjõgi River (5.38 km). In addition to them, 19 river sections are located on the areas of the Natura 2000 network where rivers and streams (3260) are the protected

[26] https://www.riigiteataja.ee/ert/act.jsp?id=13177239
[27] https://www.riigiteataja.ee/ert/act.jsp?id=13118655
[28] https://www.riigiteataja.ee/ert/act.jsp?id=13169009
[29] https://www.riigiteataja.ee/ert/act.jsp?replstring=33&dyn=13169009&id=208599
[30] https://www.riigiteataja.ee/ert/act.jsp?id=13136785
[31] https://www.riigiteataja.ee/ert/act.jsp?id=13169009
[32] https://www.riigiteataja.ee/ert/act.jsp?id=13169009
[33] http://www.riigiteataja.ee/ert/act.jsp?id=13101746
[34] http://www.riigiteataja.ee/ert/act.jsp?id=12950336
[35] http://www.tervisekaitse.ee/?mid=27

habitat type.

There are 25 **nature sites**, included in the **Natura 2000** network, on the territory of the Koiva river basin district. All lakes in the Koiva river basin district are located on the nature sites of the Natura 2000 network.

10 rivers or parts of rivers are on the **list of spawning sites and habitats of salmon, river trout, sea trout and grayling** (approved by the Minister of the Environment regulation no. 73 of 15 June 2004 (RTL 2004, 87, 1362)). Pursuant to § 51 (1) of the Nature Conservation Act, building of new impoundments and reconstruction of existing impoundments to the extent which would raise the level of water, as well as altering the natural bed or water regime of the water body is prohibited in such areas.

There are no water bodies protected as habitats of cyprinids in the river basin district.

The larger protected **wetlands** are the meadow of Kalliküla-Tõrvase, the meadow of Saru-Kuutsi, the meadow of Mustjõgi near Hargla and the meadow of Koiva-Mustjõgi, all located in the area of Mustjõgi River.

There are no wetlands entered on the **list of Ramsar wetlands** in the Koiva river basin district.

The Nature Conservation Act has specified limited management zones of shores and banks with a width of 200 meters on the shores of the Baltic Sea; 100 meters on the lakes and reservoirs with an area of more than ten hectares and on rivers, brooks, streams and artificial recipients of drainage systems with a river basin of more than 25 square kilometres; 50 meters on rivers, springs and artificial recipients of drainage systems with a river basin of up to 25 square kilometres.

The objective of protection of shores and banks is to preserve the natural biotic communities present on the shores and banks, to curb the harmful impact of human activity, to promote human settlement systems which consider the specific character of the shores and banks, and to ensure unrestricted movement within and unrestricted access to the territories thereof. The objective for protecting forests located within the limited management zones of shores and banks is the protection of the water and soil, and the preservation of suitable conditions for recreation.

Need to protect springs. The river basin district includes many virtually natural springs, which are very rare in entire Europe. The springs include some representatives of relict biota from the ice age and there are spring bogs that deserve protection around the springs. Even though some springs are located in other protected areas and the Natura sites, long-term preservation of valuable springs in their natural condition is not ensured with previously applied protection measures. There is no ordered database of the springs.

5.2 Sanitary protection zones and water protection zones

The width of a sanitary protection zone of groundwater intake depends on the level of

protection of the used aquifer and the volume of abstracted water, and can be from 10 meters to 50 meters (exceptionally up to 200 m) from the water abstraction point.

The water intakes in the Koiva river basin district do not have sanitary protection zones wider than 50 m. The majority of water intakes (80 bore wells) have a sanitary protection zone of 30 meters; five wells have a sanitary protection zone of 50 meters. A sanitary protection zone is not ensured in a few isolated cases (the border guard station of Vastse-Roosa).

Water protection zones. In order to protect water against diffuse source pollution and to avoid erosion of the banks of a water body, water protection zones are formed in the area of the banks of the water body. The extent of water protection zones from the usual boundary of the water is 20 m on the Baltic Sea; 10 m on lakes, reservoirs, rivers, streams, springs, main ditches and channels and artificial recipients of drainage systems; and 1 m on artificial recipients of drainage systems with a basin of less than 10 km^2.

5.3 Bathing sites

A bathing site is a water body or a part thereof, which is used for bathing, as well as the adjacent land, which has been marked in a generally understandable manner. Bathing water means the water of a water body, which is designated as a bathing site, unambiguously marked for bathers, and separated. Official bathing sites constitute only a very small portion of all water bodies that could be used for bathing. Official bathing sites are regularly maintained. The official bathing season starts on 1 June and ends on 31 August. To enable safe use of bathing sites, the bathing sites have to be maintained and ordered, equipped with a sufficient number of changing cabins, toilets and litter bins before opening of the bathing season.

Requirements for beaches, bathing sites and bathing water have been established with the Government of the Republic Regulation no. 74 of 3 April 2008[36].

According to Health Board, there are no official bathing sites in the Koiva river basin district. There are 26 known unofficial bathing sites on 19 different water bodies in the Koiva river basin district. The majority of such sites are small sandy beaches of 10-15 meters in width, without changing cabins, toilets or litter bins. These unofficial bathing sites have emerged principally through the initiative of local residents, with some of them being located on municipal land and others on private land.

5.4 Monitoring on protected areas

Water bodies included in the Natura 2000 network. There is no separate monitoring programme for the water bodies in the Natura network. Monitoring is conducted on the basis of sub-programmes for monitoring inland water bodies. The

[36] http://www.terviseamet.ee/keskkonnatervis/vesi/suplusvesi/nouded-suplusveele-ja-supluskohtadele.html

results of monitoring are summarised in environmental monitoring reports[37].

The **monitoring of protection management** on protected areas is organised by the Environmental Board. The monitoring of protection management focuses on assessing achievement of the objectives described in the management plans of protected areas and in the action plans for the protection of species. The assessment covers the status of protected habitats and species, success of planned protection management activities, and efficiency and justifiability of protection measures. The monitoring of protection management is linked to protection objectives of protected areas.

Water bodies or sections of water bodies on the list of spawning sites and habitats of salmon, river trout, sea trout and grayling. The monitoring of these sites has been organised under a special programme for monitoring river biota[38]. The results of monitoring indicate that the status of fish fauna is strongly dependent on the presence of any obstructions on the river. In most water bodies, the chemical quality of water is not a problem for the areas and species requiring protection. Beavers reduce the status of water in smaller rivers. The organic matter and suspended solids content of the water increases as a result of closing of streams and ditches and spoiling of banks, and oxygen deficiency could potentially develop in the water bodies during the winter.

Monitoring of the activities in **water protection zones** is conducted by local governments and the Environmental Inspectorate. Infringements in water protection zones have been discovered and the persons at fault have been punished. There are no separate monitoring arrangements for water protection zones.

The protected areas are shown of Figure 7.

Sanitary protection zones of water intakes. The monitoring of drinking water intakes has been organised according to water permits and it is conducted by permit holders in accordance with the procedure specified in the permit. There are no separate monitoring arrangements for sanitary protection zones of water intakes.

Monitoring of bathing areas. An owner or possessor of an official bathing site organises monitoring of bathing water in accordance with the monitoring schedule, approved by the Health Board. The Koiva river basin district has no official beaches or bathing sites, which would be subject to submission of monitoring data to the Health Board. This can be explained by excessively strict requirements imposed on local governments for managing official bathing sites. No water sampling has been performed in most of the unofficial bathing sites.

[37] http://eelis.ic.envir.ee:88/seireveeb/index.php?id=13&act=show_subprograms&subact=&prog_id=-385362150
[38] https://www.riigiteataja.ee/ert/act.jsp?id=208599

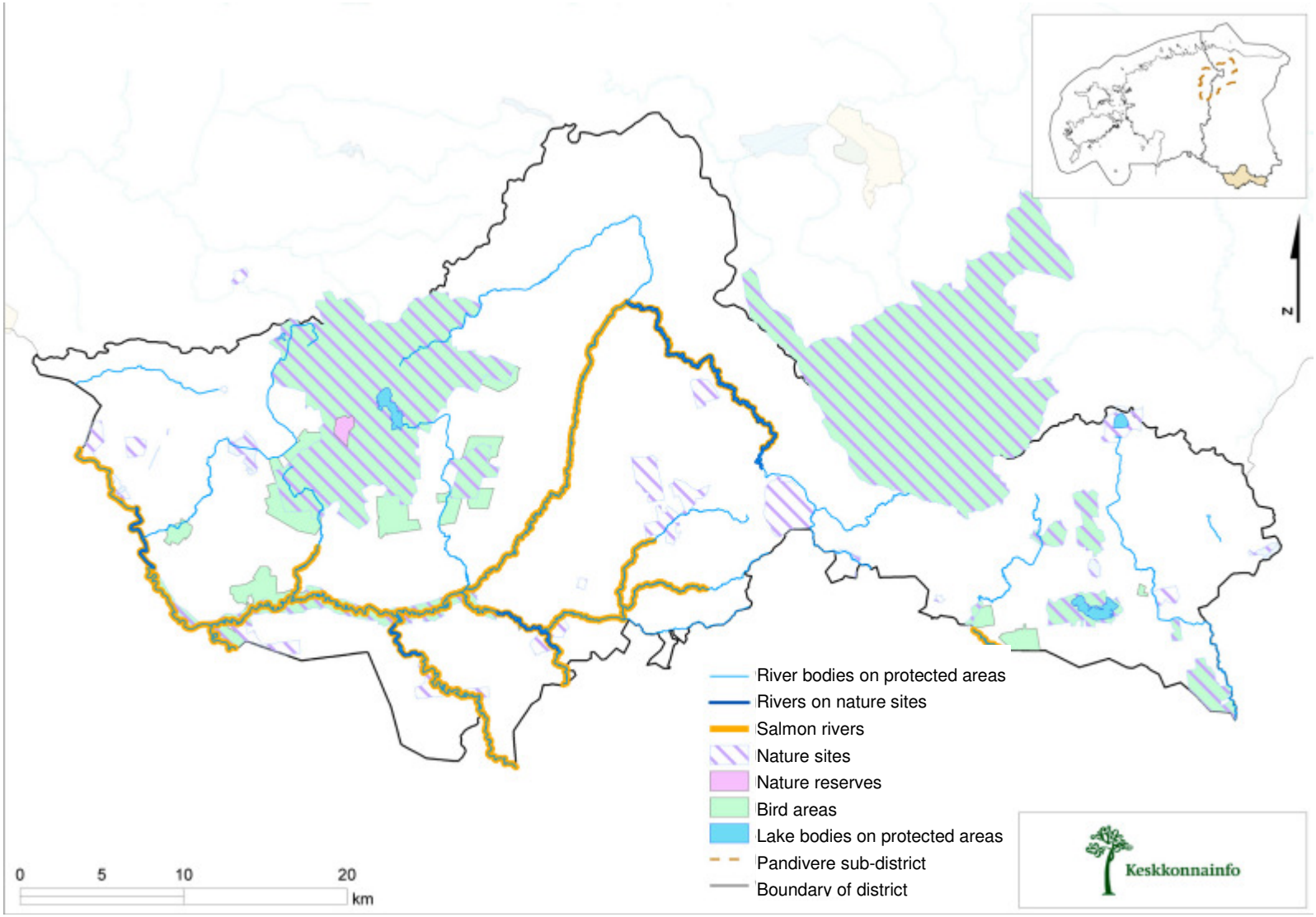

Figure 7 Protected areas and the overlapping water bodies

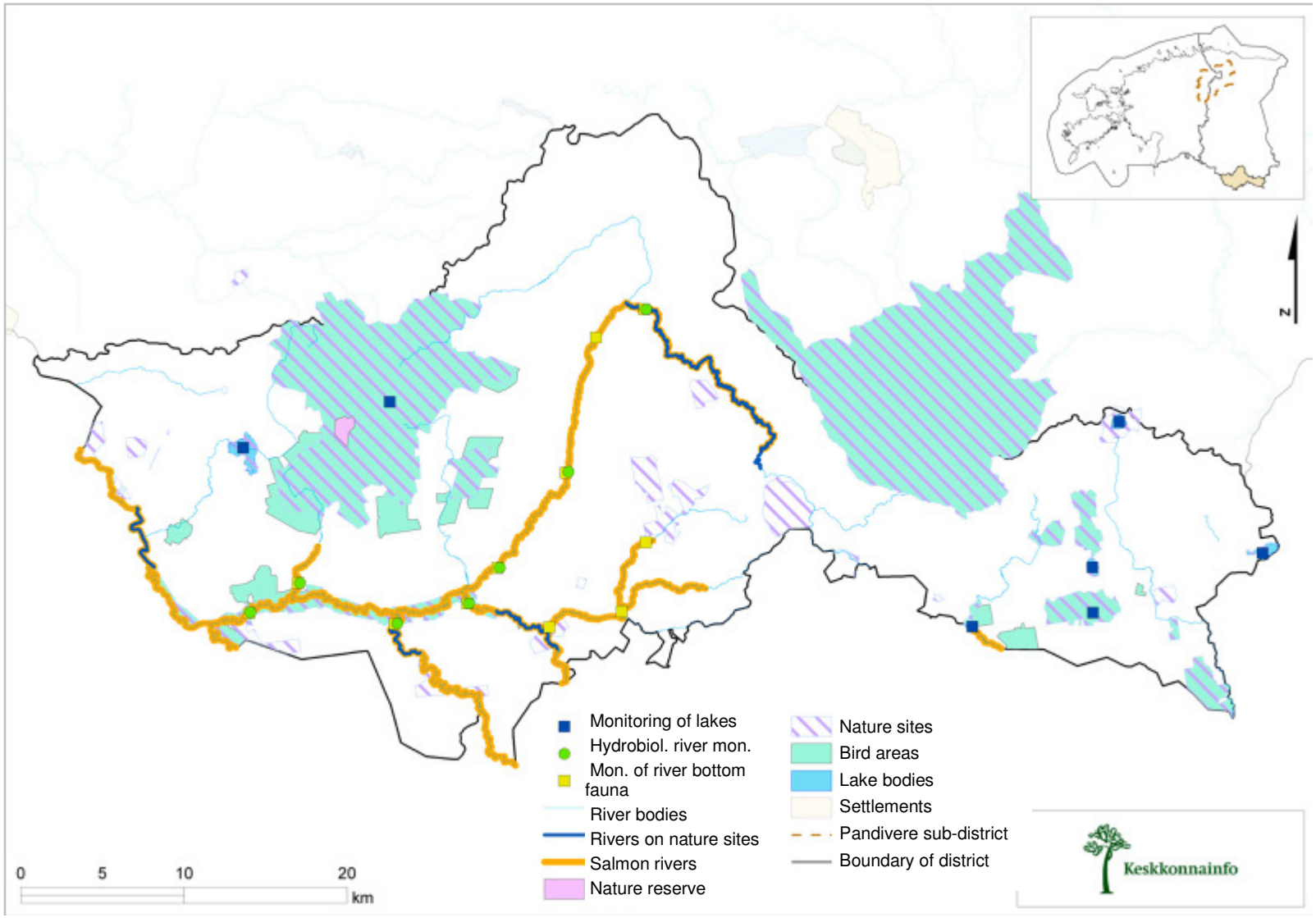

Figure 8 Monitoring network of protected areas

6 STATUS OF SURFACE WATER AND GROUNDWATER

6.1 Maps of the monitoring network

The water monitoring programmes of river basin district management plans have been established by the Minister of the Environment Directive[39] no. 425 of 17 April 2008 and they are regularly updated. The monitoring networks for monitoring surface water and groundwater according to the water monitoring programme are shown on the following figures. The results of monitoring have been used for assessment of the status of water bodies.

A river basin district water monitoring programme is a source document, which is used to plan and manage water management in a river basin district and which should be taken into account in the process of developing and implementing a national environmental monitoring programme and its sub-programmes. The objective of the water monitoring programme is to obtain a single and comprehensive overview of the status of surface water and groundwater in each river basin district.

In order to arrange water management in a river basin district, the Ministry of the Environment drafts for each river basin district or for the Estonian part of a trans-boundary river basin district:

1. a long-term water monitoring programme for one management plan period, with the first water monitoring programme drafted for 2010-2015;

2. a short-term water monitoring programme for one year.

3. a water monitoring programme includes survey, operational and investigative monitoring of surface water, groundwater and protected areas, including:

4. a monitoring plan for the volume and level or flow rate of surface water to the extent required for determining the values of quality indicators used for assessing the ecological status or ecological potential and chemical status of surface water bodies;

5. a monitoring plan for the ecological status or ecological potential and chemical status of surface water bodies;

6. a monitoring plan for the chemical and volume status of groundwater bodies;

7. a monitoring plan for measures implemented to prevent risks associated with flooding;

8. a monitoring plan for the reference network for water body types;

[39] http://www.envir.ee/1075668/

9. a plan for additional monitoring of protected areas with respect to indicators used to establish the respective protected area.

A water monitoring programme specifies the monitoring areas, the coordinates and maps of the required water monitoring sites, types of monitoring to be conducted on monitoring sites, method of monitoring, objects to be monitored (water, aquatic biota, bottom sediments, etc.) and quality indicators, the time and frequency of monitoring during the monitoring period, an overview of measures used to ensure reliability and accuracy of the monitoring programme, and criteria used for selecting the monitoring sites.

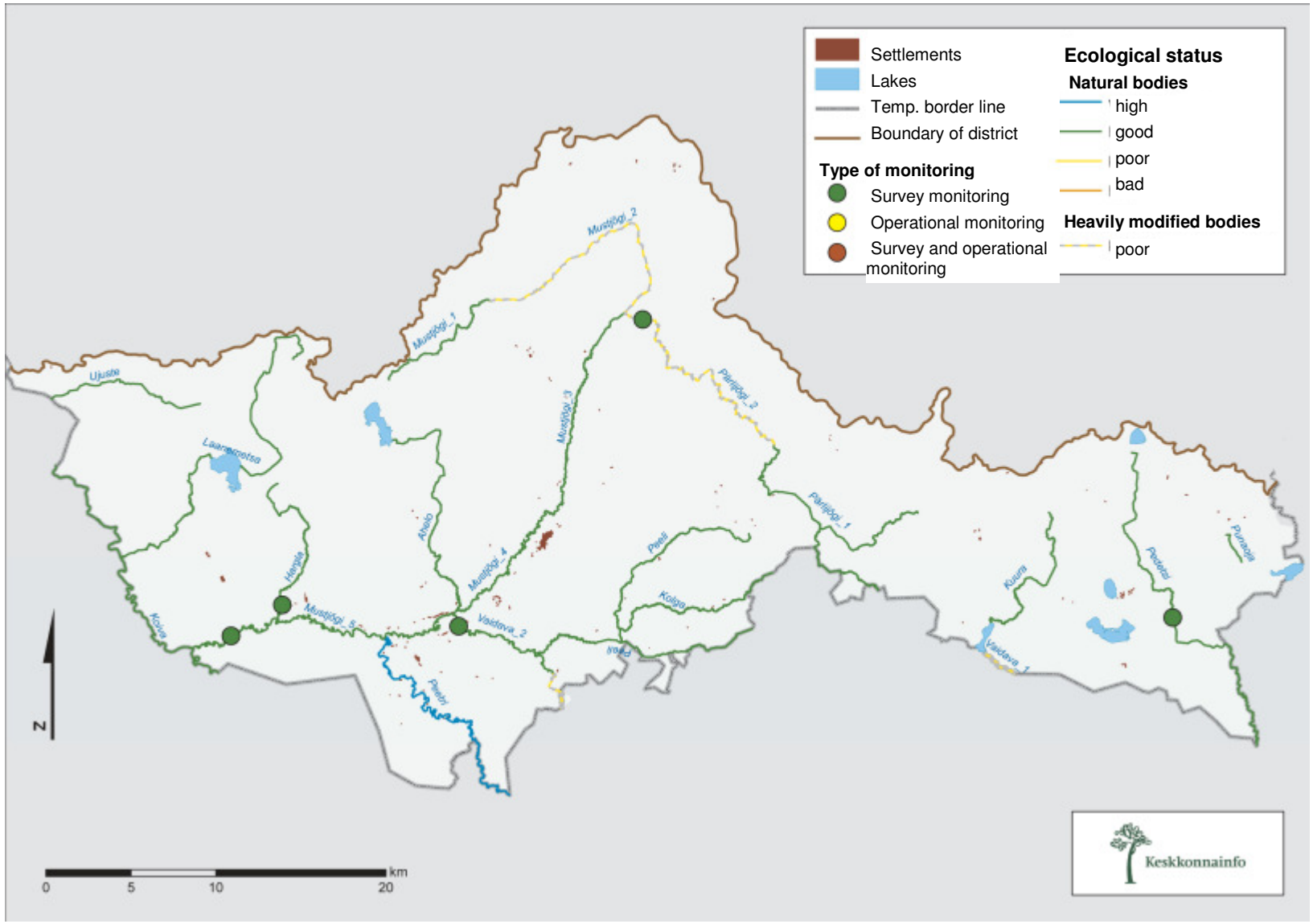

Figure 9 Monitoring of rivers

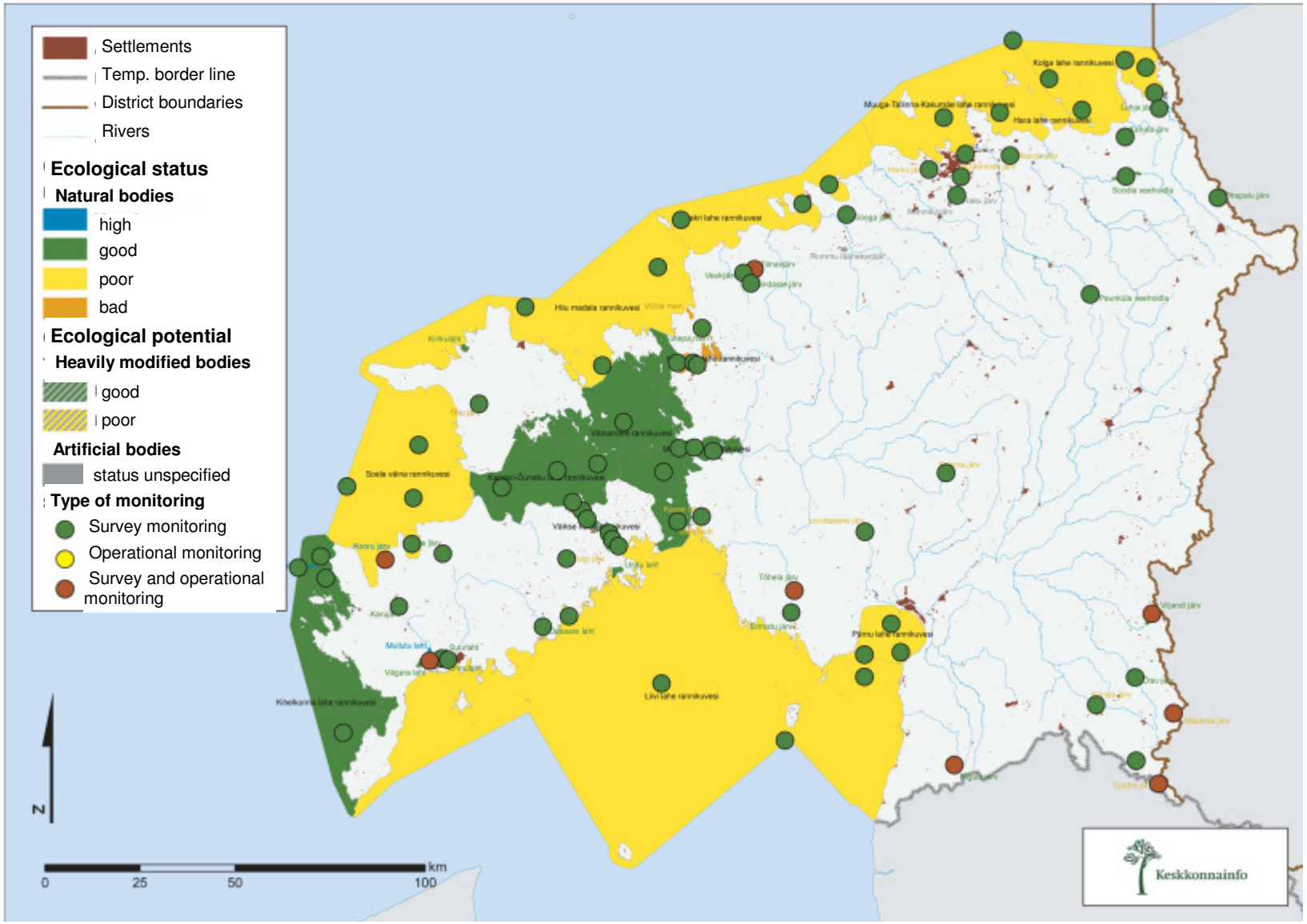

Figure 10 Monitoring of lakes

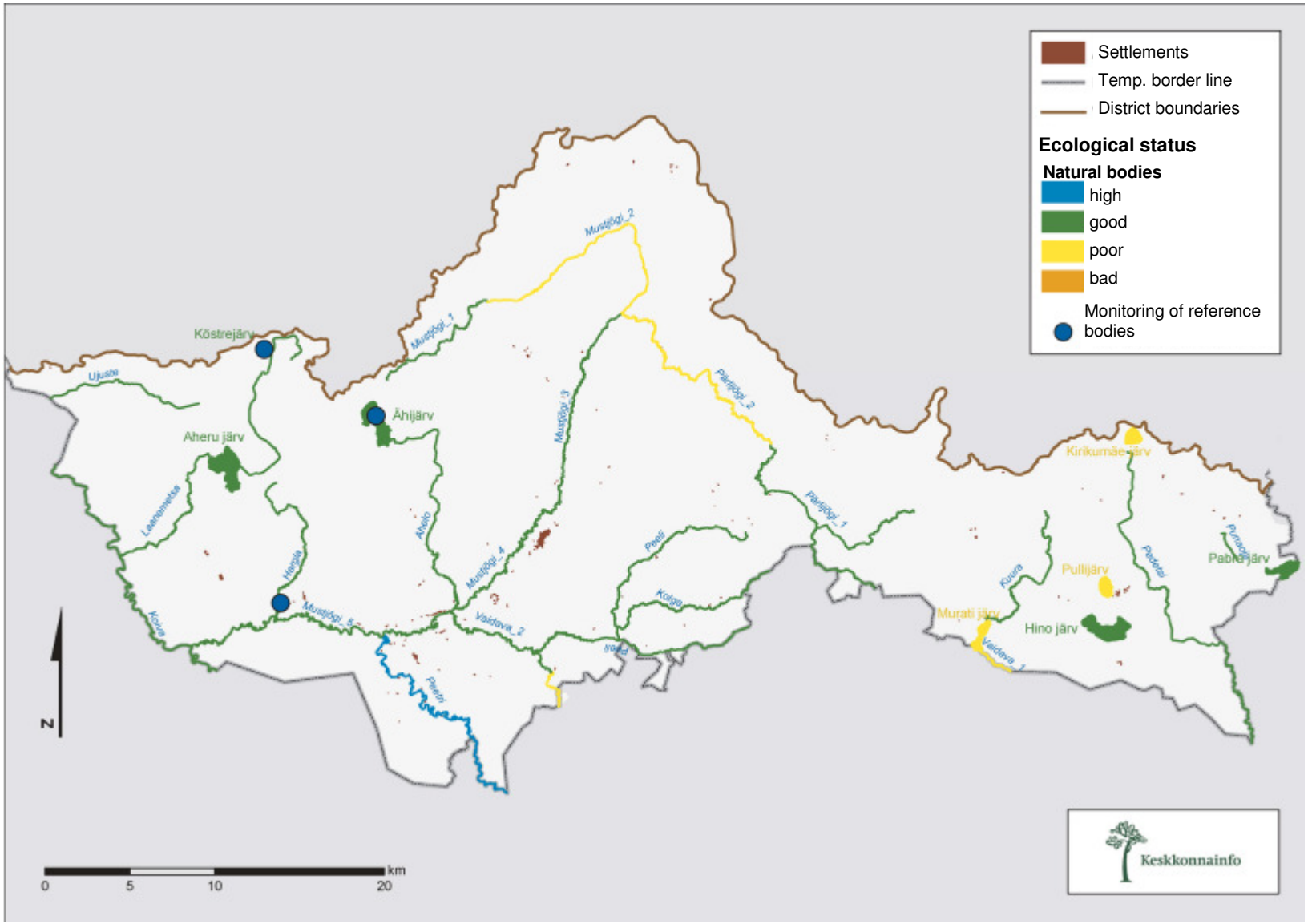

Figure 11 Reference monitoring

6.2 Ecological status of surface water bodies

The status of rivers has been assessed on the basis of monitoring data or, when monitoring data has not been available, on the basis of pressure factors and, if possible, also expert assessments derived from general impressions. All assessments have been made on the basis of the status classes of water bodies, corresponding to the types of water bodies specified in the Minister of the Environment Regulation[40]. A reliability evaluation is appended to each assessment to describe the level of reliability of the data.

General assessment of surface water bodies was based on the following principles:

1. Determination of general assessment on the basis of the element with the lowest quality was used whenever possible.

2. If individual physical/chemical elements indicated a poorer status than biological quality elements, the worst biological element was used.

3. The assessment within a quality element was found by calculating the average value of quality ratios of different indicators (different indicators were assigned equal weights in general assessment).

4. Reliability of assessments was evaluated on a three-point scale, considering the quality of data, the length of the period covered by data, spatial representativeness of the monitoring programme, and variability of the results obtained in the assessment of different quality elements.

6.2.1 Rivers

The majority of natural river bodies in the Koiva river basin district have a good status. Only one body (Peetri River) has a high status and three have a poor status. The status, or the corresponding ecological potential, of the rivers in the Koiva river basin district is shown in Table 19.

Table 19 Status of river bodies in the Koiva river basin district

	Status	**Koiva river basin district**
Natural	High	1
	Good	16
	Poor	2
HMWB	Poor	1

[40] Minister of the Environment Regulation no. 44 of 28 July 2009, "Procedure for establishment of surface water bodies and the list of surface water bodies for which the status class shall be determined, status classes of surface water bodies and the values of quality indicators corresponding to the status classes and the procedure for determining status classes" (https://www.riigiteataja.ee/ert/act.jsp?id=13210253)

Large rivers (type 3B) have a good status (lower course of Koiva and Mustjõgi rivers). Of the medium-sized rivers, Pärlijõgi River was found to have a poor status between the Saarlase impoundment and the mouth, and Vaidava River upstream of the Vastse-Roosa impoundment. The main causes of poor status are dams, overabundance of beavers and diffuse source pollution. The section of Mustjõgi River starting from the Antsla-Litsmetsa road has poor ecological potential. The reliability level of status assessment of small river bodies is often low and, in many instances, hydrogeomorphological indicators have not been assessed. According to the assessments, the smaller river bodies in the Koiva river basin district have a good status.

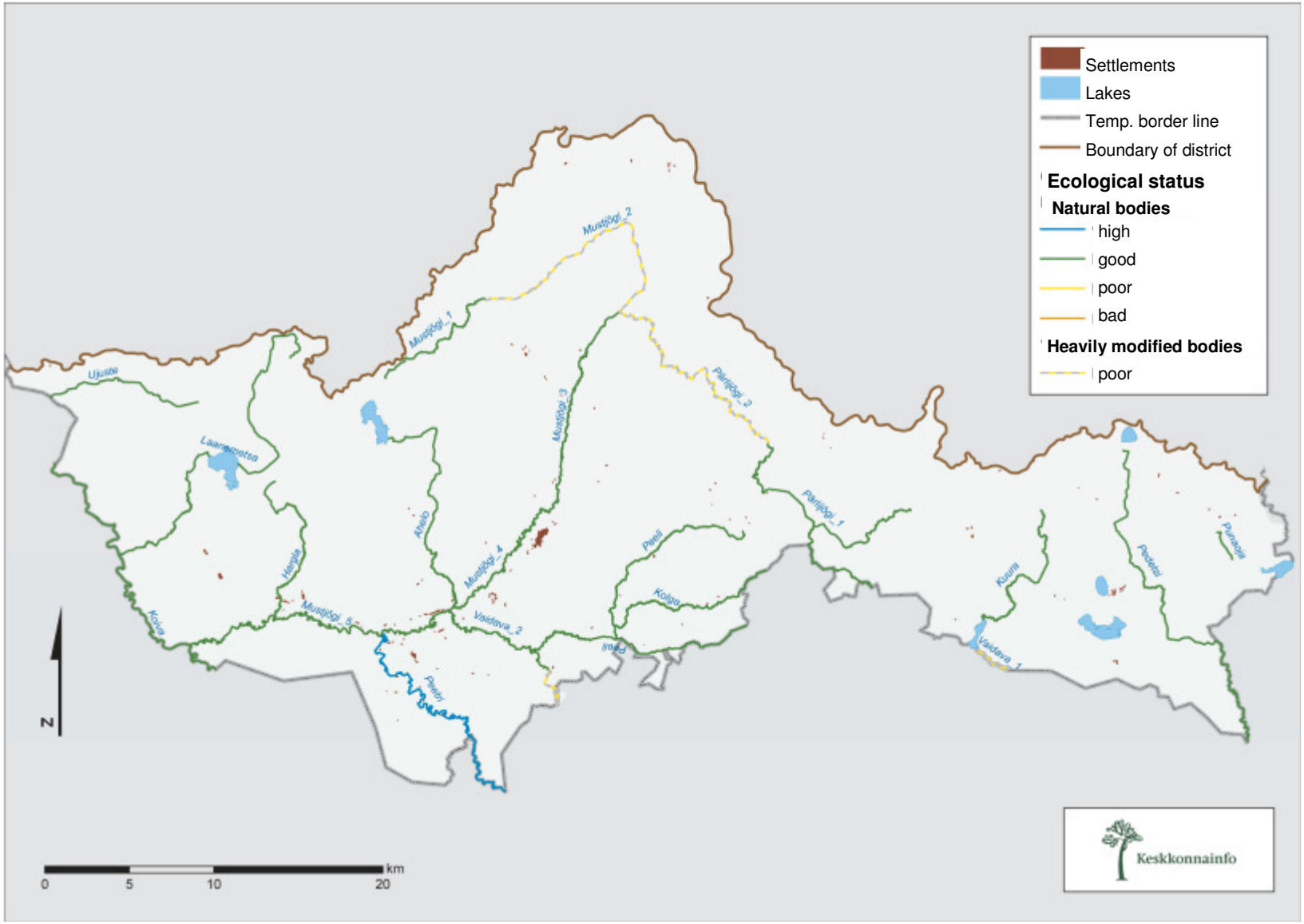

Figure 12 Ecological status or potential of river bodies

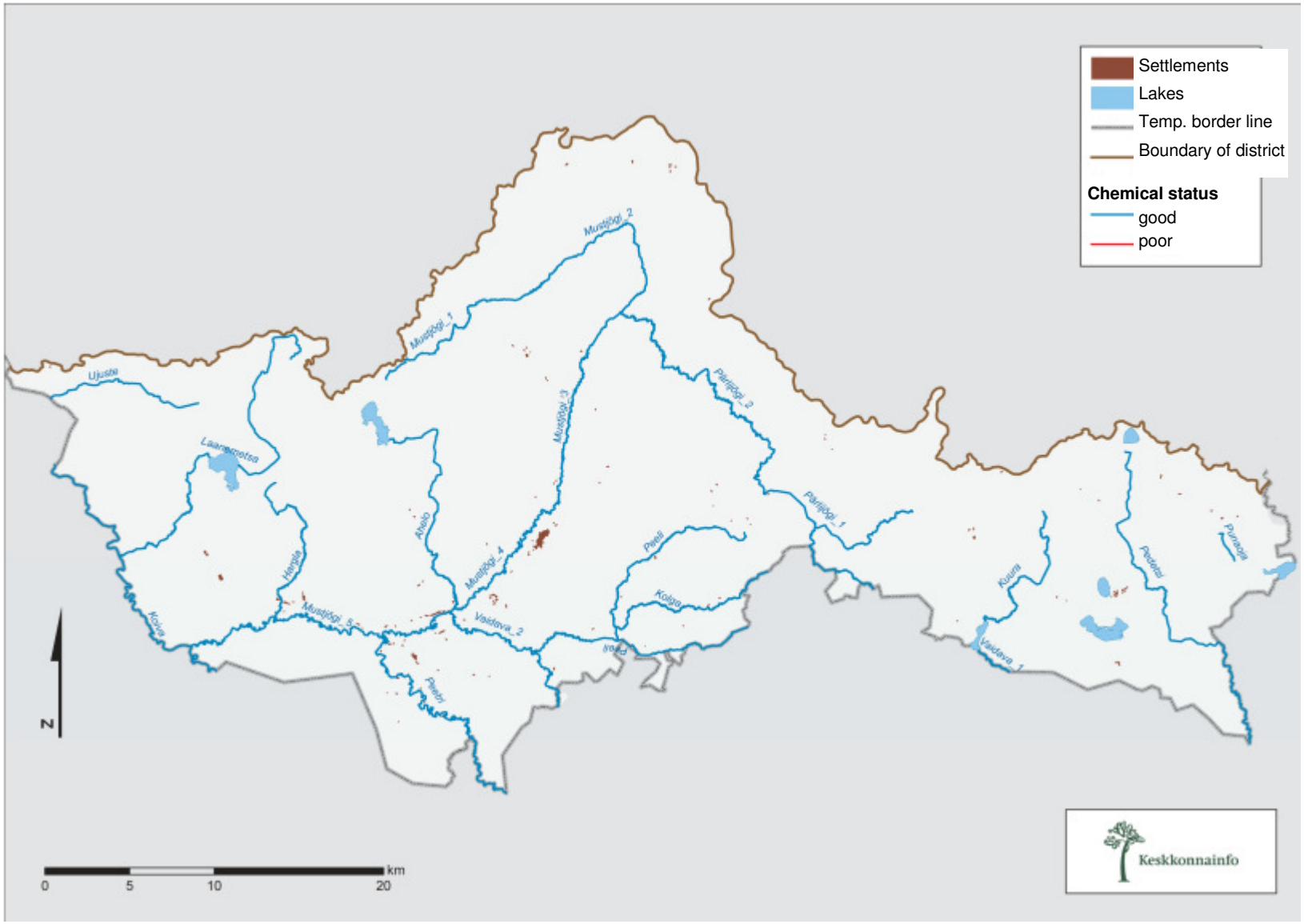

Figure 13 Chemical status of river bodies

6.2.2 Lakes

The status of eight lakes has been assessed in the Koiva river basin district (Table 20); five of them have a good status and three have a poor status. A poor status was established in the case of lakes Pullijärv, Murati and Kirikumäe. A direct human impact from pollution sources could not be detected in the case of these lakes. In case of Pullijärv, it is possible that the poor status could be caused by historic internal pollution load.

Table 20 Statuses of lakes

Name	Body code	Area, ha	Type	Status
Murati Lake	215590_1	65,8	V	Poor
Kirikumäe Lake	214470_1	62,0	V	Poor
Lake Pullijärv	215520_1	63,1	III	Poor
Lake Ähijärv	213600_1	181,2	III	Good
Aheru Lake	213660_1	232,5	II	Good
Hino Lake	215550_1	207,1	III	Good
Pabra Lake	215670_1	93,1	III	Good
Lake Köstrejärv	2133700_1	11,5	II	Good

Graphic representations of the statuses of water bodies in the Koiva river basin district are shown on Figures 12, 13, 14 and 15.

6.2.3 Chemical status of surface water bodies

There are no known problems in the Koiva river basin district with exceeding the limit values[41] for heavy metals, which are on the lists of substances hazardous for the aquatic environment[42].

Based on inventories of hazardous substances emissions[43], there are no known emissions of hazardous substances, which would endanger the chemical status class of water bodies, in the Koiva river basin district.

The chemical status of all water bodies is good (see Figures 13 and 15).

[41] https://www.riigiteataja.ee/ert/act.jsp?id=866073
[42] https://www.riigiteataja.ee/ert/act.jsp?id=86128
[43] http://www.envir.ee/orb.aw/class=file/action=preview/id=1095476/Ohtlike+ainete+inventuur%2C+12+maakonda.pdf

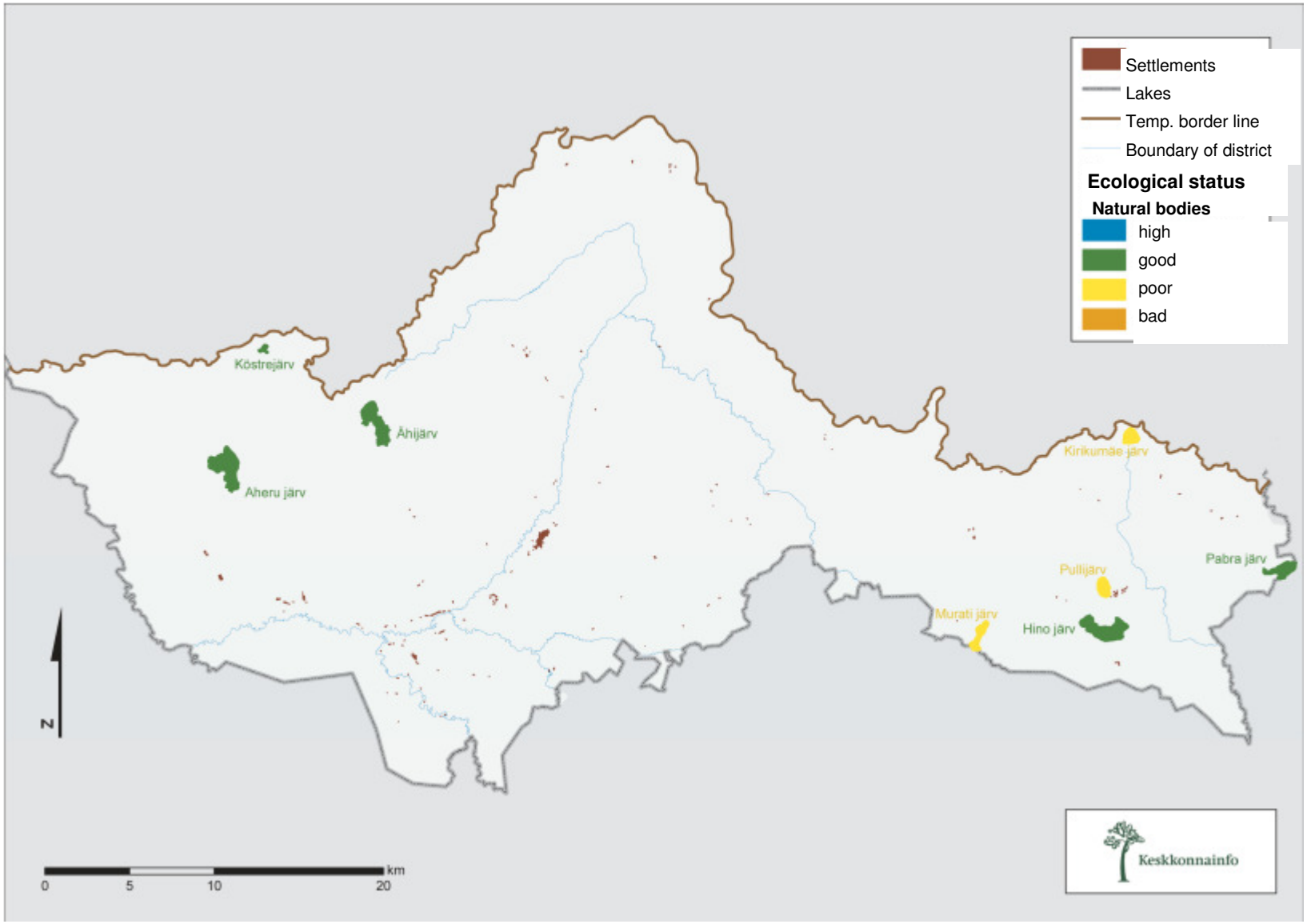

Figure 14 Ecological status of lakes

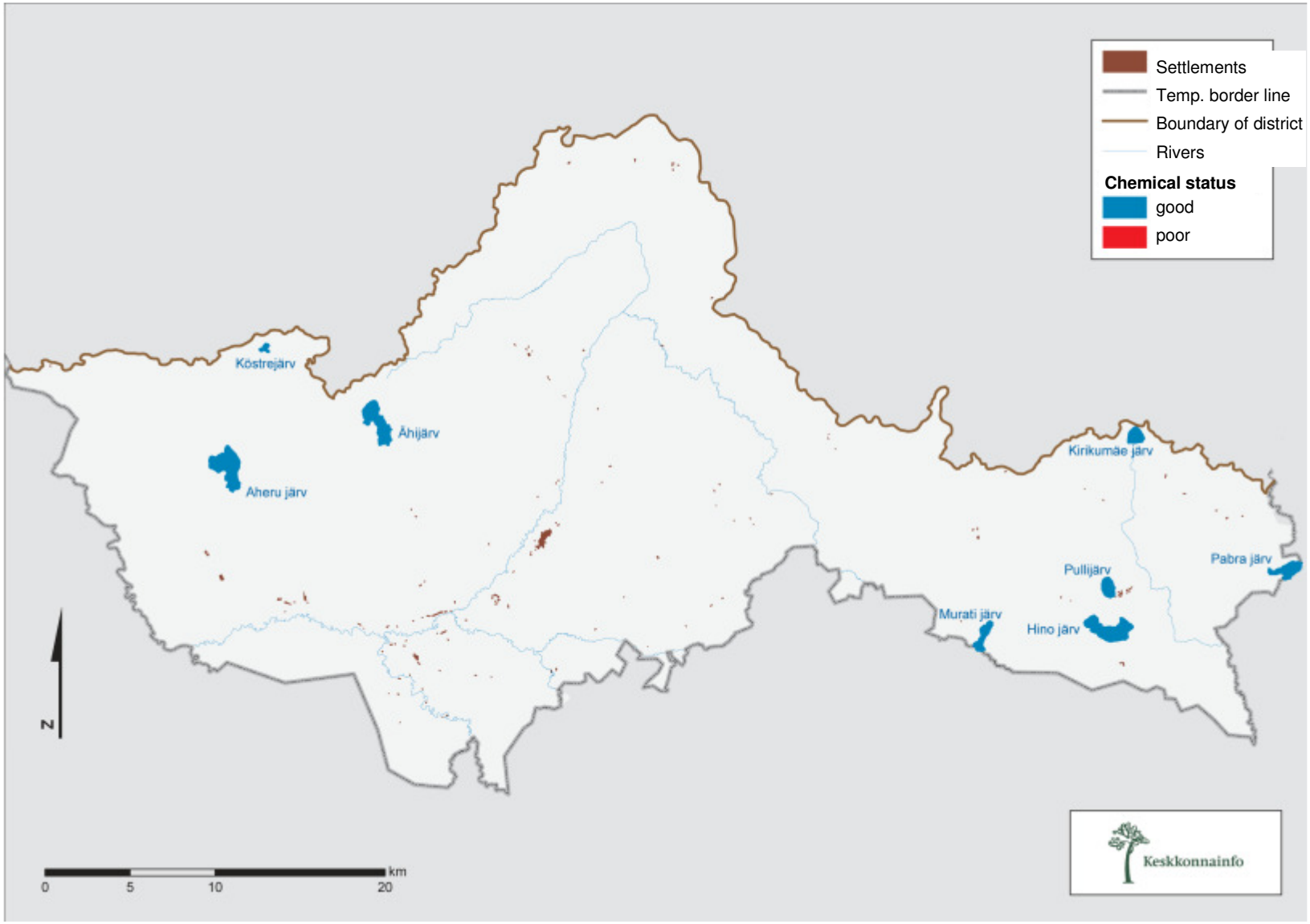

Figure 15 Chemical status of lakes

6.3 Chemical and volume status of groundwater

The groundwater bodies in the Koiva river basin district have a good status (Figures 16 and 17). This has been ensured through large proportion of natural and semi-natural land and land used for low-intensity cultivation in comparison to settlement land and agricultural land.

The change of status assessment from good to bad before 2015 is not likely in any of the groundwater bodies. Changes in the groundwater level of groundwater bodies do not pose a risk to any surface water bodies or ecosystems.

Any rapid changes that would affect the status of the entire groundwater body are unlikely in the Koiva river basin district due to Estonia's lop population concentration. Attention should be focused on more densely populated areas to prevent pollution of any particular water intakes. A change in the status of groundwater bodies does not create a need for relocating population or industries.

Based on water chemistry indicators of the groundwater bodies in the Koiva river basin district (Table 21), there are no significant problems with the chemical status of groundwater. The average of a groundwater body can be regarded as background level and the average of monitoring as baseline level (to identify trends).

Table 21 Water chemistry indicators of groundwater bodies

Name of groundwater body or part of a groundwater body	Years 2006-2009	pH > 6 and < 9	PHT < 5 mg/l O2	NH4 < 0.5 mg/l, anaerobic < 1.5 mg/l	NO3 < 50 mg/l	Pesticides < 0.1 µg/l or aggregate < 0.5 µg/l	1 al phenols < 0.001 mg/l	Oil products < 0.02 mg/l	Benzene < 1 µg/l	sum PAH < 0.1 µg/l	SO4 < 250 mg/l	Cl < 250 mg/l ** < 350 mg/l
Middle Devonian groundwater body	Body average	7.41	1.5	0.19	2.2	<0.5				<0.1	12	12
	Monitoring average	7.61	1.5	0.09	2.6	<0.5				<0.1	11	12
Upper Devonian groundwater body	Body average	7.85	2.4	0.23	0.3	<0.5				<0.1	9	11
	Monitoring average	7.55	3.2	0.22	0.2	<0.5					12	11

The total volume of groundwater reserves in the river basin district has not been determined in Estonia, because of small volume of water abstraction and limited need for water (within the river basin district, <1000 m^3/d from the Middle Devonian groundwater body and <500 m^3/d from the Upper Devonian groundwater body). A projection based on the current level of water use indicates that no significant

changes are likely to occur in the quality and volume of the groundwater bodies. The existing groundwater reserves in the Koiva river basin district are sufficient and are several times larger than the needed volume of water.

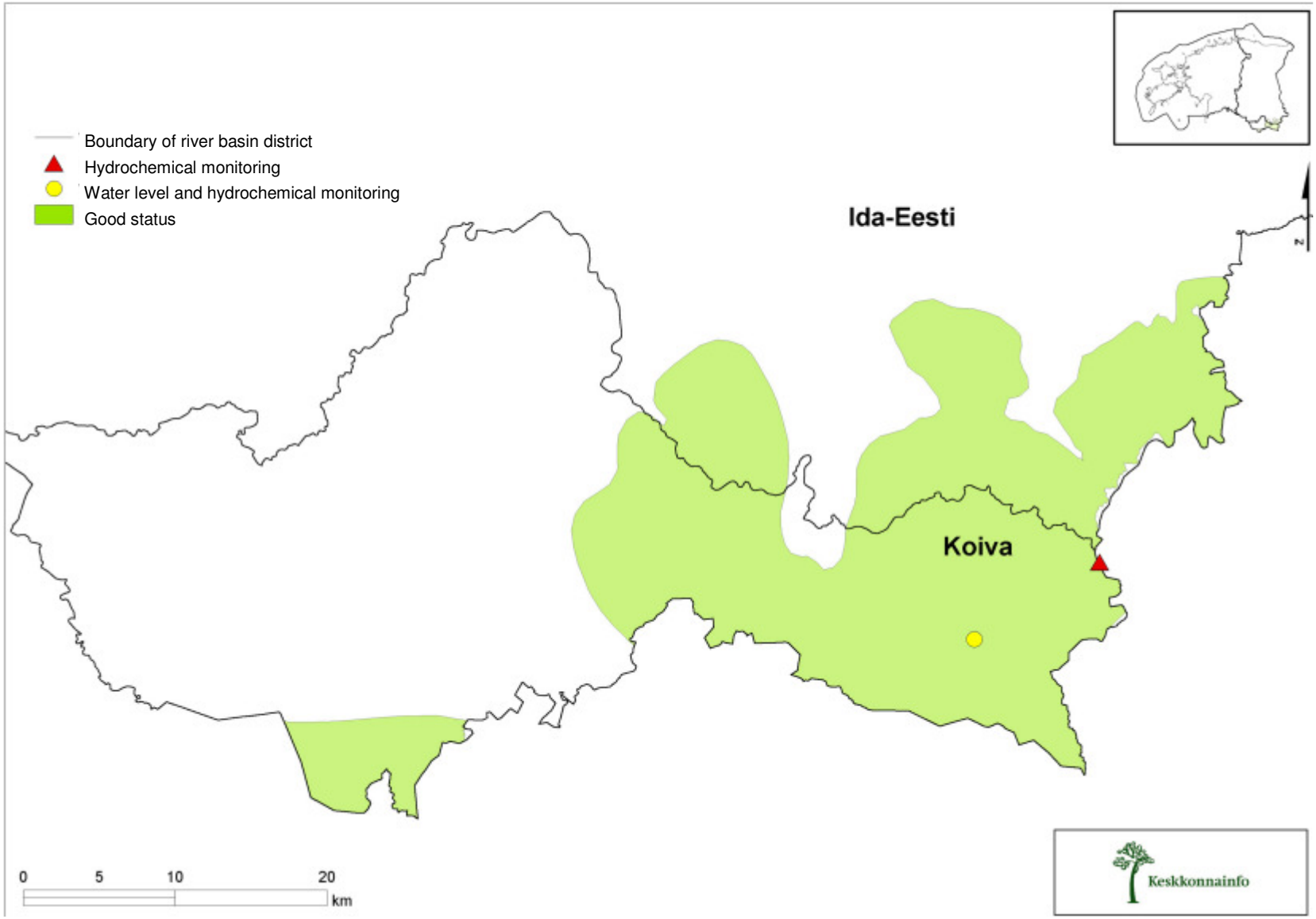

Figure 16 Status and monitoring of the Upper Devonian body of groundwater

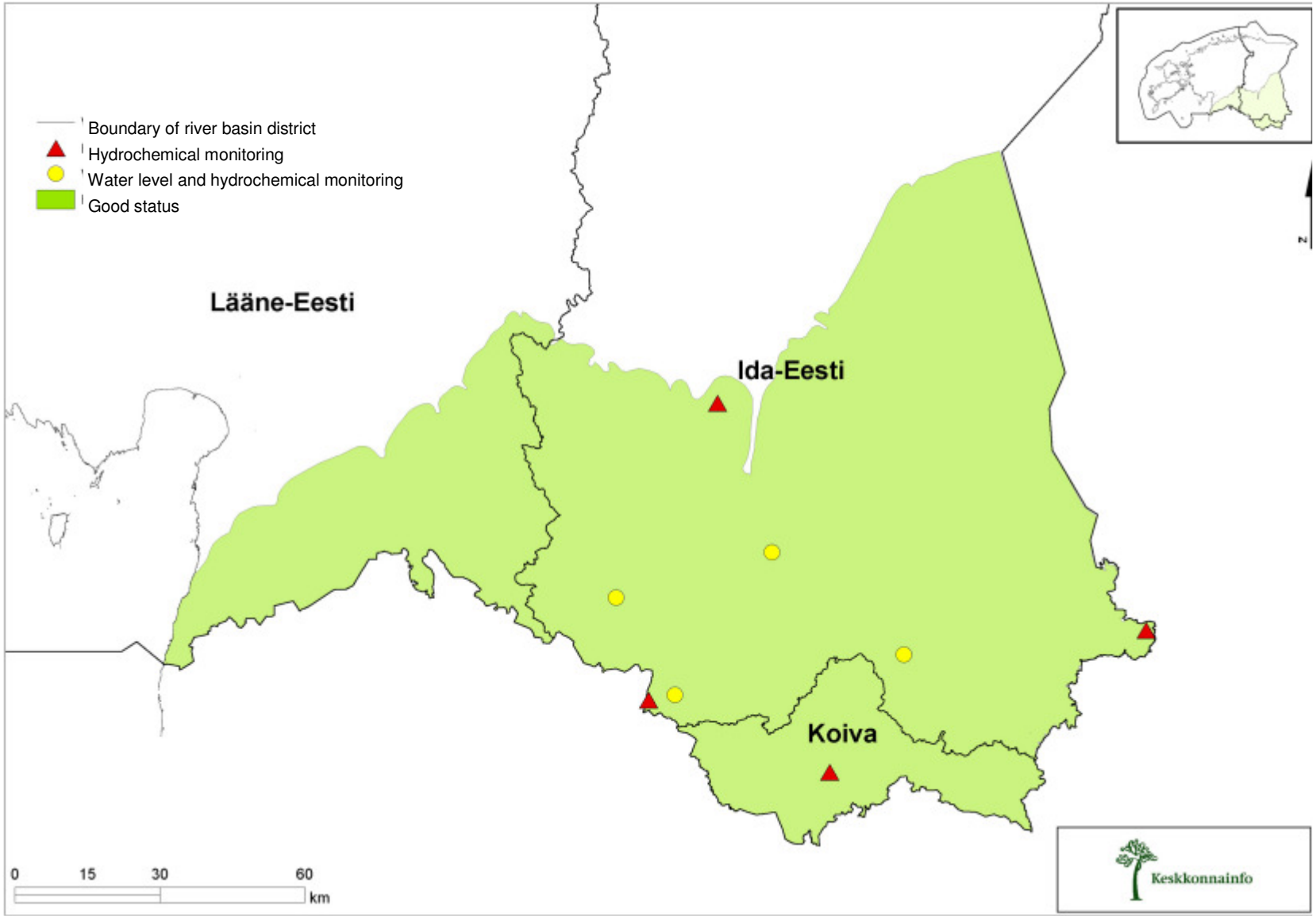

Figure 17 Status and monitoring of the Middle Devonian body of groundwater

7 OBJECTIVES FOR SURFACE WATER, GROUNDWATER AND PROTECTED AREAS

Pursuant to the Water Act, measures to achieve a good status of water should be planned and implemented on the basis of management plans. The first stage covers implementation of measures to achieve a good status of water by the end of 2015. This will be followed by further two water management periods: 2015 -2021 and 2021-2027. Achieving a good status of all water bodies by 2027 is a major challenge and the socio-economic and technological options for accomplishing this are not clear at this moment in time.

Achieving a good status of water may not endanger achievement of other environmental objectives.

With regard to surface water, achieving a good status means achieving both a good ecological status and a good chemical status. Achieving a good ecological status means that the values of biological, hydromorphological and physical/chemical indicators of water quality are within the range specified for a good status class. Achieving a good chemical status of surface water means that the quality of surface water is within the limits established for various hazardous substances or compounds.

With regard to groundwater, achieving a good status means achieving both a good quantitative status and a good chemical status. A good quantitative status requires stability and availability of sufficient water reserves. A good chemical status of groundwater is achieved by ensuring compliance with the limit values established for various hazardous substances or compounds.

The Water Act also provides for exemptions with regard to achieving the objectives. Exemptions are linked to non-achievement of a good status as the general objective under certain conditions. Exemptions from the obligation to achieve the general objective – a good status of surface water or groundwater – are made in the following cases:

- Establishment of an extended objective for a surface water body or a groundwater body;
- Determination of the best possible status and establishment of this status as a objective, i.e., establishment of a more lenient objective for a surface water body or a groundwater body;
- Permitting temporary lowering of the water status due to natural changes;
- Permitting lowering of the water status due to significant new development.

Exemptions from achievement of the objectives established for surface water and groundwater are listed in Annex 4.

This annex includes a list of water bodies, which are not likely to achieve a good status through measures implemented in 2009-2015. In the current plan, the objective of achieving a good status for these bodies has been postponed until 2021. Due to insufficient information, it is not possible to determine at the moment, which

water bodies could realistically achieve the objective by 2021 or by 2027 and which water bodies could not possibly achieve a good status according to the current criteria, using known technologies.

Especially in the case of currently designated small river bodies, uncompromising achievement of a good status would require major reorganisation of land use and agriculture, which would be highly unlikely due to socio-economic reasons. Consequently, in the case of some water bodies, achieving a good status according to the current criteria, even by the year 2027, would be disproportionately expensive and technically unfeasible.

According to an assessment based on the current level of knowledge, the projected share of surface water bodies with a good status in the Koiva river basin district would be as follows: 2009 – 80 %; 2015 – 90 %; 2027 – 95 %.

7.1 Inland surface water

Deficiencies in ecological status indicators are the main reasons for poor or bad status of water bodies. Achieving a good ecological status of river bodies requires elimination of major obstacles to migration, restoration of tortuosity, if possible, of water bodies straightened in the course of drainage works, creation of rapid river sections, and ensuring that fish have access to tributaries and former river beds.

Furthermore, ensuring a good status requires reduction of nutrient load on water bodies. This is particularly important for maintaining a good status of lakes. All urban and industrial wastewater should be treated in accordance with requirements. If necessary, the limits for discharging effluent into receiving water bodies should be made stricter with a water permit, based on the integrated approach.

Good agricultural practice should be followed in livestock farming and land cultivation to prevent and eliminate pollution.

In the case of heavily modified and artificial water bodies, the objective is to achieve the maximum ecological potential possible. In any case, a good chemical status must be achieved and the water quality of heavily modified and artificial water bodies (incl. nutrient load on natural water bodies) may not endanger the status class of natural water bodies.

A total of six surface water bodies in the Koiva river basin district (incl. three river bodies and three lakes, see Annex 1) are in a poor condition (incl. artificial water bodies with a poor ecological potential). Three of these bodies (Pärlijõgi River, Murati Lake and Kirikumäe Lake) can be expected to achieve a good status by 2015 after implementation of the planned measures.

The following are the main reasons that prevent achievement of a good status of all river bodies by 2015:

1. Low level of reliability of status assessment and identification of causes of non-compliance makes it difficult to choose the most adequate measures;

2. Small water bodies are used as artificial recipients of drainage systems;
3. Due to low flow rates, a good status of water is difficult to achieve on the water bodies of upper courses of rivers, located on agricultural areas and areas with higher population density.

A poor or bad condition of the lake water bodies is often caused by historical reasons (reduction of water level, earlier pollution) or by pollution load from the atmosphere in the case of particularly sensitive lakes (types 4 and 5). Researchers are doubtful about the options for improving the status of lakes in general and, for the most part, recommend to use only conserving measures (maintaining the current status). Consequently, rapid changes in the status of most lakes cannot be expected.

Establishment of exemptions from the objectives of achieving a good status of surface water bodies was based on the following:

- The pressure factors affecting the status were identified in the case of each surface water body (see Chapter 3 and Annex 3);
- The impact of point source pollution and wastewater treatment plants on water status was assessed on the basis of available data in permits for the special use of water or in the databases of the EEIC;
- The impact of diffuse source pollution was considered on the basis of conducted studies;
- A package of measures to ensure achievement of a good status of the surface water body by 2015 was selected. The selection of measures was based on previous experience and expert opinions;
- If possible, the cost of individual measures was determined on the basis of established unit prices. Stronger sets of measures were selected for entire water bodies or, if necessary, for specific surface water bodies with a bad or poor status, because achievement of a good status on a particular water body requires elimination of several concurrent underlying causes that affect the status of the water body.
- Compensation of the damage to the aquatic environment, caused by the users of water, was considered as well. For that purpose, the level of cost recovery associated with water use was assessed in the light of solvency of business operators, population, industrial and agricultural undertakings, as well as the potential for using financial resources from the state budget (taxpayers' money), incl. financing from the EU Cohesion Fund.[44]

The deadline for achieving a good status of a surface water body was extended for those surface water bodies where the sub-category of the water body is unclear, technological options for implementing measures are limited, and expenses required for achieving a good status of the surface water body in question would be prohibitive. The size of rivers was taken into account when extending the deadlines.

The second important reason for establishing extended objectives for surface water bodies was the projected exceeding of time limits in the case of step-by-step implementation of technical measures. For instance, reduction of diffuse source pollution from agriculture requires leaching of nutrients accumulated in soil, as well as modification and modernisation of production technologies. This could not be

[44] http://www.envir.ee/orb.aw/class=file/action=preview/id=295059/Majandusanal%FC%FCs+2005.pdf

accomplished all at once, but only in gradual steps.

The natural conditions are also a major factor in terms of timely achievement of objectives, particularly in the case of lakes and coastal waters. Achievement of a good status of larger rivers, lakes and coastal waters does not depend only on the speed of implementation of measures, but also on large inertia of natural processes. Reduction of the impact of pollution, which has accumulated over decades, depends on the rate of water exchange, the rate of pollutant transformation and the speed of recovery of the ecological status.

According to projections, three surface water bodies (incl. two surface water bodies on rivers and one lake) will not achieve a good status by 2015 (see Figure 18). The list of surface water bodies, requiring extension of the deadline for achievement of a good status, and the reasons why achievement of a good status by 2015 is not possible, are provided in Annex 4.

7.2 Groundwater

The general objective is to preserve the natural or almost natural composition and regime of groundwater. It means that the groundwater in designated groundwater bodies has to have a good water status. The Water Act establishes the objective of maintaining a good status of groundwater and preventing pollution and depletion of groundwater. Maintaining and ensuring a good status of groundwater until the end of 2015 means that the chemical and quantitative status of groundwater should meet the quality requirements for a good status class. Due to the specific nature of groundwater, protection of groundwater cannot be based solely on the objective of maintaining a good status of extensive groundwater bodies.

The groundwater protection objectives are linked to the significance of groundwater. The following classification levels are used for groundwater (from general to specific): groundwater, aquifer, groundwater body, and water used for the abstraction of drinking water. The strongest level of protection is required in the case of water used for the abstraction of drinking water. At the same time, the most lenient environmental quality limit values, based only on the needs of human health protection, are applied in the case of groundwater, which is located close to the surface under industrial areas.

The following should be taken into account in the context of achieving the objectives for groundwater:

- Protection of groundwater deposits with officially established groundwater reserves from pollution and depletion must be ensured.
- Protection of aquifers located close to the surface is particularly important in areas where the upper layers of groundwater are the source of drinking water for individual users.
- Agricultural land use on the groundwater recharge area may not cause pollution of groundwater with nitrogen compounds, organic substances or pesticides.
- Springs and karst areas must be preserved in a natural state as far as possible. An access to them must be ensured.

- Protection of groundwater from contamination with hazardous substances must be ensured. Potential environmentally hazardous objects must be brought into compliance with environmental requirements or liquidated; surveillance and reconditioning of areas with polluted soil and groundwater must be ensured.
- Mining and reconditioning of quarries in the course of extracting mineral resources must be performed using technologies that pose the least hazard to groundwater reserves.

There is no need to extend the deadlines for maintaining the general good status of groundwater bodies. All bodies of groundwater in the Koiva river basin district have a good status.

7.3 Reconditioning of drinking water systems

The entire population must have access to safe drinking water, which may not contain pathogens or toxic substances above permitted limits. Drinking water must comply with the requirements established by the Minister of Social Affairs Regulation No 82 of 31 July 2001 on "The quality and control requirements and analysis methods for drinking water".

The drinking water quality and monitoring of public water supply systems (with more than 50 consumers or output over 10 m^3/d or water supply systems with less than 50 consumers or output under 10 m^3/d that supply water to the public (child care institutions, recreation centres, etc.)) is regulated at the EU level by the Drinking Water Directive (98/83/EC) and implementation of the Directive in Estonia is subject to a transition period until 2013. Annex VI to the Treaty of Accession to the EU specifies that, in water supply systems serving less than 2 000 persons, the period of transition with regard to limit values of colour, pH, iron, manganese, odour, turbidity, chloride, conductivity and sulphate will be extended until 31 December 2013.

The Drinking Water Directive provides an opportunity to apply for derogations if compliance of an indicator with limit values cannot be achieved. Derogations may be applied for on up to three occasions; in the first two occasions, the decision to allow a derogation must be communicated to the European Commission; in the third occasion, an approval of the Commission is also required. A description of the grounds for derogation and an action plan must be appended to the communication submitted to the Commission. The duration of a derogation may not exceed three years. After accession to the European Union, Estonia has applied for a derogation from the European Commission on two occasions with regard to fluoride content and on one occasion with regard to aggregate boron and trihalomethane.

During the period of transition, such non-compliant drinking water may be sold on the basis of a sales permit for drinking water, which does not comply with quality requirements but is safe for health. The permit is issued for up to three years by the local office of the Health Board on the basis of materials submitted in the application. An overview of issued permits is available on the website of the Health Board[45].

[45] http://www.tervisekaitse.ee/?mid=39

7.4 Protected areas

The purpose of protecting various areas is to preserve and protect the environment in certain regions from the negative impact of human activities to preserve the people's immediate living environment and a viable natural environment as a whole.

The purpose of sanitary protection zones of water intakes is to prevent deterioration of the quality of used drinking water and to protect the water intake constructions.

Nitrate sensitive areas have been determined for the purpose of protecting surface water and groundwater in regions of intense agricultural production to prevent contamination of water with agricultural nitrates (the nitrate ion concentration in water may not exceed 50 mg/l) and to reduce potential water pollution.

The protection of bathing sites is based on the Minister of Social Affairs Regulation, adopted to preserve, protect and improve the quality of the environment and to protect human health.

The purpose of water protection zones on the bank areas of water bodies is to protect water from diffuse source pollution and to avoid erosion of the banks.

The principal regulatory document of nature conservation in Estonia is the Nature Conservation Act, adopted in 2004. The protection of biota is indirectly, through restrictions established for other principal purposes (e.g., water protection zones, nitrate sensitive areas, sanitary protection zones, etc.), also regulated by the Water Act. The Forest Act regulates the protection of key biotopes, incl. spring areas and habitats located near water bodies.

Compliance with EU directives is the strictest international obligation assumed by Estonia for the purpose of protecting natural resources. These directives have to be integrated into national legislation.

Nature conservation in the classic sense is regulated at the EU level by Council Directive 79/409/EEC on the conservation of wild birds (Birds Directive) and by Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive). In Estonia, there are 60 habitat types and 51 animal and plant species listed in the Habitats Directive and 136 bird species listed in the Birds Directive. Their protection is organised through establishment of nature reserves and bird areas, which constitute the Natura 2000 network in Estonia.

The main purpose of the Natura 2000 network of protected areas is to protect all significant habitats at the EU level, ensuring preservation of flora and fauna and vitality of natural communities in the future.

Estonia has acceded to the following major international conventions on nature conservation:

- The Ramsar Convention on Wetlands of International Importance. The

objective of the Ramsar Convention is to protect wetlands throughout the world, as the area and value of wetlands is continually decreasing as a result of drainage, pollution and economic exploitation. The Convention emphasises the major ecological role of wetlands, particularly as migration, stopover and nesting sites for birds. Protection is extended to coastal see (up to a depth of 6 m), coastal lakes, coastal areas, inland water bodies and fens.

- The Bern Convention on the Conservation of European Wildlife and Natural Habitats. The purpose of the Bern convention is conservation of European wild flora and fauna and their natural habitats, promotion of international cooperation for the protection of wildlife, paying particular attention to the protection of endangered species, incl. endangered migratory species. The Habitats Directive can be regarded as a legislative instrument, which regulates implementation of the Bern Convention in the EU Member States.

- Convention on the Protection of the Marine Environment of the Baltic Sea Area – HELCOM Convention. The main objectives of the Convention are to reduce pollution of the Baltic Sea from land, air and ships to ensure a tolerable ecological status of the marine environment; to cooperate in the field of research and technology to develop modern environmental measures; to coordinate research in the marine environment and atmosphere; to develop and implement a single environmental protection strategy in the Baltic Sea area. There are five protected marine areas, subject to protection under the Helsinki Convention, within the territory of Estonia.

- Rio de Janeiro Convention on Biological Diversity. The general objectives of the Convention are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources.

Protection of species is a very important part of nature conservation. The objectives of conserving species protection sites are also linked with the protection of species. For the purposes of the Nature Conservation Act, species protection site means the breeding area or aggregation site of a protected animal species, the natural habitat of a protected plant or fungus, or the spawning area of salmon or river lamprey. Salmon and river lamprey have been specifically mentioned in the law, because these species are not under protection in Estonia, but are listed in the annexes to the Habitats Directive and, therefore, significant spawning areas of these species have to be protected, but commercial fishing of salmon and river lamprey may be continued outside the defined protection areas for these species. The restrictions established in species protection sites correspond to the behaviour of the species in question. For instance, damaging the banks of water bodies is subject to restrictions in the mink protection sites and restocking small water bodies with fish is restricted in the newt protection sites.

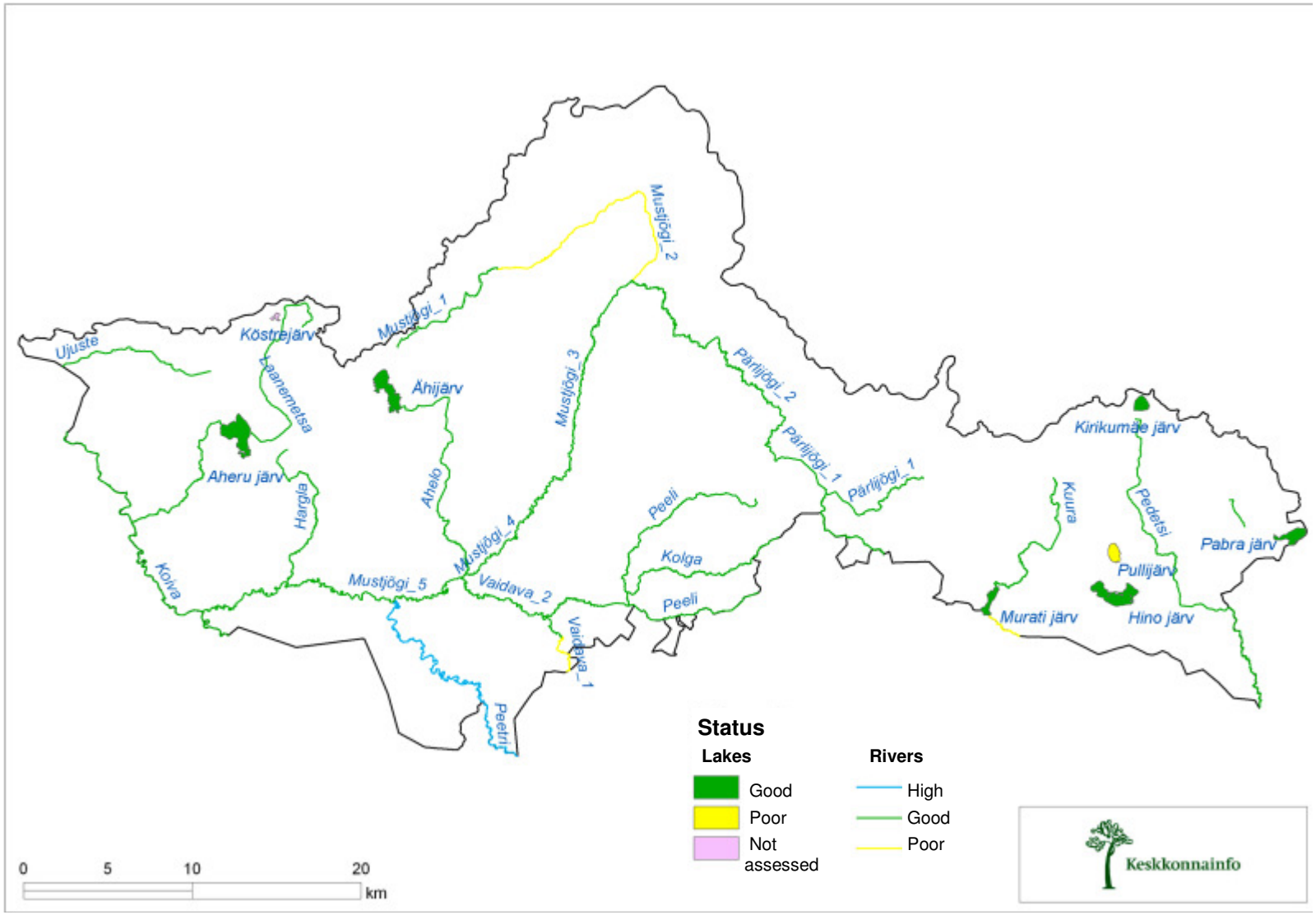

Figure 18 Projection of achievement of the objectives for surface water bodies by 2015

8 SUMMARY OF THE ECONOMIC ANALYSIS OF WATER USE

The economic analysis of water use was prepared in 2005 in the course of specification of river basin districts and the Ministry of the Environment has published a detailed overview on this[46]. The economic analysis of water use covers three aspects – assessment of economic importance of water use, projection of changes in water use, and assessment of recovery of costs for water services.

8.1 Assessment of economic importance of water use and projected demand for water

Assessment of economic importance of water use was based on the review of the shares of different economic sectors in water use. The main sectors in terms of water use in the Republic of Estonia are: households, mines, manufacturing industry, energy sector, agriculture and fish farming (except generation of hydropower). Table 23 provides an overview of larger water users in Estonia.

Table 22 Consumption of water by Estonia's largest water users in 2003 and 2007 (EEIC)

Water use	Water use in 2003		Water use in 2007	
	m m^3/y	Share, %	m m^3/y	Share, %
Households	42.4	3	44.4	2.3
Mining	215.0	13	197.2	10.4
Industry	43.1	3	34.3	1.8
Energetics	1 231.9	77	1 545.8	81.6
Agriculture	4.1	0	4.1	0.2
Fish farming	63.2	4	63.2	3.3
Others	6.2	0	5.8	0.3
Total	1 605.9	100	1 894.8	100.0

Source: Estonian Environment Information Centre, 2008

The economic sectors that use water play an important role in Estonian economy, both as creators of added value and as employers. In 2004, the turnover of Estonia's major water users constituted around 12 % of the total business turnover and, on average, these companies employed 12 % of the labour force employed by businesses. The shares of turnovers in economic sectors with significant level of water use are shown, by river basin districts, in Table 24.

[46] http://www.envir.ee/295059

Table 23 Total turnover of businesses and turnover of sectors with significant level of water use by river basin districts in 2003

River basin district	All businesses		Sectors with significant level of water use	
	Turnover (m EEK)	Share in total turnover of businesses (%)	Turnover (m EEK)	Share in total turnover of businesses (%)
Western Estonia	178 535	79	14 861	8.2
Eastern Estonia	47 307	21	12 583	26.6
Koiva	791	0	0	0
TOTAL	**226 633**	**100**	**27 444**	**12.1**

The table indicates that there are no businesses with significant level of water use in the Koiva river basin district. Table 25 provides an overview of employment, by river basin districts, in all businesses and in businesses with significant level of water use.

Table 24 Employment in all businesses and in sectors with significant level of water use by river basin districts in 2003

River basin district	All businesses		Sectors with significant level of water use	
	Employees (no.)	Share (%)	Employees (no.)	Share in total number of employees (%)
Western Estonia	191 555	70	25 214	13.2
Eastern Estonia	79 249	29	21 335	26.9
Koiva	1 555	1	0	0
TOTAL	**272 360**	**100**	46 549	**17.1**

The businesses in the Koiva river basin district provide jobs to only 1 % of all employees in businesses and, as there are no businesses with significant level of water use in the Koiva rive basin, the share of employees is also 0 %. Consequently, an analysis of industrial water use in the Koiva river basin district has not been conducted.

Water use of households. The water use of Estonian households connected to a public water supply system has significantly decreased over the past decade, dropping to an average of 100 l/d/p[47] in 2003. At the same time, the water use in Estonian households per person is considerably below the European average – 150 l/d/p. The water use of Estonian population is also significantly lower than the corresponding indicators in Scandinavia – e.g., 200 l/d/p in Finland. The water use

[47] l/d/p- litres per day per person

has increased, on average, by 5 % over the past 15 years in developed European countries, while the water use in Eastern Europe has dropped by around 18 %.

The water use of Estonian population connected to a public water supply system has stabilised in the past five years at the level of 100 litres per day per person.

The increasing incomes and a demand for high-quality service can be expected to result in a slight increase in water use (up to 110 litres per day per person). However, there are no grounds to predict an increase in water use in low density areas (currently estimated at 110 litres per day per person. A summary of the projected water use of Estonian residents is shown in Table 27.

Table 25 Projected water use of Estonian residents until 2015

Projected water use of Estonian residents	**2003**	**2015**
Number of inhabitants in Estonia[48]	1 356 045	1 356 045
Inhabitants in the Koiva river basin district (estimate)	7 490	7 490
Share of inhabitants connected to a public water supply system in Estonia, %	83 %	90 %
Share of inhabitants not connected to a public water supply system, %	17 %	10 %
Share of inhabitants connected to a public water supply system in the Koiva river basin district, %	31 %	31 %
Average water use of inhabitants connected to a public water supply system – litres/day/person	100	110
Average water use of inhabitants not connected to a public water supply system – l/d/p	100	110
Volume of water used through public water supply systems – m m^3/a	40.5	48.8
Volume of water used through independent consumption – m m^3/y	9.2	5.4
Total water use - m m^3/a	49.7	54.2

The projection of the residents' water use is based on the following assumptions:

a) people continue to move into larger settlements;

b) residents' water use in larger settlements is higher than in small settlements;

c) continued increase in income will create conditions for decreased share of expenditure on water in the income of households.

Based on the projected average increase in water consumption (1 % per year per inhabitant) and the increase of residents connected to a public water supply system from current 83 % to an estimated 90 % in 2015, the total water use would increase from current 49.7 million cubic metres to 54.2 million cubic metres, i.e., by around 10 %. As there are no larger settlements in the Koiva river basin district, an increase in the number of inhabitants connected to a public water supply network is not projected here.

[48] According to Statistics Estonia data from 2003

Water use in agriculture. There are no reliable development projections in Estonia for the agricultural sector as a whole. The Estonian Rural Development Plan 2004-2006 (Estonian Ministry of Agriculture, 2004) establishes a objective of increasing the share of inhabitants involved in agricultural production from the current level of 5 % to 7 % of all employed residents. This would mean an increase in agricultural production by approximately 40 % between 2005 and 2015. The assumption is that water consumption will increase annually by 3 %.

As no major structural changes are expected in the Estonian agricultural sector, i.e., the current production structure can be expected to continue and no significant decrease in water consumption can be predicted, one could assume that increased production levels will lead to increased water use.

Correspondingly, an increase in agricultural water use could be projected, assuming that no major structural changes will take place in agricultural production (Table 27).

Table 26 Projected agricultural water use in Estonia until 2015

Water consumption	**2004**	**2015**
Agricultural water use in Estonia, m m^3/y	4 .1	5.5
Annual change in water use	3 %	

Based on the above assumptions, the water use associated with agricultural production could be expected to increase to roughly 5.5 million cubic metres per year. This figure is based only on data associated with water permits, which means that it does not cover a significant part of livestock farming. According to estimates, there are some 280.8 thousand bovines and 329.8 thousand pigs in Estonia (Agricultural Census, 2001) and they require an estimated 24.4 million cubic metres of water per year.

8.2 Assessment of the cost of water use and cost recovery

The following is an overview of the cost of measures required to ensure a good status of water. In addition, an overview is provided of the costs of water services and the calculations of cost recovery. Pursuant to the Water Act, water use includes all water services and other activities that have a significant impact on the status of water.

For the purposes of the Water Act, water services are any services provided to households, state and local government agencies, public and private legal persons and natural persons, incl. abstraction, impounding, storage, treatment and distribution of surface water or groundwater, as well as collecting and treating wastewater and discharging it into an effluent recipient.

The results of the 2003 assessment of the recovery of costs for water services were significantly supplemented by a study in 2008[49], which clarified the actual expenditures and recovery options.

[49] http://www.envir.ee/1098587

The costs to be recovered were linked, in particular, to any improvement activities, incl. investments, measures or actions to achieve or maintain a good status of water.

The following sections specify the grounds for calculating the specific value of costs.

8.2.1 Grounds for calculating the value of costs associated with water use

The assessment of the value of costs included, among other things, environmental and resource costs.

Determination of environmental costs was based on the assumption that the actual environmental costs of a water body are proportional to the total cost of measures required for elimination of damage and achievement of a good status of the water body or a specific surface water body. Such measures include construction of sewerage systems, reconstruction of wastewater treatment plants to enable additional phosphor or nitrogen removal, and construction of new treatment plants. It also includes reconstruction and construction of manure storage facilities.

Resource costs generally occur in the case of additional costs arising from the need to ensure water supply to the population in connection with discharge of drainage water from mines and quarries. As there is no immediate shortage of water in Estonia and the supply of water to the population is ensured, no separate measures have been specified for this purpose and, therefore, the share of resource costs in the damage caused to the population can be considered as insignificant. However, the programme of measures includes measures required for elimination of environmental damage caused by impoundment or generation of hydropower. Elimination or reparation of such damage requires expenditure on opening or restoring fish migration routes.

The programme of measures was prepared on the basis of the assessment of the status of water bodies in the Koiva river basin district. The selection of measures was based on three main types of water consumption: households (drinking water and wastewater systems), industry (separate hydropower impoundments), and agriculture (point source pollution from agriculture – manure storage facilities).

The cost of measures was calculated from unit prices. The methodology used for calculating the cost of implementation of each measure and examples of calculating the expenditures related to various pressure factors are provided in the study "Development of methodology for estimating environmental costs and estimation of environmental costs related to the main pressure factors affecting the aquatic environment", published by the Ministry of the Environment.[50]

The cost of renovation and construction of treatment facilities, required to eliminate the **impact of point source pollution**, was calculated on the basis of the cost of elimination of pollution equal to one population equivalent. Elimination of pollution equal to one population equivalent costs approximately 12 000 kroons. This cost does not include the construction cost of sewerage systems, which can be calculated

[50] http://www.envir.ee/1098587

on the basis of the average price of one metre of new pipelines – around 3 000 kroons/m (4 000 – 5 000 per meter in Tallinn and 2 000 – 3 000 kroons per meter in smaller settlements). The lengths of sewerage networks to be constructed and reconstructed were taken from the public water supply and sewerage development plans of local governments. Development and updating of these development plans is mandatory for local governments. In addition to this, the costs of water supply and sewerage facilities in low density areas were also considered to ensure implementation of the required water protection measures. The total cost of construction of wastewater treatment plants and sewerage systems, required for elimination of pollution load from point source pollution and for achieving compliance with current environmental requirements in the Koiva river basin district, is approximately 215m kroons.

Drinking water systems. The calculations relating to availability of compliant drinking water to all people were based on the public water supply and sewerage development plans of local governments. This enabled to determine the length of pipelines to be constructed and reconstructed and the number of treatment plants. The cost of ensuring drinking water supply in low density areas is additional to that. The cost of measures associated with renovation of water supply systems was calculated on the basis of unit prices and the result for Koiva river basin district was approximately 96 m kroons.

The cost of measures required to eliminate the impact of polluted areas in the Koiva river basin district is, according to several estimates ordered by the Ministry of the Environment, approximately 1.6m kroons.

The cost estimate of measures for reducing the impact from **agricultural point source load** (manure storage facilities) is based on the average cost of construction of a manure storage facility per one livestock unit (LU). An analysis of construction costs indicates that the cost of a manure storage facility per LU is around 8 000 kroons. The total cost of reduction of agricultural point source load was calculated on the basis of the number of livestock units that require a manure storage facility in the river basin district. The required input data was received from the databases of the ARIB. The total need for investment to reduce the load from phosphor and nitrogen, released into the environment from manure storage facilities in the Koiva river basin district, is approximately 21.9 million kroons.

The cost of measures required to reduce **diffuse source pollution load** was estimated on the basis of the requirements of water protection zones to be established at water bodies, the restriction on land use as a result of reducing diffuse source pollution, and the expenditures required for implementation of HELCOM recommendations to reduce the impact of diffuse source pollution on the Baltic Sea. The cost of 67m kroons was determined on the basis of expert assessments. There was no specific calculation methodology.

The cost of measures required for **protecting and maintaining a good status of groundwater reserves** was found on the basis of an expert assessment. The estimates include the costs of both studies and implementation of protection measures. The total cost is 1.6m kroons.

The cost of measures required for **ensuring a good status of inland surface water bodies and reconditioning of water bodies** was determined on the basis of an expert assessment. The total cost of 19.9m kroons includes the cost of measures for alleviating the impact of morphological changes caused by drainage and impoundments.

The cost of alleviating the impact of morphological changes due to drainage was estimated on the basis of the length of drainage ditches and artificial recipients, which have a poor or bad status. The required information on lengths is available in the register of land reclamation systems[51] and the unit prices of works were determined on the basis of the document "Construction and maintenance costs of land reclamation systems and estimated unit costs for implementation of Measure 3.4"[52].

The costs of measures required for achievement of the objectives of the Koiva River Basin District MP are provided in Table 29.

Table 29 Costs of measures required for achievement of the objectives of the MP, 2009-2015

No.	Principal measures	Cost, m kroons
1.	Reconditioning and development of wastewater collection systems	214.9
2.	Reconditioning and development of drinking water systems	95.9
3.	Reconditioning of livestock farms	21.9
4.	Reconditioning of polluted areas (residual pollution)	1.6
5.	Reduction of diffuse source pollution	67
6.	Protecting and maintaining a good status of groundwater	1.6
7.	Improvement of surface water bodies	19.9
8.	Management of management plans and organisation of implementation	12.7
	Total	**433**

8.2.2 Price of public water supply and sewerage services

The price of public water supply and sewerage services (PWSS services) for inhabitants and industrial facilities connected to public water supply and sewerage networks has not been established by the state. The price is calculated pursuant to § 14 of the Public Water Supply and Sewerage Act (PWSSA) and comprises a basic fee, a charge for water consumed, and a charge for leading off and treating wastewater. The price of a PWSS service should enable the water undertaking to recover production costs, comply with quality and safety requirements, comply with

[51] http://msr.agri.ee/index_avalik.aspx
[52] http://www.mpb.ee/eeb/?lk=info

environmental protection requirements, and operate with justified profitability. Establishment of pollution charges pursuant to the Environmental Charges Act is based on the principle that even effluent that has been treated according to standards causes additional load for the environment. In order to collect funds to recover the environmental costs, the pollution charges were established on the basis of standardised concentrations of pollutants. Pollution above the standard limit is subject to much higher pollution charges. The collected resource and pollution charges are used to implement the necessary water protection measures.

The price of PWSS services for industrial facilities, connected to a public water supply and sewerage network, is established in a similar manner. Depending on local government, the price of PWSS services for industrials facilities can be higher to subsidise the lower price charged from individuals but, unfortunately, this does not comply with the polluter pays principle.

The PWSSA also regulates the price of connection to a public water supply and sewerage system. The connection charges should generally enable recovery of the costs of developing the system, except in regions where more than 50 % of building permits were issued before 1999. Consequently, the price of PWSS services should theoretically enable recovery of all costs associated with PWSS services. The average price of PWSS services in Estonia has been gradually increasing over the years according to the Estonian Association of Water Undertakings. This development has been parallel with a decrease in water consumption and the decreasing share of expenditures on water in household income. The change in the prices of PWSS services is illustrated on Chart 5.

As a result of the method of establishment of the price of PWSS services, the price should include all costs associated with PWSS services, incl. costs required to compensate the damage resulting from the use of the service to the aquatic environment or to other water users. The damage caused to the aquatic environment has been estimated through studies and calculations of environmental costs, which describe the damage caused to the aquatic environment. The damage caused to other water users was estimated as resource costs and the respective specifications have been provided above.

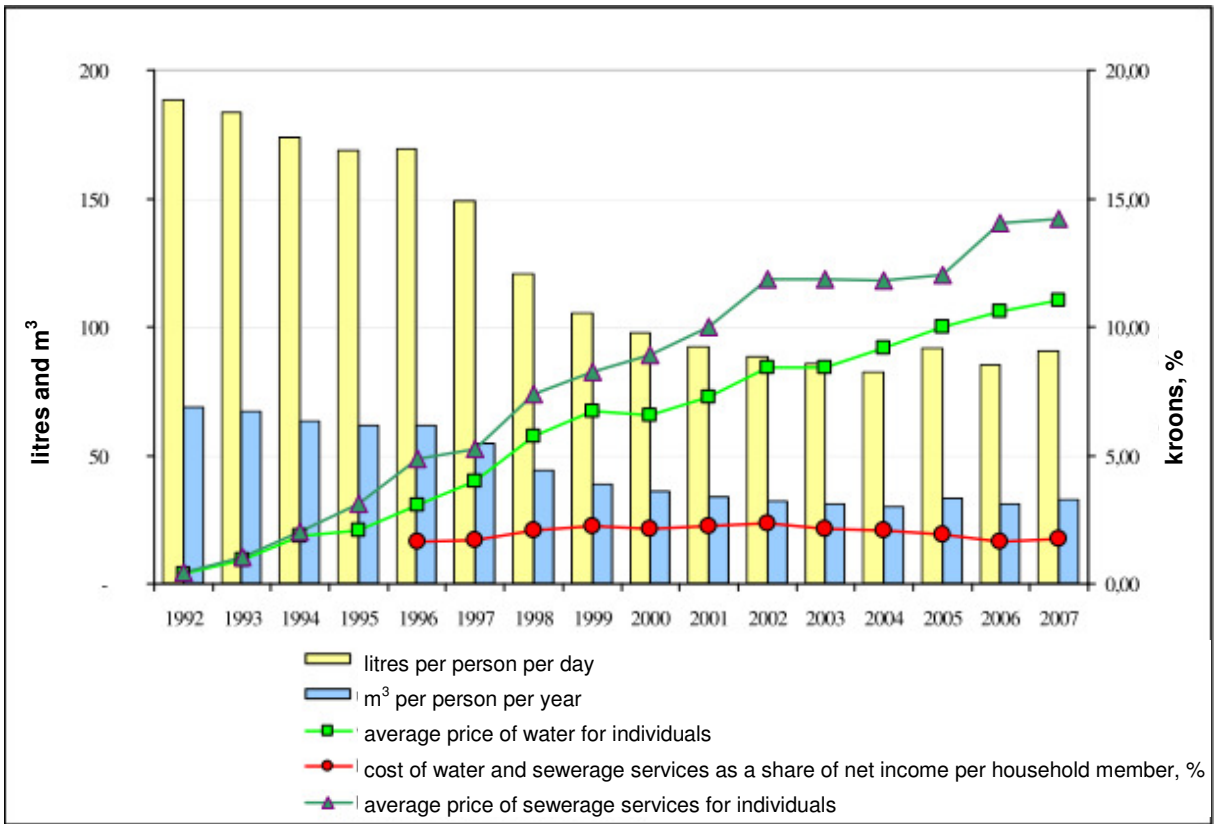

Chart 5 Changes in the prices of water supply and sewerage services over the years

The price of water services for inhabitants, who are not connected to public water supply and sewerage systems, comprises actual investments and running costs.

8.2.3 Recovery of the costs of water services in the Koiva river basin district

The Koiva river basin district covers an area of 1 330 km^2 in Southern Estonia, with approximately 7 500 inhabitants. Consequently, the river basin district constitutes 3.0 % of Estonian territory and its inhabitants constitute 0.6 % of Estonian population. Approximately 30-50 % of the inhabitants in the river basin district are connected to a public water supply system. Considering the rate of recovery of the costs of water service in small settlements, the average estimated level of recovery of the costs of water service would be around 60 or 70 %. Insufficiency of available data does not enable a full analysis of the costs of water services in the river basin district.

9 SUMMARY OF THE PROGRAMME OF MEASURES

The programme of measures comprises principal and additional measures. Additional measures will be implemented if compliance with environmental requirements, prescribed by legislation, is not sufficient to achieve a good status of water and to ensure a safe aquatic environment for all inhabitants and a favourable condition for biota that depend on water.

Ensuring compliant supply of drinking water to residents is an important element of the management plan. A primary factor for achieving this objective is ensuring sufficient level of the sources of drinking water (groundwater and surface water).

The measures of reconditioning the objects that affect the status of water bodies are the same in the case of both groundwater and surface water. Reconditioning of wastewater treatment plants, as well as manure and silage storage facilities is significant for elimination of the impact of point source pollution. In the case of diffuse source pollution, the main attention should be focused on the use of toxic chemicals, manure and fertilizers, as well as on compliance with environmental requirements during peat extraction.

The measure of opening fish migration routes is a measure directed directly towards improving the status of rivers. The main factors in maintaining a good status of river bodies is avoiding creation of new impoundments and preventing pollution of water bodies.

The expenditures, specified in the programme of measures for ensuring a good condition of water bodies, have been determined on the basis of previous studies and the management plans of sub-districts. The programme of measures should be updated by 2012 at the latest on the basis of required additional studies and the experience gained from implementing the preceding measures.

Implementing the measures and actions envisaged in the programme of measures is the responsibility of all water users and of persons, who are required by law to implement a respective measure. The measures are financed on account of funds collected through water use, as well as from taxpayers' contribution. Due to horizontal nature of the management plan, the management plan also includes some partial expenditures financed through other action plans (national waste management plan, Estonian Rural Development Plan).

The measures to be implemented under the Koiva River Basin District MP are listed in Table 28. The programme of measures is based on actions specified in the river basin sub-district management plan (detailed work tables of actions are included in river basin sub-district plans) and on their costs, which have been adjusted in line with the decrease in construction prices and from which the works completed in 2009 have been deducted. The costs shown are estimates. The estimated total cost of the programme of measures is 432.6 million kroons.

Table 27 Aggregate plan of measures

	MEASURE	Amount, m EEK
1	**RECONDITIONING AND DEVELOPMENT OF DRINKING WATER SYSTEMS**	
	Principal measures	**64.8**
	Additional measures	31.1
	Total measures of development and reconditioning of drinking water systems	**95.9**
2	**RECONDITIONING OF SOURCES OF POINT SOURCE POLLUTION**	
2.1	**Reconditioning and development of wastewater collection systems**	
	Principal measures	**145.8**
	Additional measures	69.0
	Total measures of reconditioning and development of wastewater collection systems	**214.9**
2.2	**Reconditioning of livestock farms**	
	Total measures of reconditioning of livestock farms	**21.9**
2.3	**Reconditioning of polluted areas (residual pollution)**	
	Principal measures	**1.3**
	Additional measures	**0.3**
	Total measures of reconditioning of polluted areas	**1.6**
	Total measures of reconditioning of sources of point source pollution	**238.3**
3	**REDUCTION OF DIFFUSE SOURCE POLLUTION**	
	Additional measures	66.6
	Total measures of reduction of diffuse source pollution	**66.6**
4	**MAINTAINING THE QUALITY AND RESERVES OF GROUNDWATER**	
	Principal measures	**0.2**
	Additional measures	**1.4**
	Total measures of maintaining the quality and reserves of groundwater	**1.6**
5	**IMPROVEMENT OF SURFACE WATER BODIES**	
	Principal measures	**15.9**
	Additional measures	**4.0**

	Total measures of improvement of surface water bodies	**19.9**
6	**COASTAL WATER**	**-**
7	**MANAGEMENT OF THE MANAGEMENT PLAN AND ORGANISATION OF IMPLEMENTATION**	
	Total measures of management of the management plan and organisation of implementation	**12.7**
	TOTAL MEASURES IN THE KOIVA RIVER BASIN DISTRICT	**432.6**

10 SUMMARY OF COMPLIANCE WITH LEGISLATION

The majority of the measures included in the programme of measures are necessary for compliance with water protection requirements established by the laws of the Republic of Estonia.

The largest expenditures in the Koiva river basin district (311 million kroons) will be made on drinking water and on reducing the impact of point sources of pollution, incl. achievement of compliance with the Drinking Water Directive and the Urban Wastewater Directive. Implementation of these measures will provide the population with compliant drinking water and wastewater treatment according to established standards.

Additional expenditures for compliance with new requirements for wastewater treatment and reducing nutrient load, arising from the Baltic Sea Action Plan of HELCOM and being a part of the plan to achieve a good status of the Baltic Sea by 2021, have been provisionally included in the programme of measures.

Pursuant to the Water Act, fish migration routes should be opened on salmon rivers by 2013. Respective measures for compliance with statutory obligations have been included in the programme of measures. The estimated cost of opening the fish migration routes on salmon rivers will be 8 million kroons.

Achievement and preservation of a good status of surface water bodies will cost an estimated 20m kroons.

The Water Act requires implementation of measures to restrict the spread of hazardous substances. The planned expenditures for reconditioning of polluted areas amount to 1.6m kroons. The estimated cost of the requirements, arising from the Water Act, for the protection of groundwater and water intakes is around 1.6m kroons.

Achieving compliance of livestock farms with the environmental requirements will cost an estimated 22m kroons.

The measures arising from HELCOM recommendations for reducing diffuse source pollution are a part of the environmental protection programme for the entire Baltic Sea. The approximate cost is 67m kroons.

11 IMPLEMENTATION OF THE PRINCIPLE OF COST RECOVERY

Chapter 7 provided an overview of the grounds of pricing of water services and the actual level of cost recovery. The level of recovery of the costs of PWSS services is at 69 %. The manufacturing industry that uses public water supply and sewerage systems fully reimburses the costs associated with its water services (environmental and resource costs). The environmental costs associated with the extraction of mineral resources are borne by miners and taxpayers, with a certain part also being borne by nature. The environmental and resource costs associated with agriculture (in Estonia, this also includes fish farming) and generation of hydropower are, to a large extent, not recovered.

There are plans to establish regular reviews of cost recovery in all fields of water use and all water services to achieve a more regular evaluation and compensation of damage caused to the environment. In order to take into account actual environmental and resource costs, the Ministry of the Environment has prepared the study “Implementation of environmental charges in water management” (AS SWECO Projekt, 2008).

Pursuant to § 10 (2) of the current Environmental Charges Act, the water abstraction charge is not required if the water is abstracted:

1. for generation of hydro energy;
2. for irrigation of agricultural land;
3. for fish farming purposes;
4. from groundwater in an amount of less than 5 cubic metres daily, except in cases where the water abstracted is mineral water;
5. from a body of surface water in an amount of less than 30 cubic metres daily.

Points 1 and 3 of § 10 (2) of the Environmental Charges Act have created a situation where the producers of hydro energy and fish farmers do not reimburse the environmental and resource costs they have caused. Resource costs occur in the first case and environmental costs in the second case. However, reimbursement of costs is crucial for implementation of the polluter pays principle.

In addition to establishment of additional pollution charges and charges for water abstraction, the standard rates of pollution charges and charges for water abstraction have been continually increasing as well. Chart 3 shows the changes in the rates of pollution charges for the main pollutants (BOD,P , N) over the past 15 years.

The charges for water abstraction have been gradually increasing as well, increasing the recovery of costs and supporting implementation of the mechanism of cost recovery. Chart 4 shows the increase in water abstraction charges over the past 8 years. Increasing the charges serves two purposes: 1) to increase the contribution of water users to compensating the environmental damage to the environment, caused through water use; 2) to restrict excessive use of natural water resources and to encourage reuse of water among industrial users.

Recovery of the environmental costs caused by agricultural diffuse source pollution is still borne only by nature and all taxpayers in general. Establishment of pollution charges is not possible due to methodological difficulties in determining the load from agriculture and, consequently, these costs will have to be borne partially by the taxpayers and partially by the environment even in the future.

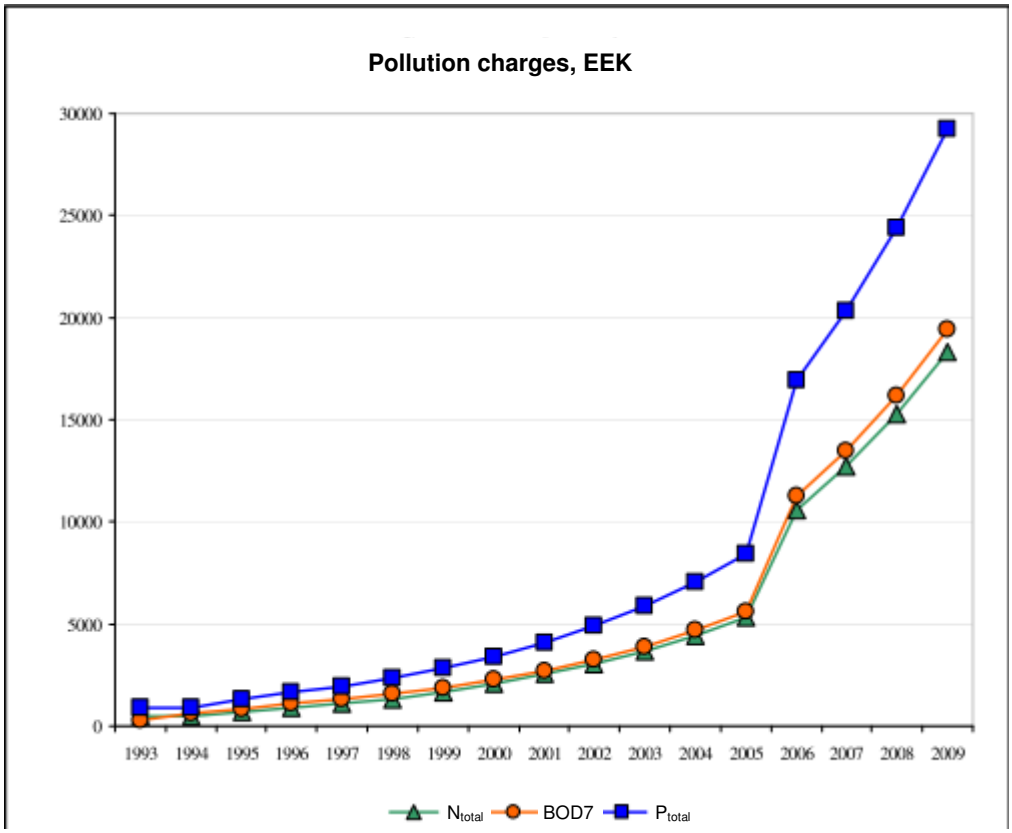

Chart 2 Changes in pollution charges over the years (EEK per tonne) (EEIC)

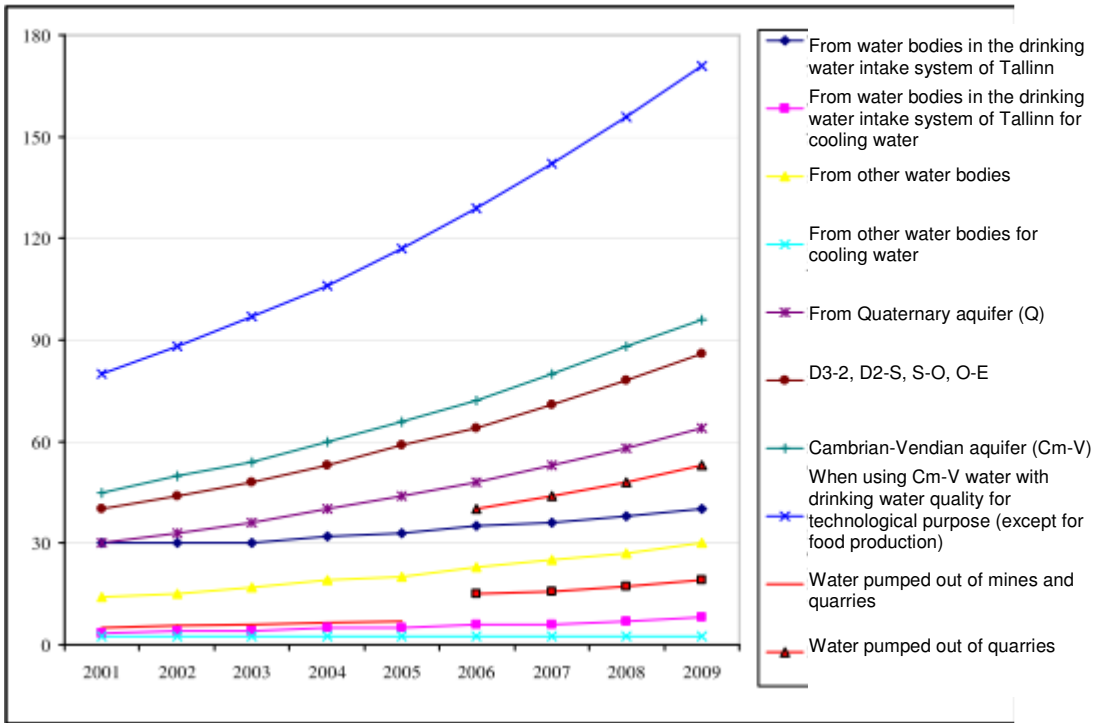

Chart 3 Changes in water abstraction charges over the years (EEIC)

12 ENSURING AVAILABILITY OF HIGH-QUALITY DRINKING WATER

Principal measures. The cost of ensuring high-quality and availability of drinking water in the Koiva river basin district will be, according to current estimates, 96 million kroons (Table 28).

The majority of the expenditure will be made on reconstruction of water networks and construction of new pipelines. As a first priority, availability of compliant drinking water in the Koiva river basin district will be ensured in the rural municipalities of Haanja, Misso, Mõniste, Rõuge, Sõmerpalu, Varstu and Vastseliina.

The supply of drinking water in local governments is regulated by public water supply and sewerage development plans, which have to be updated regularly.

The principal measures should solve the problems in water networks with more than 50 consumers or output over 10 m^3/d where the quality of drinking water does not comply with requirements.

Additional measures, water supply in low density areas. Additional measures include support for reconditioning of the supply systems in settlements with small water supply networks (less than 50 consumers or output under 10 m^3/d) and creation of new wells or replacement of polluted wells in low density areas. An inventory of water supply in low density areas and regular monitoring of the quality of drinking water will be required.

There will be a need for counselling and assistance for preventing and solving any water problems resulting from economic development (e.g., extraction of mineral resources, establishment of large farms, construction of infrastructure objects) in small villages and in low density areas. The initiative of local governments and villages in submitting applications for development of local water supply is important for implementing any additional measures.

According to estimates, 31 million kroons have to be spent on supporting development of the water supply in low density areas.

It would be advisable to start, in the next period, keeping records on the drinking water measures by individual water supply networks.

Plans for ensuring supply of safe drinking water in case of emergencies or accidents should be drawn up in cooperation with the Rescue Board.

13 WATER ABSTRACTION AND DAMMING OF WATER

An overview of the impact of water abstraction and damming in the Koiva river basin district is provided in sections 3.4 and 3.4.1.

A very important measure is opening the rivers to enable migration of migratory fish. There are several options for achieving this, e.g., dismantling of impoundments or creation of fish channels. Dismantling of impoundments is suitable in places where the artificial lake is no longer used and the natural bed can be restored. However, if an artificial lake is actively used for recreation, maintenance of the reservoir and impoundment should be ensured in cooperation between the local government and the owners of the land and impoundment.

Preservation of the ecological status of salmon rivers should based on the requirements of the Water Act and the Nature Conservation Act.

The levels of priority applicable to rivers affected by impoundments:

1. In the case of impoundments on rivers, which have been established as spawning areas or habitats of salmon, river trout, sea trout or grayling on the basis of § 51 (2) of the Nature Conservation Act, both upstream and downstream passage should be ensured for fish by 1 January 2013 at the latest (for the list of rivers, see Annex 7.1).

2. In the case of impoundments located on water bodies included in the Natura 2000 network – depending on particular species whose habitats are being protected (there are currently no known special needs in addition to those specified in previous points).

3. In the case of other rivers, a fish passage upstream and downstream of the impoundment should be ensured, at a justified request of the issuer of the water permit, by 2015 at the latest if this is necessary for maintaining or achieving a good status class of the water body.

There is no option of extending the terms in this respect and achievement of the objective requires intense efforts.

A very important consideration in the case of impoundments on salmon rivers is protection of the spawning areas and habitats of the migratory fish that have survived downstream of the impoundments. The water regime of existing impoundments on salmon rivers should be regulated in such a manner as to ensure a suitable water regime for salmonids downstream of the impoundment. If such requirement has not been specified in sufficient detail in the current water permit, the respective permit should be amended after a reasonable period of advance notice. This is particularly relevant in the case of exploitation of water power when electricity is generated by using cyclical collection of water. In this case, the flow rates after the dam fluctuate radically during a short period of time (from sanitary flow rates to flow rates required by a generator) and breeding of fish downstream of the impoundment is hindered. See Annex 6.1 and 7.1.

It is likely that the water body Vaidava_1 in the Koiva river basin district will not achieve a good status by the end of 2015 because, in addition to the impoundment of Vastse-Rooste, there are other significant pressures (incl. diffuse source pollution), which could cause poor status of the water body.

14 SUMMARY OF LOAD CONTROL MEASURES

14.1 Reconditioning of wastewater systems

The **principal measures** (nearly 146m kroons) will ensure compliance with the requirements of Estonian legislation. The local governments have to include measures for bringing wastewater treatment in line with statutory requirements in their development plans for PWSS (Table 28).

The principal measures in the Koiva river basin district will also cover the settlements with 50-2 000 inhabitants. Using a support project of the EU Cohesion Fund, the most urgent problems, together with the supply of drinking water, will be solved in the settlements of Hargla, Koikküla and Taheva for a total cost of 23 million kroons.

Additional measures. The additional measures include support for sewerage solutions in low density areas, establishment of rain water systems, additional phosphor and nitrogen removal under the Baltic Sea Action Plan, ensuring collection and treatment of water in cresspits.

The estimated total cost of additional measures is 69m kroons.

14.2 Environmental measures for livestock farming

Principal measures. In the case of livestock farms, compliance with statutory requirements should be achieved in storage and use of manure and silage. In addition, wastewater handling in farms needs improvement. Implementation of the environmental measures associated with livestock farms will be financed by the business owners themselves. Applications for support may be submitted to EU funds. Achieving compliance of livestock farms with the environmental requirements, including reconditioning of manure and silage storage facilities, reconditioning of manure spreading equipment, silage storage facilities and wastewater handling, will cost an estimated 22m kroons.

According to the latest survey among producers, 64 % of the manure storage facilities were compliant (2008). Farms subject to integrated environmental permit (with mire than 300 LU) had to implement the best available technique by November 2007 – consequently, investments in farms with over 300 LU should no be complete (an integrated permit has been issued to the Tsooru pig farm of OÜ Põlva Peekon).

Implementation and the necessary scope of **additional measures** will be clarified after implementation of principal measures and a review of livestock farms, after which the need for additional measures will have to be assessed again.

14.3 Reduction of diffuse source pollution

Agriculture is the main source of diffuse source pollution. The extent of pollution load

depends on the scope and intensity of production. Nearly 67 million kroons have been planned for reduction of diffuse source pollution in the Koiva river basin district.

Agricultural diffuse source pollution can be reduced only by reducing the potential load (especially the volume of used organic and mineral fertilizers in the water basin and on the river basins of water bodies). However, this conflicts with the objective of maintaining competitiveness of agricultural production.

The specific programme for dealing with agricultural diffuse source pollution is based on the Water Act and recommendations of HELCOM.

The actions for reducing diffuse source pollution, proposed at the level of sub-districts, have so far been limited to pilot projects. Provision of training to people engaged in agricultural production is an important part of reducing diffuse source pollution. The programme of measures envisages allocation of 0.2 million kroons for organisation of training and information workshops for agricultural producers.

Management plans propose several general measures for reducing the impact of diffuse source pollution and improving the status of water bodies:

- compliance with good agricultural practice, raising the awareness of agricultural producers;
- improving the health of water bodies, reducing the negative impact of drainage;
- reducing internal load (nutrients collected in water bodies, mud);
- extension of sewerage networks to people who are not connected to a sewerage system;
- reduction of the impact of peat extraction;
- construction of a rain water collection system with rain water treatment facilities.

Generally, several measures have to be applied simultaneously in the case of those surface water bodies that are in a poor condition partially due to pollution load from agriculture. As implementation of measures for reducing diffuse source pollution is a long-term process, the implementation of such measures is not necessarily followed by immediate improvement in the status of water bodies. In the case of Vaidava River, reduction of diffuse source pollution (mainly from the spreading of whey) should be complemented by creation of a fish passage through the impoundment of Vastse-Roosa. Land reclamation measures should be launched from the section of Mustjõgi River, which is used as an artificial recipient maintained by the state.

In the case of lakes, a more important concern is preserving the status of lakes with a good or high status. Improving the status of lakes with a poor, bad or very bad status is a very complicated and labour-intensive, sometimes even impossible process. Reduction of internal load has been planned in the management plan of Lake Pullijärv.

Protection of groundwater requires establishment of additional restrictions, in comparison to current regulation, on agricultural production for protection of public water intakes. If necessary, this includes establishment of stricter restrictions on fertilizing on the water intake recharge area.

If the concentration of pollutants increases to and remains at 75 % of the quality limit values for groundwater, measures should be implemented to reverse this trend (incl. establishment of additional environmental protection requirements for objects with a risk of pollution and for land use).

The Estonian Rural Development Plan 2007-2013[53] envisages allocation of support to high nature value agriculture from 2009, with a 5-year obligation period, as a sub-measure of agri-environment support. The approximate budget of the measure is 300 million kroons per year for all agricultural producers in Estonia. In the case of high nature value agriculture, the fertilization restrictions established for NSAs are extended to all Estonia and at least 30 % of eligible land of the business entity should be covered by a crop by 1 November of each year of the obligation period to prevent nutrient leaching.

Facilitation of organic farming continues as the second sub-measure of agri-environment support under the RDP 2007-2013. This action reduces the environmental and health risks associated with excessive use of mineral fertilizers and pesticides, increases food safety, helps to preserve the surrounding water and land ecosystems, as well as soil fertility and biological diversity. The approximate budget of the measure is 100 million kroons (for all Estonia). Organic farming is suitable for hilly areas of the Koiva river basin district and in places where the natural conditions are not particularly good for agricultural production.

Management of land reclamation systems is used to maintain land reclamation systems and to reduce the negative impact of diffuse source pollution reaching water bodies. The necessary works are planned in management plans for land reclamation systems. According to estimates, 50 million kroons per year (for all Estonia) would be required for managing the artificial recipients maintained by the state. The current allocation is five times less than that. In the autumn of 2009, more than 100 applications were submitted for construction of environmental protection facilities for management of land reclamation systems (incl. marshes to reduce diffuse source pollution load, sediment pools, and extensions of water protection zones) in the framework of measure 1.8 “Infrastructure of agriculture and forest management” of the Estonian Rural Development Plan 2007-2013.

There were plans to launch a scheme to support establishment of forest strips on agricultural land to protect water in the framework of the Estonian Rural Development Plan 2007-2013. The pilot study[54] indicated that implementation of the measure requires close cooperation between the parties.

The efforts towards harmonised implementation[55] of actions of the Estonian Rural Development plan and management plans should be continued.

[53] http://www.agri.ee/?id=27084
[54] http://www.envir.ee/89749
[55] http://www.envir.ee/1085016

15 LIST OF CASES WHERE DIRECT EMISSIONS INTO GROUNDWATER ARE PERMITTED

There are no direct emissions into groundwater in the Koiva river basin district.

16 SUMMARY OF MEASURES FOR REDUCING THE IMPACT OF PRIORITY HAZARDOUS SUBSTANCES

According to inventories conducted from 2000 to 2002, there were no companies in the Koiva river basin district directly subject to provisions of directives in the group of the Restriction of Hazardous Substances Directive. Reduction of the emissions of hazardous substances should be accomplished by completing the reconditioning of polluted areas.

Safe use of pesticides should be ensured through respective control measures in agriculture and through legislation, which prohibits the use of pesticides containing certain hazardous substances.

Principal measures. 1.25 million kroons have been envisaged as support for elimination of polluted areas of local significance (former fertilizer storage facilities and fuel tanks).

Additional measures include inspection and follow-up reconditioning of closed landfills and liquidated filling stations, as well as prevention and fast elimination of accidental pollution, with a total envisaged cost of 0.2 million kroons.

17 SUMMARY OF MEASURES FOR REDUCING THE IMPACT OF POLLUTION ACCIDENTS

The main types of pollution accidents, which could affect the aquatic environment in the Koiva river basin district, are transport and transport infrastructure accidents. Elimination of the consequences of such accidents is the responsibility of the Rescue Board.

Pollution of soil and surface water with oil products and toxic chemicals could occur in case of accidents with trains or road tankers carrying hazardous chemicals or oil products in the vicinity of water bodies.

Measures have been developed for reducing the impact of accidental pollution and local governments have prepared crisis management plans, which include programmes of measures for preventing emergencies and guidelines for actions during emergencies. In addition to general crisis management plans of local governments, larger water undertakings have developed their own internal crisis management plans for emergency situations to ensure supply of drinking water to the population and safe discharge and treatment of wastewater.

Actions in emergency situations are coordinated by local governments and the Rescue Board according to previously developed and approved action plans. The measures of the action plans are financed from the budgets of local governments and, consequently, these measures have not been included in management plans.

18 SUMMARY OF MEASURES FOR IMPROVING THE STATUS OF SURFACE WATER AND GROUNDWATER

18.1 Surface water bodies

Principal measures

A good ecological status of river bodies is achieved by liquidation of migration obstacles or creation of fish passages. One body (Pärlijõgi_2) is expected to achieve a good status as a result of implementation of the measure.

Improving the status of small and medium rivers, designated as water bodies, as well as the upper courses of rivers with low water levels is more difficult because, in addition to liquidation of migration obstacles, this requires a variety of actions associated with maintenance, improvement and reduction of nutrient load. In this context, it is important to utilise land reclamation techniques on smaller river bodies (particularly artificial recipients of drainage systems) to improve the morphological conditions and to restore the habitats and breeding sites of aquatic biota.

Maintenance of drainage systems and use of drained lands may not reduce the status class of natural water bodies, which are used as recipients. This requirement has to be taken into account in the development of management plans for land reclamation systems. Maintenance of water bodies, which have had a good status, is also essential. The cost of these works in all Estonia until 2015 would be approximately 300m kroons.

In the case of lakes, priority should be given to conserving actions to preserve the current status. The actions required for improving the health of Lake Pullijärv (cost 0.5 million kroons) are specified in the management plan. These actions should ensure preservation of the established water level of natural lakes, which in many cases depends on impoundments or culverts, which have been built a long time ago and may no longer have an owner.

Additional measures

An unavoidable measure for preserving a good status of small water bodies is restriction of the number of beavers.

Recreational water bodies and their surrounding areas should be reconditioned and adapted for recreation.

Reconditioning of artificial lakes is significant from the viewpoint of their use in recreation, reduction of internal load, and ensuring safety. Liquidation should be considered in case of unnecessary artificial lakes without an owner.

Programmes and projects with adequate scope should be drafted for preserving the status and restoring a good status of water bodies. Monitoring of the performance of implemented measures is essential. Hasty and rash action could cause more harm

than good. Despite the measures, it is likely that two river bodies (Vaidava_1 and Mustjõgi_2) and one lake (Pullijärv) will not achieve a good status by 2015.

It is likely that, in the case of some small water bodies, achievement of a good status and performance of obligations assumed to reduce the load on the Baltic Sea requires implementation of additional measures to reduce nutrient load (incl. more frequent maintenance of water bodies, reducing the intensity of land use, protection zones). The estimated cost of these measures in around 67 million kroons and their level of efficiency is not clear at the moment.

The following factors complicate planning of measures for achieving a good status of small river bodies (less than 100 km^2):

- Low level of reliability of status assessment and identification of causes of non-compliance makes it difficult to choose the most adequate measures.
- Small water bodies are mostly used as artificial recipients of drainage systems. Depending on the manner of usage, it is often impossible for these water bodies to achieve a good status comparable to natural water bodies.
- A good status class of water bodies is difficult to ensure with existing technologies due to the combined effect of load from agricultural and densely populated areas and a low flow rate in the upper courses of rivers.

18.2 Groundwater bodies

The measures of reconditioning the objects that affect the status of water bodies are the same in the case of both groundwater and surface water. The most important measures from the viewpoint of groundwater management include reconditioning of polluted areas, reduction of diffuse source load from agriculture, and extraction of mineral resources in a sustainable manner for groundwater (see Table 28). Another principal measure is inventory, liquidation or conservation of unused bore wells.

Protection of groundwater deposits with officially established groundwater reserves requires entry of the boundaries of groundwater deposits in the Environmental Register and establishment of the necessary restrictions on land use within these boundaries to protect groundwater from pollution and depletion. Protection of aquifers located close to the surface is particularly important in areas where the upper layers of groundwater are the source water for individual users.

Protection of groundwater from contamination with hazardous substances must be ensured. Potential environmentally hazardous objects must be brought into compliance with environmental requirements or liquidated.

Additional measures include:

- support for utilization of the aquifer close to the surface, incl. for technological purposes;
- updating of the register of springs and karst areas and management of protection;

- organisation of training and information workshops.

Springs and karst areas must be preserved in a natural state as far as possible. An access to them must be ensured. The existing database of springs and karst areas has to be updated. Particular attention should be paid to preserving the natural state of springs, which have not been affected by human activities.

Extraction of mineral resources must be performed using mining and quarry re-cultivation technologies that pose the least hazard to groundwater. Contaminated water abstraction sites must be replaced.

The estimated total cost of groundwater measures (in addition to measures for reducing point source and diffuse source pollution) is 2m kroons. Detailed descriptions of the measures are provided in the management plans of sub-districts.

19 OTHER ADDITIONAL MEASURES

19.1 Management of the management plan

All economic and social developments cannot be projected until 2015. Today, rapid economic growth has been replaced by rapid decline. Implementation of management plans should be based on the principles of environmental management and integrated water management. Implementation of programmes of measures should be based on the efficiency of actions in terms of improving the water services and ensuring a good status of water.

Implementation of a management plan requires continuous cooperation with authorities and businesses. Cooperation with settlements that own the public water supply and sewerage networks as the largest users of water services is very important in the river basin district.

Monitoring and research is required to verify efficiency of measures, to update the programme of measures and increase the efficiency of measures in maintaining a good status of water. Information should be provided to stakeholders and general public on a regular basis. Maintenance of a sufficient level of expertise in water management should be ensured in both the public and the private sector.

Achievement of the objectives of the management plan is possible only through close cooperation between all parties concerned. Even the objective of ensuring a compliant water supply involves intertwining tasks of the Ministry of the Environment, the Ministry of Social Affairs and the local governments, as well as the interests of entrepreneurs and inhabitants.

Separation of the expenditure for implementation of the management plan from other management activities of government agencies is provisional. The provided estimate should reflect the expenditure associated with implementation of the management plan.

19.2 Management of land reclamation systems

Management plans for land reclamation systems are drafted to enable systematic management of land reclamation systems and planning of environmental measures for these systems. The management plans for land reclamation systems are developed by regional offices of the Agricultural Board. The Koiva river basin district includes one district of a management plan for land reclamation systems. A management plan for land reclamation systems is developed on the basis of relevant data and research findings, taking into account the principles of the management plan.

After completion of first management plans for land reclamation systems, the designation of drainage ditches and artificial recipients as facilities or water bodies

should be reviewed. Then, the sub-categories of water bodies should be determined (natural, heavily modified or artificial water body). The status objectives for water bodies should be specified on this basis. The number of natural river bodies could decrease significantly as a result of this review.

The management plan does not impose any restrictions on the management of land reclamation systems, assuming that the actions related to the management of land reclamation systems enable to achieve the environmental objectives established in the management plan or are subject to exemptions applicable to the environmental objectives.

Routing the rain water of new settlements into the artificial recipients of existing drainage systems could cause temporary flooding, because the artificial recipients have not been dimensioned to receive such high volumes of water (culvert diameter, etc.). To avoid this, any plans for drainage of rain water should be approved by the Agricultural Board. Local governments should pay more attention to rain water solutions in their PWSS development plans to avoid future complications due to flooding.

20 LIST OF OTHER PROGRAMMES AND PLANS

As far as is known, there are no other measures or other major programmes beyond those referred to in this plan for improving the status of surface water bodies or groundwater or improving the conditions for aquatic species in this river basin district.

The following other programmes were considered in the process of developing this plan:

- Draft of the management plan for the Mustjõgi river basin sub-district[56]

[56] http://www.envir.ee/vesikonnad/

21 PUBLICATION OF MANAGEMENT PLANS

Involvement of the public in the process of drafting management plans is a part of the planning process in water management. Public presentations and displays of the drafts of the management plan were organised in the course of drafting the MP, enabling the public to express their opinions. Everyone had a right to submit proposals and express their opinion on the draft of the MP. Any justified proposals and opinions were considered in the drafting of the MP.

The development and publication of the Koiva River Basin District MP was preceded by development and publication of the Mustjõgi River Basin Sub-District MP.

The draft of the Koiva management plan was made available to the public in December 2008. The Ministry of the Environment notified the public of the opportunity to take active part in the drafting of management plans for river basin districts. A discussion meeting to present the drafts of the management plans for Eastern Estonian and Koiva river basin districts was held in Tallinn in March 2009.

A revised draft of the Koiva management plan was submitted for approval to the local and county governments located in the territory of the river basin district, as well as to the ministries whose government area is associated with the MP. The public display of the draft MP, revised on the basis of comments and proposals received during the approval procedure, started on 1 September 2009 and ended on 28 February 2010. The draft of the MP and other document associated with the MP were available in all county centres in an electronic format and on paper, as well as on the website of the Ministry of the Environment, at www.envir.ee/1099232.

It was also possible to submit proposals and objections to the MP at the same address.

After public display, the draft of the MP of the river basin district was discussed in all county centres located on the territory of the river basin district (Valga and Võru). There were several meetings of various working groups for specific fields.

A survey of inhabitants, businesses and other organisations on the territory of the river basin district was conducted in the course of the public display to find out their opinions about the draft of the MP.

The draft of the MP was once more revised on the basis of relevant proposals received during the six-month period of public display, before the final version was submitted to the Government of the Republic for approval.

22 COMPETENT AUTHORITY

The Ministry of the Environment serves as the competent authority. Drafting and practical implementation of management plans is managed by the Water Department of the Ministry of the Environment.

Name:Ministry of the Environment

Address: Narva mnt 7a
15172 Tallinn

Telephone: (+372) 626 2855

Fax: (+372) 626 2801

Website: http://www.envir.ee

Specified information on the tasks of the competent authority is provided in a report on competent authorities[57], prepared by the Ministry of the Environment.

The main task of the Ministry of the Environment as the competent authority is to coordinate the development and implementation of management plans in cooperation with other relevant institutions and organisations.

[57] Report on implementation of Article 3.8 of the EU Water Framework Directive (2000/60/EC) (www.envir.ee/1097881)

23 CONTACT DETAILS, REQUESTS FOR BACKGROUND INFORMATION AND ADDITIONAL DATA

The source materials for the Koiva River Basin District Management Plan include the draft of the Mustjõgi River Basin Sub-District Management Plan[58] as well as studies and reports[59] prepared in the course of developing the management plans[60].

Further information on the drafting of the MP can be obtained from the Water Department of the Ministry of the Environment (Rene Reisner, rene.reisner@envir.ee).

[58] http://www.envir.ee/orb.aw/class=file/action=preview/id=1085027/Mustj%F5e+VMK+03.03.2008.pdf
[59] http://www.envir.ee/89749
[60] http://www.envir.ee/vmk

ANNEX 1 STATUS CLASSES OF THE SURFACE WATER BODIES IN THE KOIVA RIVER BASIN DISTRICT IN 2009, STATUS OBJECTIVES FOR THE SURFACE WATER BODIES IN 2015, AND EXTENDED STATUS OBJECTIVES FOR THE SURFACE WATER BODIES IN 2021

Abbreviations and symbols:

PHCH – ecological status class based on general physical/chemical conditions

LINV – ecological status class based on large invertebrates

PHBE – ecological status class based on phytobenthos

FISH – ecological status class based on fish

ECST – ecological status class on natural water bodies

ECP – status class of ecological potential on heavily modified and artificial water bodies

CHSC – chemical status class

- This quality indicator was not used for determination of status class in 2009

* The status class of the water body was derived from analogy and pressure factors on the basis of expert assessments; there are no data on individual quality indicators

Annex 1.1 River water bodies

Annex 1.1.1 Natural river water bodies in the sub-district of Mustjõgi

No.	Code of the water body in the Environmental Register	Name of water body	Type	Status classes in 2009						Final specification of status class in 2009	Status class objective for 2015	Extended objective for 2021
				PHCH	LINV	PHBE	FISH	ECST	CHST			
1	1154200_1	Koiva	3B	-	good	-	-	good	good*	good	good	-
2	1154300_1	Ujuste	1A	-	good	-	-	good	good*	good	good	-
3	1154600_1	Laanemetsa	1A	-	good	-	-	good	good*	good	good	
4	1154800_1	Mustjõgi until Antsla-Litsmetsa road	1A	good	-	good	-	good	good*	good	good	-
5	1154800_3	Mustjõgi from Pärlijõgi to Raudsepa stream	2B	high	good	good	high	good	good*	good	good	-
6	1154800_4	Mustjõgi from Raudsepa stream to the protected area of the Koiva-Mustjõgi meadow	2B	good	high	good	good	good	good	good	good	-
7	1154800_5	Mustjõgi from the protected area of the Koiva-Mustjõgi meadow to the state border	2B	good	high	good	-	good	good	good	good	-

8	1155700_1	Pärlijõgi until the impoundment of Saarlase	1A	-	high	-	good	good	good*	good	good	-
9	1155700_2	Pärlijõgi from the impoundment of Saarlase to the mouth	2B	good	good	-	poor	poor	good	poor	good	-
10	1157400_1	Ahelo	1A	-	good	-	-	good	good	good	good	-
11	1157600_1	Kuura	1A	-	-	-	-	good*	good	good	good	-
12	1158000_1	Vaidava until the impoundment of Vastse-Roosa	2B	-	-	-	-	poor*	good	poor	poor	good
13	1158000_2	Vaidava from the impoundment of Vastse-Roosa to the mouth	2B	good	high	-	good	good	good	good	good	-
14	1158100_1	Peeli	1B	good	good	high	high	good	good	good	good	-
15	1158400_1	Kolga	1B	-	high	-	good	good	good	good	good	-
16	1158700_1	Peetri	2B	good	high	-	high	high	good	high	high	-
17	1159300_1	Hargla	1A	good	-	-	good	good	good	good	good	-
18	1159700_1	Pedetsi	1A	-	high	-	-	good	good	good	good	-
19	1160200_1	Punaoja	1A	-	-	-	-	good	good	good	good	-

Annex 1.1.2 Heavily modified river water bodies in the sub-district of Mustjõgi

No.	Code of the water body in the Environmental Register	Name of water body	Type	Status classes in 2009						Final specification of status class in 2009	Status class objective for 2015	Extended objective for 2021
				PHCH	LINV	PHBE	FISH	ECP	CHST			
1	1154800_2	Mustjõgi from Antsla-Litsmetsa road to Pärijõgi	HMWB	good	poor	good	good	poor	good*	poor	poor	good

Annex 1.2 Lake water bodies

Annex 1.2.1 Natural lake water bodies in the sub-district of Mustjõgi

No.	Code of the water body in the Environmental Register	Name of water body	Type	Final specification of status class in 2009	Status class objective for 2015	Extended objective for 2021
1	2133700_1	Köstrejärv	2	good	good	-
2	2136000_1	Ähijärv	3	good	good	-
3	2136600_1	Aheru Lake	3	good	good	-
4	2144700_1	Kirikumäe Lake	5	poor	good	-
5	2155200_1	Pullijärv	5	poor	poor	good
6	2155500_1	Hino Lake	2	good	good	-
7	2155900_1	Murati Lake	3	poor	good	-
8	2156700_1	Pabra Lake	5	good	good	-

ANNEX 2 PROGRAMME OF MEASURES

	MEASURE	Amount, m EEK
1	**RECONDITIONING AND DEVELOPMENT OF DRINKING WATER SYSTEMS**	
	Principal measures	
	Reconditioning of water supple, construction of new water pipelines: settlements with over 50 consumers or supply system output over 10m^3/d or smaller supply systems that supply water to the public (child care institutions, recreation centres, etc.)	62.4
	Renovation and extension of existing water supply systems	2.4
	Total principal measures	**64.8**
	Additional measures	
	Reconditioning of water supply in small settlements – less than 50 consumers or output under 10 m^3/d, support for replacement of dry or polluted wells	31.1
	Total additional measures	31.1
	Total measures of reconditioning and development of drinking water systems	**95.9**
2	**RECONDITIONING OF SOURCES OF POINT SOURCE POLLUTION**	
2.1	**Reconditioning and development of wastewater collection systems**	
	Principal measures	
	Construction of new and reconstruction of old sewerage systems	**145.8**
	Additional measures	
	Support for sewerage solutions in low density areas	69.0
	Total additional measures	69.0
	Total measures of reconditioning and development of wastewater collection systems	**214.9**
2.2	**Reconditioning of livestock farms**	
	Principal measures	
	Reconditioning of manure storage facilities	13.9
	Procurement of manure spreading equipment	5.7
	Construction of silage storage facilities	1.6
	Improvement of wastewater handling	0.7
	Total measures of reconditioning of livestock farms	**21.9**

2.3	**Reconditioning of polluted areas (residual pollution)**	
	Principal measures	
	Support for elimination of local discoverable polluted areas and hazardous waste	1.3
	Total principal measures	**1.3**
	Additional measures	
	Surveys and digital mapping of soil pollution under former liquid fuel storages	0.2
	Follow-up inspection and reconditioning of closed landfills	0.1
	Total additional measures	**0.3**
	Total measures of reconditioning of polluted areas	**1.6**
	Total measures of reconditioning of sources of point source pollution	**238.3**
3	**REDUCTION OF DIFFUSE SOURCE POLLUTION**	
	Principal measures	
	Total principal measures	**0**
	Additional measures	
	Study of diffuse source pollution load	0.5
	Establishment of forest strips for water protection	0.3
	Additional measures and compensation for restrictions on land use on river basins of water bodies with a poor status	15.4
	Additional measures for reducing load (land use, marshes, increased frequency of maintenance of water bodies), based on the HELCOM requirements for reducing pollution load	50.0
	Organisation of training and information workshops for agricultural producers	0.2
	Measures for peat extraction and for other quarries	0.2
	Total additional measures	66.6
	Total measures of reduction of diffuse source pollution	**66.6**
4	**MAINTAINING THE QUALITY AND RESERVES OF GROUNDWATER**	
	Principal measures	
	Inventory, liquidation or conservation of unused bore wells	0.2
	Total principal measures	**0.2**

	Additional measures	
	Support for utilization of the aquifer close to the surface, incl. for technological purposes	0.5
	Updating of the register of springs and karst areas and management of protection	0.8
	Organisation of training and information workshops	0.1
	Total additional measures	**1.4**
	Total measures of maintaining the quality and reserves of groundwater	**1.6**
5	**IMPROVEMENT OF SURFACE WATER BODIES**	
	Principal measures	
	Assessment and studies of the status of water bodies	1.0
	Preservation of the status of lakes	3.2
	Maintenance and improvement of the status of river bodies (incl. ensuring passage of fish through impoundments)	11.6
	Total principal measures	**15.9**
	Additional measures	
	Reconditioning of bathing and recreational water bodies	0.5
	Reconditioning of artificial lakes	3.0
	Support for reduction of the number of beavers	0.5
	Total additional measures	**4,0**
	Total measures of improvement of surface water bodies	**19.9**
6	**COASTAL WATER**	-
7	**MANAGEMENT OF THE MANAGEMENT PLAN AND ORGANISATION OF IMPLEMENTATION**	
	Managing, coordinating evaluating the implementation of the MP, cost recovery studies, cooperation (incl. agricultural programmes, management plan for land reclamation systems), guidelines, involvement of stakeholders (incl. other programmes) and the public, training	5.0
	Regular updating of the PWSS development plans by local governments	3.0
	Linking the surveillance of environmentally hazardous objects and of compliance with production requirements with the MP objectives	1.0
	Surface water and groundwater surveillance programmes, linking them with the MP	1.4
	Specification of public interest in the use of water bodies, combining the actions of water management and nature conservation, managing recreation on water bodies	1.5
	Regular review and specification of the management plan of the river basin district (incl. statuses of water bodies, programmes of measures)	0.8

	Total measures of management of the management plan and organisation of implementation	**12.7**
	TOTAL MEASURES IN THE KOIVA RIVER BASIN DISTRICT	**432.6**

Implementation of measures will be based on their efficiency in accordance with the following principles:

- The most cost-effective solution is systematic implementation of preventive measures. This means implementation of the measures for protecting drinking water intakes as a first priority and preservation of the status of water bodies with a high status. Preservation of status is particularly important in the case of lakes.
- The most efficient measure for improving the status of surface water bodies is opening of the migration routes for fish. This will help to raise the status of two river bodies and will cost approximately 7.9m kroons.

ANNEX 3 SIGNIFICANT PRESSURES ON NON-COMPLIANT WATER BODIES AND THE PROJECTED STATUS IN 2015

Annex 3.1 Significant pressures on non-compliant river bodies and the projected status in 2015

No.	Code	Name	Type	2009	Pressure factors				Status in 2015
					Land reclamation	Impoundments	Diffuse source load	Beavers	
1	1154800_2	Mustjõgi_2	HMWB	poor	+			+	poor
2	1155700_2	Pärlijõgi_2	2B	poor		+		+	good
3	1158000_1	Vaidava_1	2B	poor		+	+		poor

Annex 3.2 Significant pressures non-compliant lakes and the projected status in 2015

Body code	Name	Type	Status in 2009	Pressure factors	Status in 2015
2155200_1	Pullijärv	3	poor	Internal load, effluent, beavers, recreation	poor
2144700_1	Kirikumäe Lake	5	poor	Cause unknown, no direct human impact	good
2155900_1	Murati Lake	5	poor	Cause unknown, no direct human impact	good

ANNEX 4 WATER BODIES WITH EXTENDED OBJECTIVES

Explanations of reasons in Article 4 of the WFD:

4/1 – technical feasibility – improvements achievable in stages, which exceed the deadline

4/3 – natural conditions – e.g., long delay, drying, flooding in Soomaa

5/1 – technical feasibility – the same objective cannot be achieved using alternative methods

5/2 – unreasonable costs – alternative methods for achieving the objective are expensive

6/1 – natural reasons – unpredictable

6/2 – force majeure

6/3 – accidents

7/1 – changes in physical properties of the water body – morphological changes due to impoundments, dredging, drainage, etc.

Annex 4.1 River bodies, which are not likely to achieve a good status by 2015

No.	Body code	Body name	Type	Status in 2009	Status in 2015	Objective	Extended */ lower objective	Reason for extension WFD Art. 4, clause/ no. of reason
1	1154800_2	Mustjõgi_2	HMWB	poor	poor	good ECP	2021	4/1 and 4/2
2	1158000_1	Vaidava_1	2B	poor	poor	good status	2021	4/3

* *Achievement of the initial extended objective will be re-assessed in 2015*

Annex 4.2. Lakes, which are not likely to achieve a good status by 2015

Body code	Body name	Status in 2009	Status in 2015	Objective	Extended* objective	Reason for extension WFD Art. 4, clause/ no. of reason
2155200_1	Pullijärv	poor	poor	good status	2021	4/3 natural conditions do not enable improving the status of water body by deadline

* *Achievement of the initial extended objective will be re-assessed in 2015*

ANNEX 5 LIST OF RIVER BODIES IN WHICH THE POOR OR BAD STATUS IN 2015 IS CAUSED, IN COMBINATION WITH OTHER FACTORS, BY IMPOUNDMENTS

Body code	Body name	AVK	Status in 2015	Amount required for opening migration routs, m EEK	Reason for extension WFD Art. 4, clause/no. of reason
1158000_1	Vaidava_1	Mustjõe	poor	2.3	4/1, 4/2 impoundments in combination with other factors

ANNEX 6 LIST OF WATER BODIES REQUIRING RESTRICTIONS ON WATER USE OR PREVENTION OF ANY FURTHER WATER USE

Reduction of pollution load is required in the case of bodies with a good status if there is a risk of lowering of the status class.

R – reduction of the impact of the activity

A – avoiding the activity

RA – reduction of the impact of an existing activity; avoid activities, which would lead to increased load (such as new effluent discharges, new large barn complexes on the river basin, etc.)

Annex 6.1 List of river bodies requiring restrictions on water use or prevention of any further water use

Body code	Body name	Type	Status in 2009	Diffuse source load	Point source load	Hydromorphological changes	Damming of the water body, regulation of flow rate, modification of flow regime	Restrictions associated with nature conservation
1159300_1	Hargla	1A	good				R	
1158100_1	Peeli	1B	good				R	
1158400_1	Kolga	1B	good				R	
1158700_1	Peetri	2B	high	RA	RA	RA	R	R
1158100_1	Peeli	1B	good				R	
1159700_1	Pedetsi	1A	good				R	
1154800_5	Mustjõgi_5	2B	good				R	

1154800_3	Mustjõgi_3	2B	good				R	
1154800_4	Mustjõgi_4	2B	good				R	
1155700_1	Pärlijõgi_1	1A	good				R	R
1155700_2	Pärlijõgi_2	2B	poor				R	R
1158000_1	Vaidava_1	2B	poor				R	
1158000_2	Vaidava_2	2B	good				R	R
1154200_1	Koiva	3B	good				R	R

Annex 6.2 List of lakes requiring restrictions on water use or prevention of any further water use

Reduction of the impact of existing point sources of pollution, avoiding addition of new point sources of pollution and reduction of diffuse source pollution is required in the case of **all lakes (even those not listed in the table)**. Lowering of water level should be avoided on natural lakes.

Body code	Body name	Type	Status in 2009	Diffuse source load	Point source load	Lowering of water level	Restrictions associated with nature conservation
2133700_1	Köstrejärv	2	good	RA	RA	A	R
2136000_1	Ähijärv	3	good	RA	RA	A	R
2136600_1	Aheru Lake	3	good	RA	RA	A	R
2144700_1	Kirikumäe Lake	5	poor	RA	RA	A	R
2155200_1	Pullijärv	5	poor	RA	RA	A	R
2155500_1	Hino Lake	2	good	RA	RA	A	R
2155900_1	Murati Lake	3	poor	RA	RA	A	R
2156700_1	Pabra Lake	5	good	RA	RA	A	R

ANNEX 7 LEGAL RESTRICTIONS APPLICABLE TO GRANTING OF WATER PERMITS

§ 38 of the Water Act, planning of protection and use of water, clause 8, item 5: overview of areas where water use should be restricted or any further water use should be prevented;

Reduction of pollution load:

Minister of the Environment **Regulation no. 58** of 9 October 2002, "List of the water bodies to be protected as habitats for salmonids and cyprinids, and the requirements for the quality and monitoring of such water bodies, and stations of national environmental monitoring of salmonids and cyprinids". The water quality has to comply with the provisions of the Regulation. The water bodies to be protected as habitats of salmonids and cyprinids are specified in Regulation no. 58 as whole water bodies.

Pursuant to **§ 24 (5) of the Water Act**: Upon discharging effluent into a recipient with a bad or very bad status class, the issuer of the permit for the special use of water may increase the strictness of the requirements for the effluent to be discharged to the recipient by up to 30 per cent in comparison to the requirements established by the Minister of the Environment Regulation no. 269 of 31 July 2001, "Procedure for discharging effluent into a water body or soil". The load on polluted water bodies may not increase. Consequently, this condition does not apply to construction of new wastewater treatment plans, unless at least a poor condition is ensured.

Pursuant to § 24 (6) of the Water Act: Upon discharging effluent into a recipient, in which the quality indicators deteriorate as a result of effluent discharge and there is a risk of reduction of the status class of the water body, the issuer of the permit for the special use of water may increase the strictness of the requirements by up to 15 per cent (This refers to river bodies with a high status and this should also apply to virtually all lakes). A complete ban on the discharge of effluent should be considered in the case of lakes.

§ 13 (7) and (9) of the Water Act; Minister of the Environment Regulation no. 9 of 9 February 2001, "Approval of the list of water bodies belonging to the drinking water intake of the surface water system of the City of Tallinn", the quality of the water has to comply with the provisions of the Minister of Social Affairs Regulation no. 1 of 2 January 2003, "Quality and control requirements for surface water and groundwater, which is used or intended to be used for the production of drinking water".

Damming of water bodies, altering the flow regime and regulating the flow rate is prohibited on so-called 'salmon rivers' (Minister of the Environment **Regulation no. 73** of 15 June 2004, "List of spawning areas and habitats of salmon, river trout, sea trout and grayling"). Pursuant to § 51 (1) of the Nature Conservation Act, building of new impoundments and reconstruction of existing impoundments to the extent which would raise the level of water, as well as altering the natural bed or water regime of the water body is prohibited in such areas. Effectively, this also means prohibition of

outflow regulation (95 % of the permits are not valid for impoundments on these rivers – the flow rate required for preservation of downstream breeding sites and habitats must be ensured; regulation of downstream flow is prohibited if there is no hydro-electric power station).

In the case of **Natura 2000 sites** (rivers) and lakes on the site, the provisions of protection rules or management plan should be followed.

In case of the bodies listed below, the restrictions may not be applicable to the entire body (fish river, Natura 2000 site, etc.), but only to a part subject to restriction.

Annex 7.1 List of river bodies subject to legal restrictions on water use

Body code	Body name	Type	Status in 2009	Reduction of pollution load					Prohibition of damming of the water body, regulation of flow rate, modification of flow regime	Compliance with protection rules
				Habitat of salmonids ME Regulation No. 58	Habitat of cyprinids ME Regulation No. 58	Water body of surface water intake ME Regulation No. 9	Water Act §24 (6) 15%	Water Act §24 (5) 30%	Spawning area of salmonids ME Regulation No. 73	River on a Natura 2000 site
1159300_1	Hargla	1A	good						x	
1158100_1	Peeli	1B	good						x	
1158400_1	Kolga	1B	good						x	
1158700_1	Peetri	2B	high				x		x	x
1158100_1	Peeli	1B	good						x	
1159700_1	Pedetsi	1A	good						x	
1154800_5	Mustjõgi_5	2B	good						x	
1154800_3	Mustjõgi_3	2B	good						x	
1154800_4	Mustjõgi_4	2B	good						x	
1155700_1	Pärlijõgi_1	1A	good						x	x
1155700_2	Pärlijõgi_2	2B	poor						x	x

1158000_1	Vaidava_1	2B	poor						x	
1158000_2	Vaidava_2	2B	good						x	x
1154200_1	Koiva	3B	good						x	x

Annex 7.2 List of list of lakes subject to legal restrictions on water use

Body code	Body name	Type	Status in 2009	Reduction of pollution load	Compliance with protection rules
				Water Act §24 (6)	Lake on a Natura 2000 site
2133700_1	Köstrejärv	2	good	x	x
2136000_1	Ähijärv	3	good	x	x
2136600_1	Aheru Lake	3	good	x	x
2144700_1	Kirikumäe Lake	5	poor	x	x
2155200_1	Pullijärv	5	poor	x	x
2155500_1	Hino Lake	2	good	x	x
2155900_1	Murati Lake	3	poor	x	x
2156700_1	Pabra Lake	5	good	x	x
2133700_1	Köstrejärv	2	good	x	x
2136000_1	Ähijärv	3	good	x	x
2136600_1	Aheru Lake	3	good	x	x