SUSTAINABLE MANAGEMENT OF LITHUANIAN WATERS

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BACKGROUND INFORMATION

Water is a source of life for all living organisms. Since ancient times Lithuanian forebears considered water as holy; it was worshiped and protected from the pollution. Water sources were honored so much that their accession was forbidden. People believed souls and gods lived in water. Lithuanians believed in god Upinis, who dominated over all rivers, Divytis who protected sailors and fishermen and god Ežerinis who ruled lakes. Sacrifice was made to them and it was believed that the favour of destiny, health and welfare depended on their will. Turbid water was not praised by anybody, since dark water frightened by its mystery. There were many accumulations of clear water. Our forebears were good at finding places with a certain power field affecting temper and health. These places were considered to be sacred and temples were built there. In Lithuania, temples were usually built near water or on hills nearby water, rivers or springs. It was believed that water accumulated in a hollow of a stone had a miraculous power and could cure illnesses, protect from the evil spirits. The folklore is rich in myths about water of Life which can resurrect dead or people turned into stones, give strength and quickness.

Lithuania is the southernmost Baltic country with an area of 65,200 km^2 and number of population reaching 3.37 million. 68% of population live in urban areas, although historically Lithuania is an agricultural country. GDP in 2006 was about 7000 Euro per capita, growing approximately 8%/year.

Geographical location of Lithuania is favorable with respect to water resources therefore country has abundant rivers, lakes and groundwater aquifers. Freshwater surface water bodies (rivers, lakes, ponds, and lagoon) cover 2.9% of the territory of Lithuania.

In 2006 total amount of 3 611 million m^3 of water was withdrawn for power production, industrial and domestic purposes. 97 percent or 3496,75 million m^3 was used for energy production (mainly for cooling of Ignalina Nuclear Power Plant and operation of Kruonis Hydro-accumulation Power Plant) and 102,4 million m^3 was used for industry and fisheries.

Groundwater extraction in 2006 has reached 165 mln. m^3. Of them 2,4 mln. m^3 was used for households remaining part - for industry and agriculture.

183,2 mln. m^3 of wastewater has been discharged into surface water bodies during 2006. 128,9 mln. m^3 of them was cleaned, 53,6 mln. m^3 insufficiently cleaned and 0,6 mln. m^3 was discharged untreated.

SUSTAINABLE DEVELOPMENT

In 2000, National Commission for Sustainable Development was established to formulate sustainable development policies and coordinate activities of the ministries, government bodies and other institutions. National Commission for Sustainable Development also reports to UN Commission for Sustainable Development and other international organisations on the progress in sustainable development.

At the World Summit for Sustainable Development in 2002, Lithuania adopted Johannesburg Declaration on Sustainable Development. The Declaration underlines that sustainable development requires a long-term perspective and broad-based participation in policy formulation, decision-making and implementation at all levels.

Shortly after Johannesburg Summit, Lithuania prepared National Strategy for Sustainable Development which was adopted by the Government in September 2003. One of the main goals is a change of water governance structure in line with international commitments and requirements of the European Union (river basin management principle).

On the national level, Ministry of Environment is responsible for implementation of National Strategy for Sustainable Development and reporting to the National Commission for Sustainable Development.

SURFACE WATER RESOURCES

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Tomas Virbickas, Institute of Ecology, Vilnius University

Lithuania is located in the zone of surplus humidity. Rainfall during the average year amounts to 748 mm and exceeds mean annual evapotranspiration of 512 mm. Renewable water resources of Lithuania reach 15.4 km³, beside that 10.8 km³ of water are transit flows from Byelorussia, Poland and Russia. For managerial purposes Lithuania has designated four river basin districts: Nemunas, Lielupe, Venta and Daugava. All of them are international shared with Belorus, Latvia and Russia.

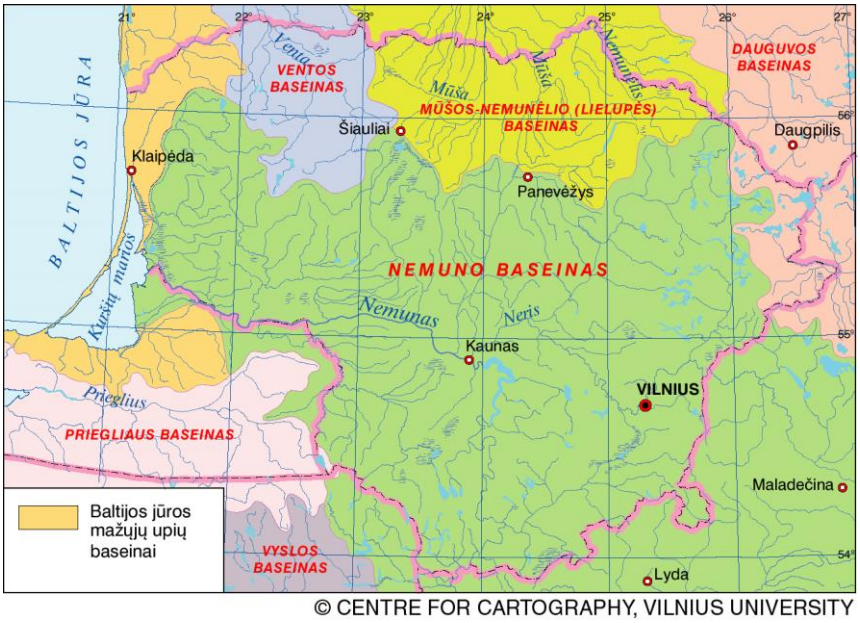


Fig. 1. Lithuanian rivers basins.

Rivers of Lithuania.
There are nearly 4400 rivers longer than 3 km flowing in the country. Their total length is more than 37.5 thousand km. Majority of them are small up to 10 km long brooks (~ 82%). There are 641 larger, 10-30 km long streams, 86 rivers with the length of 30-60 km, 28 rivers 60-100 km long, and 17 rivers longer than 100 km. Very small, less than 3 km rivulets are numerous: ~17.8 thou., with total length of 39.1 thou. km. Consequently the river network in Lithuania is very dense (on average 1.18 km per 1 km²), i.e. each square km of the country's territory on average is being crossed by one brook, stream or river. Since Lithuania is a country of surplus humidity, rivers abundant in the water throughout the year, and only some of the smallest rivulets sometimes dry out. Plains and small hills prevail in the country, thus slope of the rivers is low, usually – 0.4-1.5 m/km.

Nemunas is the largest river and drains approximately 72 % of the Lithuanian territory. Nemunas River Basin is among the largest river basins in the Baltic Sea catchment area. Total length of the river is 937 km, shared between two countries: 475 km of the lower stretch runs in Lithuania, while the upper part (462 km) is in the territory of Belorus Republic. Total catchment area of the river is 97.9 thousand km2 and it is shared between Belorus (upstream part, 49.9 thousand km2), Lithuania (46.7 thousand km2), Russian Federation – Kaliningrad Oblast (900 km2), Poland (180 km2) and Latvia (88 km2).

The Nemunas River ends up in the Curonian lagoon, which is a shallow freshwater coastal water body (average depth 3.8 m, maximum depth 5.8 m), partly isolated form the southeastern Baltic Sea by Curonian Spit. Curonian lagoon is the largest freshwater body in Lithuania. Total area of the lagoon is 1584 km^2. The northern part (413 km^2) joining the Baltic Sea is in the territory of Lithuania, while the southern part belongs to Russian Federation (Kaliningrad Region). Nemunas River basin covers 98% of the total catchment area of Curonian lagoon, thus predetermine qualitative and quantitative characteristics of the lagoon. The long-term average annual discharge to the Curonian Lagoon by the Nemunas River is 667 m^3/s which equals to 21.1 km^3. The Curonian Lagoon discharge to the Baltic Sea comprises approximately 23 km^3 per annum. The water exchange ratio in the lagoon is 4.5 times per year, or each 81 day.

The second largest Lithuanian river is Neris - Nemunas tributary. Other rivers in the country are considerably smaller. Nemunas River and its tributaries drains ~ 49 600 km² of the territory of Lithuania (Fig. 1). The other major basins are smaller and located near the borders with Latvia: Mūša-Nemunėlis (Lielupė; 8 976 km²), Venta (5 140 km²), small rivers flowing into the Baltic Sea (2 523 km²), Dauguva (Daugava) (1 857 km²) and Prieglius (Pregolya) (54 km²).

Lakes

There are about 6000 natural lakes in Lithuania. Larger than 0.5 ha lakes cover 908.33 km² area whereas the small lakes (from 0.05 ha to 0.5 ha) cover only 5.34 km². Total area of larger than 0.5 ha ponds is 235.7 km² and small artificial lakes (with areas from 0.05 ha to 0.5 ha) cover 10.81 km². All lakes cover over 1.5 % of the Lithuanian territory (Fig.2.). Baltic Highlands have the largest number of lakes (especially in the watershed of Nemunas and Dauguva Rivers).

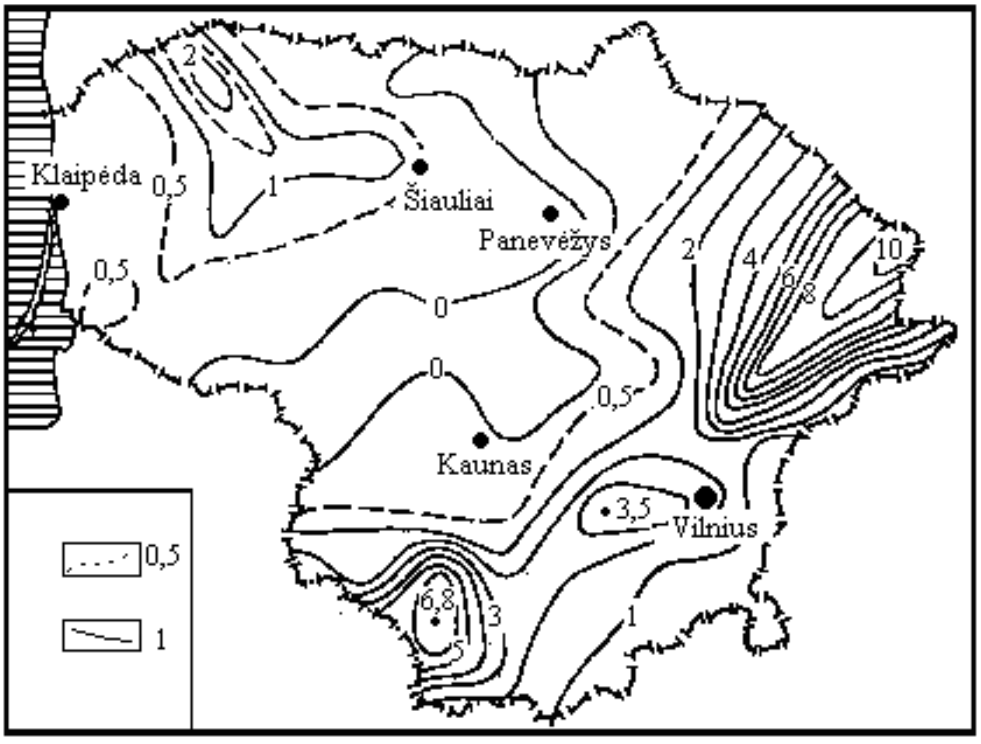


Fig. 2. Spatial distribution of lakes in Lithuania (in percents of area covered by lakes larger than 0.5 ha).

The largest Lithuanian lake is international Drūkšiai (Drisviaty) lake, which covers about 44.8 km². Dysnai (area ~ 24.0 km²) and Dusia (area ~ 23.3 km²) are accordingly on second and third place by size. The other lakes in the country have areas under 15 km². The deepest lake in Lithuania is Tauragnas (60.5 m).

Majority of the most valuable water bodies (from both biological and recreational point of view) are situated in the protected areas (national and regional parks, reservations), covering 15,28% of

Lithuanian territory. Protected territories in the country occupy more than 998 000 hectares: 6 state strict reserves (18769 ha), 5 national parks (156945 ha), 30 regional parks (446334 ha), 260 state nature reserves (161975 ha), 112 municipality nature reserves (12040 ha), and 1 biosphere reserve and 26 biosphere polygons.

The largest protected areas are Upper and Lower Lithuania national parks, Dzūkija national park, Labanoras, Gražutė, Nemunas Meanders, Nemunas Delta and Varniai regional parks, situated in the most picturesque terrains of the country. The water tourism routes go through the rivers and lakes of the parks and their vicinities.

Biodiversity, protected species, NATURA 2000 network.

About 58 fish and lamprey species, 4 crayfish, 6 amphibian, 1 reptilian, 3 water mammal, a lot of bird species inhabit freshwater bodies of Lithuania. Quite a few of them are protected on EU scale (listed in the annexes of EU Bird and Habitat directives). The network of NATURA 2000 sites was established for protection of rare and endangered species and their habitats, covering territories important for conservation of 2 mollusk species, 12 fish and lamprey, 5 amphibian, 1 reptilian, 1 water mammal and many bird species. Some of species, listed in the annexes of EU directives (e.g. beaver) are very abundant and widespread in Lithuanian waters, therefore special areas has not been designated for their protection.

Currently there are 77 important Bird sites and 296 important Habitat sites established in the whole country. According to the plans of the State Service for Protected Areas, in order to fully implement Birds Directive and Habitats Directive in Lithuania 90 protected sites for birds and 300 protected sites important for Habitats directives still have to be established.

Achievements/good practice.

In Soviet times Lithuanian waters suffered quite much from anthropogenic activities, mainly (as in the majority of other countries) from land reclamation and straightening of river beds, dam construction and pollution. After the restitution of independence, implementation of measures for mitigation of human pressure has started, particularly in the field of reduction of water pollution. These activities have provided tangible results already. The best example could be the self-restoration of population of Twaite shad (*Alosa fallax*; NATURA 2000 fish species) in the Curonian lagoon. Lagoon receives waters of the Nemunas River, which drains more than 72% of countries territory. Thus, the status of Curoniana lagoon directly reflects the loads of pollutants on the country scale. The stock of Twaite shad has been declining dramatically in Lithuania in the middle of the last century. Several decades this fish was nearly totally absent, therefore have been included into Lithuanian Red Data Book. After the significant reduction of water pollution, Twaite shad has returned to Curonian lagoon in 1994-1996. Since than, in the course of 10-12 years the stock of Twaite shad has increased to such extent, that it was excluded from the Red Data Book, and currently is commercially fished. Another example is restoration of stocks of Salmon (Salmo salar; NATURA 2000 fish species) and Sea-trout (Salmo trutta trutta) in the rivers of Lithuania. More intensive activities on restoration of this fish, i.e. initiation of artificial rearing and construction of fish ways on the dams of water reservoirs have started in 2000. Decrease in water pollution had a considerable impact too. For instance, after the reduction of pollution of the Vilnia River (running in the territory of Vilnius City), installation of fish ways, and several subsequent releases of artificially reared fish, the number of adults returning from the Sea to spawn in the river increased more than 6 times since 2000. Adult Salmon and Sea-trout are increasingly returning to other rivers too, where these fish were extinct for a long period.

GROUNDWATER RESOURCES

Kęstutis Kadūnas, Geologival Survey of Lithuania

Lithuania is one of the few countries in Europe and the world where inhabitants drink only groundwater. Country is rich in groundwater resources and it is important that groundwater compared to surface water has better quality and usually is better protected from pollution. There is no town or place in Lithuania where tap water couldn‘t be drunk.

Most intensive investigations of groundwater were carried out in the 7th–9th decades. The main attention was paid to the most productive aquifers from which large amounts of water could be extracted, with hardly considering the depth of their occurrence, the distance to the eventual consumer on which the cost of water extraction and supply depends. The investigations developed rapidly, and during the period of thirty years there were explored resources of fresh groundwater, which were enough to satisfy the needs for potable water in all towns and district centers of the country. For construction of wellfields, 103 sites with the capacity of 2023.1 thous. m^3/day of available groundwater resources were explored.

In 1989, when the consumption of groundwater reached the highest level, urban consumers used 50–75 per cent of explored resources. With a decrease in potable water consumption, at present only about 30 per cent of groundwater resources are used.

The Geological Survey of Lithuania has prepared the strategy of groundwater use and protection, in which main directions of activity for the next decade are foreseen. The strategy is an attempt to compile a complex plan of groundwater investigations and protection, use of water resources and improvement of protection management. For implementation of the strategy, coordinated efforts of various institutions are indispensable.

In the field of national hydrogeological investigations it is necessary:

- to develop the mapping of groundwater resources;
- to carry out investigations of groundwater vulnerability for substantiation of water use and protection management;
- to continue observations of the alterations of groundwater quantity and quality in the network of national monitoring as a part of the national monitoring of the environment;
- to evaluate the hazard of local pollution sources to groundwater and to foresee the preventive means;
- to harmonize the management of the use and protection of groundwater resources with the regulations of the European Union.

In 2006 Geological Survey prepared Programme for the Assessment of Groundwater Resources in Lithuania, which was approved by the Government. The main goal of the programme is to evaluate available groundwater resources on the national scale taking into account new hydrogeological information and requirements of the EU water directives.

Mineral curative water of health resorts. Water of different salinity and chemical composition is used for curative purposes in health resorts. Sodium and potassium chloride and sulphate waters without specific balneologic components are most popular. Water with salinity of up to 5 g/l is used for drinking, up to 15 g/l - for curative baths and water with substantially higher salinity and concentrations of bromine varying from 30 to 110-270 mg/l is used for various health procedures.

The volume of prospected and approved waters of health resorts makes 4476 m^3/day. Today only 6-10% of this water is consumed.

Beside four health resorts there are four medical institutions in Lithuania, which use mineral water for treatment and rehabilitation.

Bottled mineral water. Production of bottled mineral water was developing gradually, when doctors and their patients have understood that treatment could be continued also after the health resort. Later many people got used to drink bottled mineral water. Mineral waters from Birštonas: "Vytautas", "Birutė", from Druskininkai: "Dzūkija" and "Druskininkai" were well known in Lithuania 25 years ago.

After the re-establishment of independence imported mineral water has flown into Lithuania and literally flooded the local marked. As a response to the mentioned invasion in many places of Lithuania production of mineral water has been extended mostly extracting it from individual boreholes. Mineral water was entitled by various names and approved by responsible authority.

At the moment 18 types of mineral water are known. The most popular is low salinity water containing minerals of calcium, sodium, sulphate, chloride and sodium.

Resources of industrial groundwater

Industrial groundwater is the water that can be used as a raw material for production of some chemical elements and minerals. Today most often in the world such elements as iodine, bromine, lithium and some salts are extracted from the groundwater.

Hydrogeological and economical feasibility study for production of iodine and bromine from the groundwater has been performed by the Geological Institute. The results of the study showed that production of bromine would not have been profitable taking into account the market prices. The high production cost was related to utilisation of residual water with salinity of 150-190 g/l. It is not allowed to discharge such water into surface water bodies. Iodine concentration in the sedimentary aquifers was very small - only 0,6 - 1,5 mg/l. Therefore economical calculations were fulfilled only for feasibility of bromine exploitation.

Thermal groundwater resources

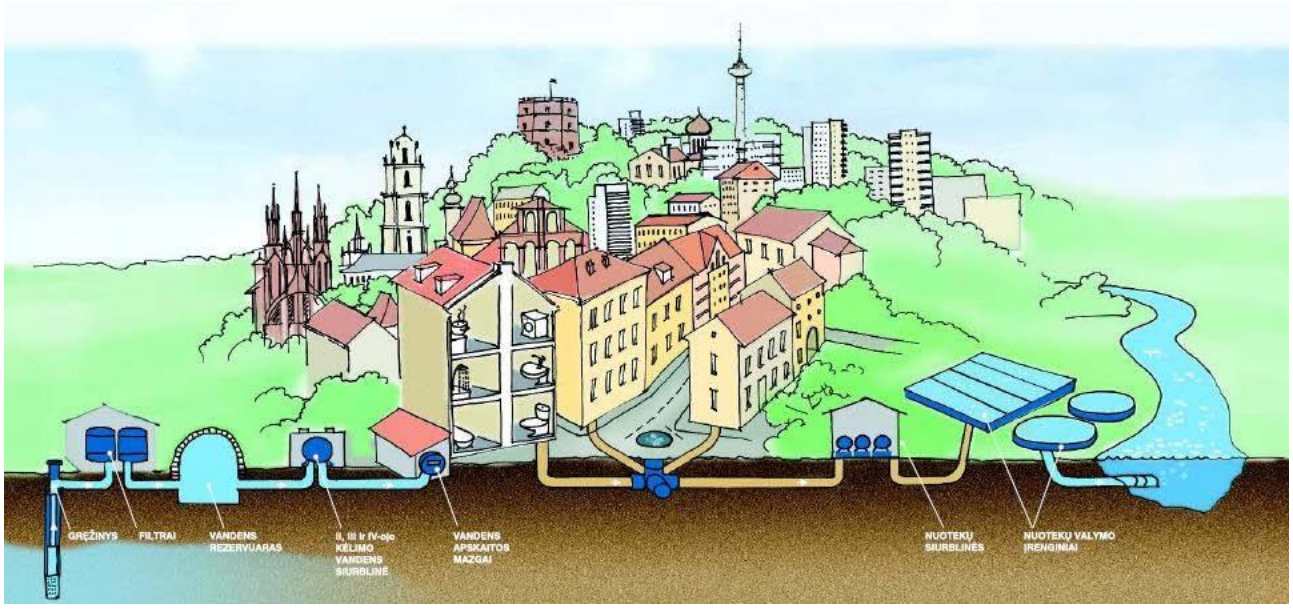
Special investigations of geothermal conditions of the subsurface started in 1986. According to prevailing temperature of the underground Lithuanian territory was divided into three major regions: 1) the West Lithuanian geothermal anomaly with groundwater temperatures varying from 60-90 to 110-145^{o}C (at the depth of 2-4 km); 2) central part of Lithuania where groundwater temperatures at the depth of 200-1800 m reach 20-60^{o}C, and 3) Eastern part of the country with the background groundwater temperatures not exceed 20^{o}C.

Geothermal potential of Lithuania is rather high, the main economic prospects relating to the West Lithuanian geothermal anomaly. The geothermal potential of Lithuania was estimated for three regional hydrogeothermal complexes: Cambrian (5.1x1018J), Lower-Middle Devonian (5.0x1018J), Middle- Upper Devonian 1.5x1018J). Petrogeothermal resources were estimated down to 7km depth in Lithuania (7x1021J). Usage of geothermal resources for district heating started at 2000. The first geothermal demonstration plant in Lithuania was built in Klaipeda. Total thermal capacity of plant is 41MW. Low-temperature geothermal heat is extracted from geothermal water (38°C pumped from 1100 m depth) using absorption heat pump.
Potential consumers of the Earth's thermal energy are several cities and towns (Palanga, Kretinga, Plunge, Gargzdai, Nida, Silale) and numerous settlements situated in area of the West Lithuanian Geothermal Field.

WATER SUPPLY AND WASTE WATER TREATMENT

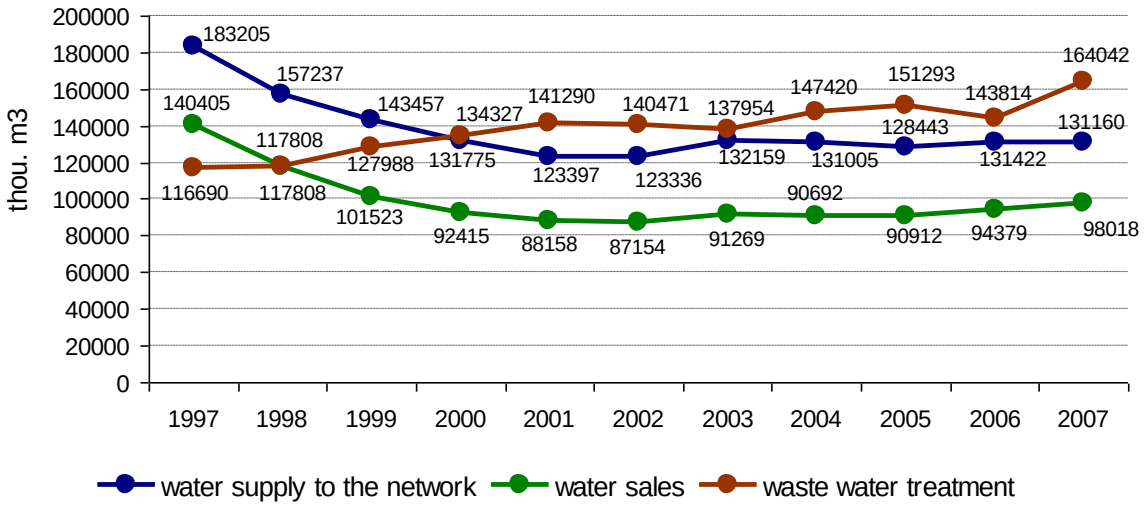
Stanislovas Benikasas, Water Suppliers Association

Groundwater resources are used for drinking water supply in the cities of the country since long time ago. For instance, water supply in Vilnius has recently celebrated 500 years anniversary, a bit earlier Klaipėda celebrated 100 years anniversary of the first water supply station, a number of water supply stations in Lithuania operate more than 50 years. Their amount and capacity significantly increased in the 50 and 60s since the demand of drinking water highly grew, thus, specialised water supply companies were established and strengthened. The main objectives of water supply companies covered a reliable supply of good quality water to the consumers and waste water treatment which is not harmful to nature.



Most companies providing water supply and waste water treatment services are responsible to municipalities. Currently, the average residential expenses for drinking water and waste water treatment services make up 2–2,5% of family income. According to the volume of water consumption and waste water collection the Lithuanian consumers are as follows: 62% of water is consumed by residents, 21% by industry and 17% municipal sector.

Changes in Water Supply, Water Sales and Waste Water Treatment in 1997-2007



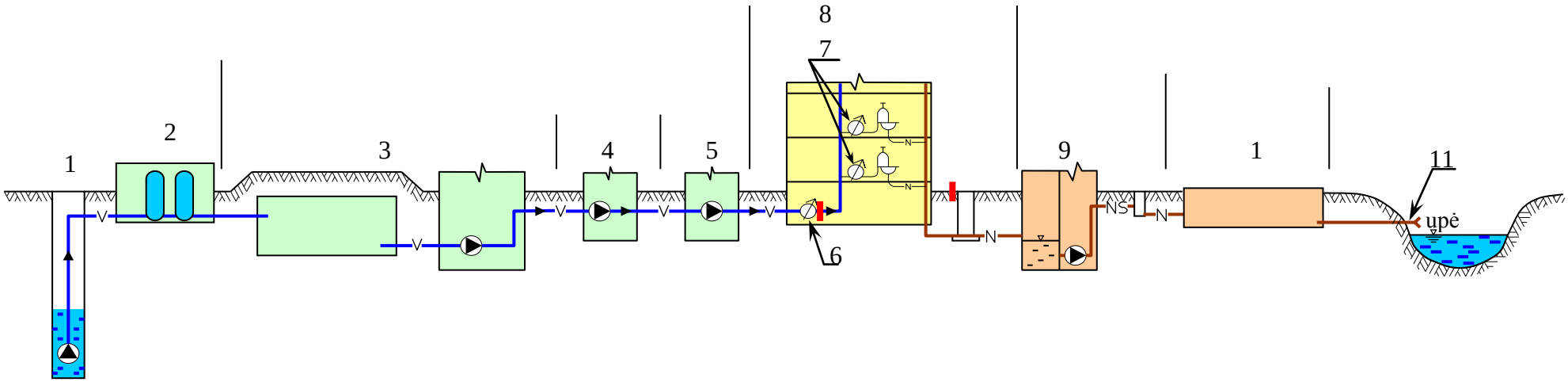
In order to implement health and environmental requirements in water sector and to secure accessibility of services, the national funds are allocated and the management of water services are re-organised. The total planned amount of the investments for construction and renovation amounts to 3,5 billion litas. For the extension and renovation of water supply and waste water treatment infrastructure about 1,3 billion litas of EU structural funds is planned to be allocated in 2007–2013. The priority is given to the construction or reconstruction of waste water treatment facilities and extension of sewage networks.

In Lithuania, water supply and waste water treatment services are provided by about 460 bigger or smaller companies. However, more than 90% residents are served by large water supply companies, which run 1192 water supply and 525 sewage collection systems. The total length of water supply networks make up about 10945 km, and sewage networks – 6824 km. The annual water supply amounts to about 136 thou. m^3 and waste water collection - to about 148 thou. m^3. In towns and settlements new waste water technologies are established, waste water treatment facilities are

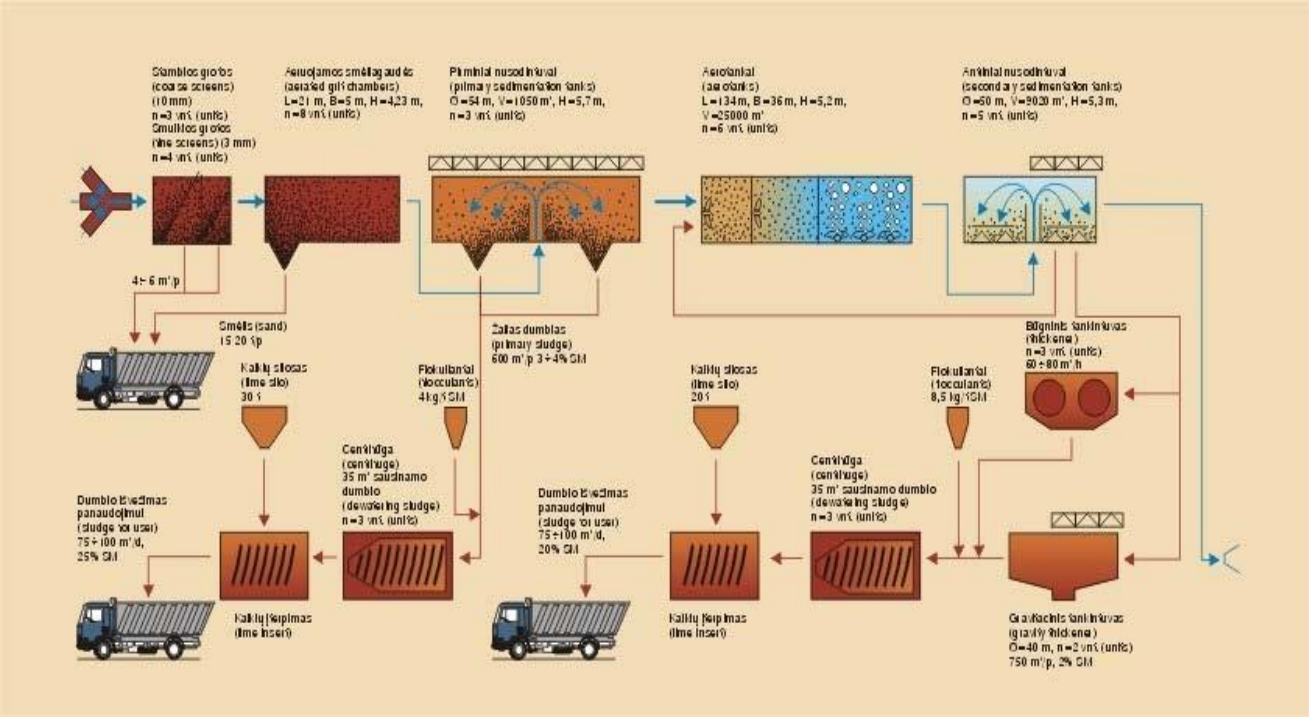
reconstructed or new ones constructed. Due to new built or reconstructed old waste water treatment facilities under the last six years, the volume of untreated and incompletely treated waste water emitted to waters diminished apparently in number; rivers and lakes are less polluted.

WATER SUPPLY AND WASTE WATER COLLECTION IN VILNIUS CITY

Water Company “Vilniaus Vandenys“ runs 1314 km of water supply networks, 45 clean water reservoirs, which total capacity amounts to 135 000 m³	Other users of water supply and sewage networks. 553,3 thou. consumers	Water Company “Vilniaus Vandenys“ runs 819.4 km sewage networks out of which 645.6 km gravitational sewage networks; 173.8 km pressurised sewage networks

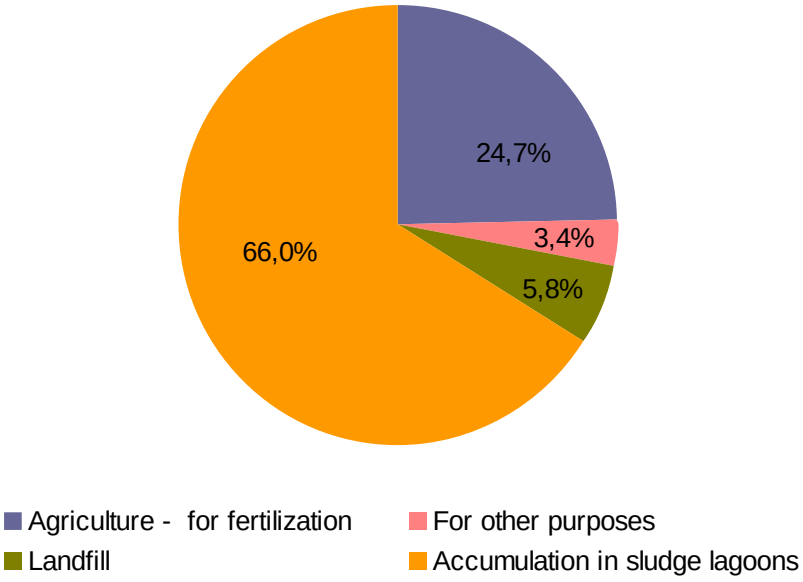


1. Deep well
2. Water treatment facilities
3. Water pumping station of the second lift and reservoir of clear water
4. Water pumping station of the third lift
5. Water pumping station of the fourth lift
6. Inlet water meter
7. Water meter in flat
8. Dwelling-house
9. Waste water pumping station
10. Waste water treatment plant
11. Emitter of treated waste water



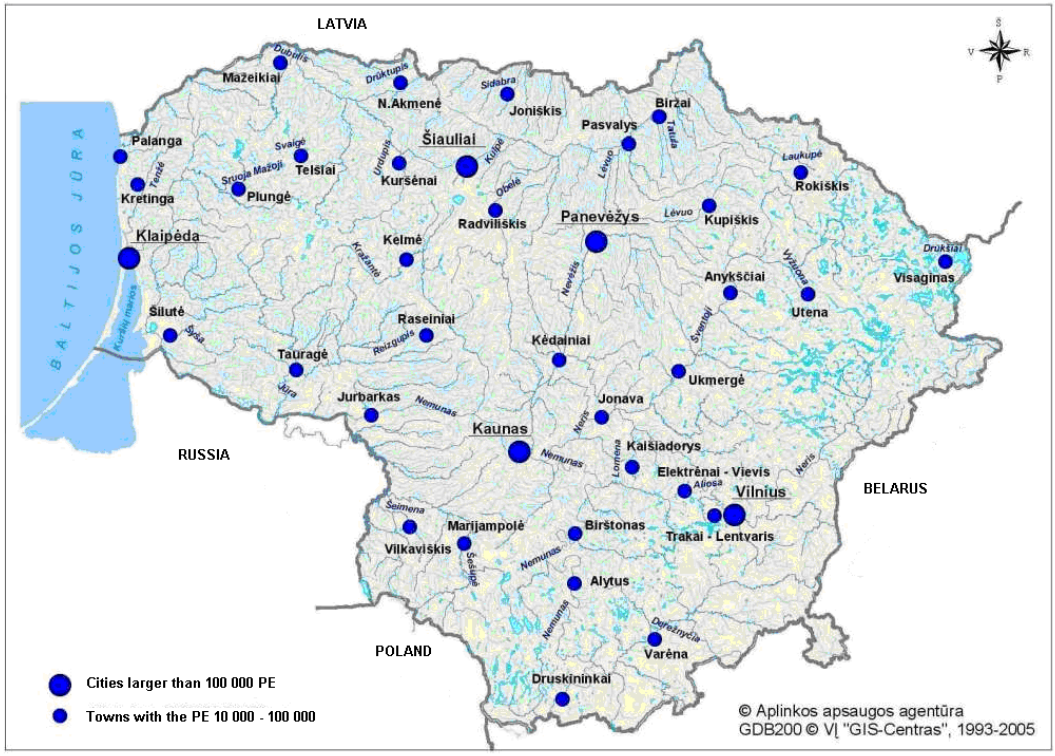
Up to 2005 there was no policy for waste water sludge treatment, therefore, over 90% of sludge accumulated in waste water treatment facilities of towns and places were stored in sludge sites. After the Lithuanian waste water sludge treatment policy was prepared in 2006, the implementation of sludge treatment system started with the financing by Cohesion fund. The main aspect highlighted in the policy is that sludge will not lead to waste, but to a product, which properly prepared could be used in agriculture as fertilizer, in energetic as fuel (directly) or as raw material for the production of biogas.

Since few years sludge digesters operate in Kaunas and Utena, where biogas is produced. Incineration of biogas generated in Utena Waste Water Treatment Plant produces energy which fully fills the demands of the company and is supplied to other consumers. According to the investment programme in the nearest future sludge digesters are planned to be constructed in Panevėžys, Klaipėda and Alytus, the major part of the funds will be financed by the Cohesion fund.

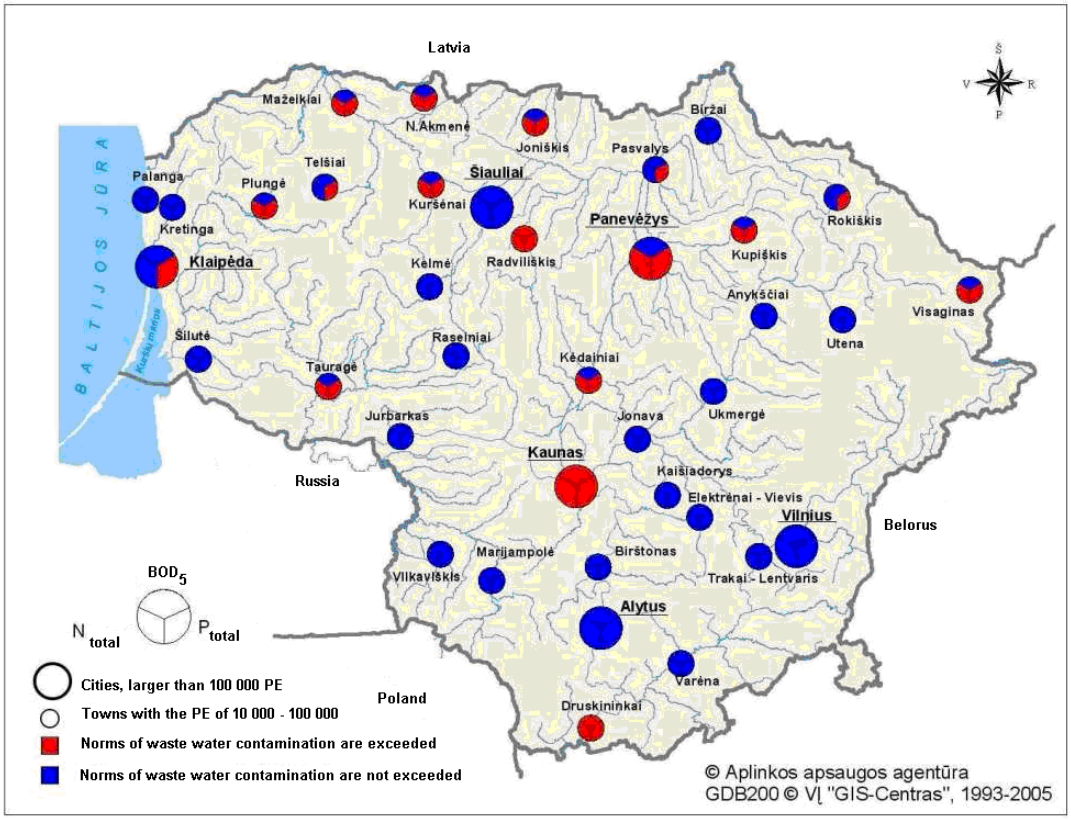


Means of sludge use and utilization in 2005

Entering the EU Lithuania signed the Treaty of Accession and thus, took an obligation to adjust water management in the country so that it complies with the EU Water Framework Directive and other directives regulating the requirements for drinking water supply and waste water treatment. Water supply and waste water treatment projects in Lithuania started implementing 10 – 15 years ago. Investments are allocated in order to reach the objectives which are important to the residents' health and environmental protection: to reduce pollution, coming to the river basins with household and industrial waste water from towns and places, to reduce the contamination of soil and groundwater and hazards of contamination of groundwater resources, to increase the number of residents getting centralised water services and to improve the quality of services rendered.



Main rivers to which waste water from the settlements exceeding 10 000 residents are discharged.



Towns with population over 10 000 residents, where waste water emitted does not comply with the requirements of the Urban Wastewater directive.

Point and non-point pollution management in Lithuania

Jurgita Vaitiekūnienė, water expert

A key component of the Water Framework Directive (WFD) is the development of *river basin management plans* which set out the actions required within each river basin to achieve set environmental quality objectives. The *programme of measures* is at the heart of river basin management planning, as it sets out the actions to be taken during the six year plan period to secure Directive objectives.

In order to elaborate equitable and efficient measures for achievement of good ecological status of all water bodies, it becomes necessary to identify all pollution sources acting within each river basin and to determine relations between human pressures and resulting water quality status. It is evident that only proper understanding of cause – effect relation leads to an efficient management of water resources and allows controlling and predicting a water quality status.

In this context, implementation of the WFD requirements has raised a number of new challenging tasks in Lithuania. One of these tasks is pressures and impacts analysis which to a large extent constitutes the basis for programme of measures. The prime objective of the program of measures is to organize the control and management of all pollution sources in such a way that good ecological status of all water bodies would be achieved. Due to its complex nature, assessment of relations between pollution loads and their impacts on surface water quality has revealed to be difficult and ambitious task, which requires an application of sophisticated and innovative techniques. Hence, decision makers turned to mathematical models to aid in the efficient pollution control and evaluation of impacts associated with various alternative pollution management strategies.

To facilitate proper management of point and non-point pollution sources and preparation of program of measures, the MIKE BASIN model (*DHI, Denmark*) has been set up at the national scale for 4 River Basin Districts (Nemunas, Venta, Lielupė, and Dauguva) in Lithuania. The model was aiming to answer the principle questions, namely, what the main water quality problems are, what factors influence river water quality, what the most important pollution sources in river basins are, how the cause is related to the effect, what regional water quality patterns are.

In order to set up and calibrate the model, all available pollution data has been collected and processed into the model. Pollution data mainly comprised the records of point pollution loads, numbers of non-sewered inhabitants, numbers of livestock, application of mineral fertilizers and numbers of sewered inhabitants living in the settlements without waste water treatment. This way, by setting up the water quality model, an inventory of all point and non-point pollution sources has been compiled at the national scale. It has to be mentioned that this was the first attempt to identify all point and non-point pollution sources acting in the country and quantify their loads. The analysis has revealed many data gaps and inconsistencies but nevertheless the pollution inventory provided a clear picture about distribution and apportionment of pollution sources and constituted a substantial basis for water quality modelling.

After the MIKE BASIN model was calibrated, time series of pollutant concentrations including BOD, ammonia, nitrates, and total phosphorus were estimated for all modelled river branches. Modelling results enabled to predict water quality status of the non-monitored rivers and to identify rivers which are at risk of not meeting set environmental quality objectives. By running model scenarios, contribution of different pollution sources has been quantified and the most important pollution sources have been identified in each delineated river sub-basin.

Thus, MIKE BASIN modelling results facilitated identification of surface water quality problems, promoted understanding on how different pollution sources affect river water quality status, and provided the basis for selection of appropriate pollution reduction measures. Relevant pollution

reduction measures were suggested after running a number of model scenarios and assuming different pollution reduction schemes. The proposed measures required to achieve good ecological status of all water bodies included construction of new waste water treatment plants (WWTPs), improvement of already existing WWTPs, and reduction of agricultural pollution loads.
It has to be concluded that application of mathematical modelling has largely supported sustainable management of water resources in Lithuania. Assuming the results of mathematical modelling, control and management of all pollution sources will be organized in future in such a way that good ecological status would not be deteriorated or would be achieved in all Lithuanian rivers.

IMPLEMENTATION OF THE EU DIRECTIVES IN LITHUANIA

Mindaugas Gudas, Environmental Protection Agency

The main concern of national water policy is implementation of the Water Framework Directive and other EU water directives. Although the main EU water directives are already transposed into the national legislation (Urban Waste Water Treatment, Dangerous Substances, Nitrates, Fish Water, Drinking Water, Bathing Water, Major Accidents (Seveso II) Directive, Environmental Impact Assessment Directive, Integrated Pollution Prevention and Control Directive, etc.), the implementation of the directives still require a lot of efforts on all levels. Expansion of monitoring programs, development of quality assurance systems, design of long- term quality objectives for waters, development of administrative structures for permitting and data collection are to be mentioned. The WFD requirement to apply river basin principal in water resources management will lead to reorganisation of administrative system and strengthening of co-operation in water management with the neighbouring countries.

Until 2005 Lithuania has set up a water management framework according to basin boundaries and performed natural and anthropogenic characterization of the country's river basins according to the current knowledge and available data. The river basin management plans are being drafted and will be ready by 2009.

The Water Law outlines the main components of integrated water resources management and the obligation to elaborate and implement river basin management plans. The Water Law also fully specifies the steps toward preparation of programs of measures and basin management plans to reach the objectives, which must balance environmental and economic-society needs in a sustainable manner. The environmental regulations outline in detail the content of basin management plan and possible measures. They also distribute responsibilities among environmental protection institutions. In addition, the Coordination boards of 4 river basin districts have been established, comprising the representatives from national and regional levels, from government and NGOs. The Boards will act as a platform of stakeholder involvement in decision making while preparing and implementing basin management plans.

It is foreseen that good status of all water bodies has to be reached by 2015. For this purpose the programme of measures consisting of basic measures and supplementary measures has to be prepared and implemented. The draft management plan and programme of measures of the largest - Nemunas river basin district have been prepared and is updated at the moment. Plans for other three river basin districts are in the process of preparation.

For planning purposes existing environmental data and data on human activities have been collected from all possible sources in Lithuania. The data is used for: preparation of typology of water bodies, establishment of reference conditions and the development of water status classification system,

pressures and impacts analysis, economic analysis of water uses, identification of water bodies at risk, designation of artificial and heavily modified water bodies and economical justification for the designation, stakeholders involvement in watershed management in Lithuania, adjustment of state monitoring program, etc.

Lithuania has carried out an assessment of sensitivity of receiving waters according to the Article 5 and has made a decision for the purposes of the Urban Waste Water Treatment Directive to declare the whole national territory as sensitive. Therefore requirements for additional treatment (removal of phosphorus and nitrogen) of urban waste water will be applied for 38 agglomerations above 10 000 person equivalents. Before 2009 sewerage collection systems and appropriate treatment will be installed in 84 agglomerations larger than 2 000 person equivalents. When planning the use of the EU structural assistance for 2007–2013, the Ministry of Environment has selected 116 settlements with less than 2000 person equivalents which require immediate solution of watewater treatment problems.

Several important environmental measures in agriculture have already been implemented. Construction of manure storages in all farms having more than 10 animal units is required by legislation.

Programme for protection of Curonian Lagoon and Action Plan for reduction of pollution of the Baltic Sea have been adopted by the Government and are being implemented.

Part of Lithuania's obligations related to the implementation of the WFD is to conduct public consultations during the process of planning for the River Basin Districts and implementation of the plans. For this purpose awareness raising, education and training of society is performed. Governmental and non-governmental organizations need to increase capacity, improve theoretical and practical skills and experience required for implementation of the River Basin Management and approach in practice.

Since independence, water management has been a top priority in an environmental area. The importance of water sector was indicated in all environmental protection programmes developed during the last 17 years. But despite many efforts to improve water management, problems in water sector are still among the main environmental concerns in the country. Nevertheless Lithuania is making firm steps towards implementation of river basin management principles.