

DRINKING WATER AND SANITATION IN BULGARIA: CHALLENGES AND PERSPECTIVES

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BULGARIA

ABSTRACT: ALBEIT MORE THAN 98% OF BULGARIANS HAVE ENTRY TO RUNNING WATER, THE SAME ACHIEVEMENT CAN'T BE SAID FOR THE NATIONAL SEWAGE SYSTEM, WITH JUST 3.2% OF TOWNS ASSOCIATED WITH A SEWAGE FACILITIES. JOINING THE EU IN 2007 IMPLIED STRICTER GUIDELINES AND REGULATIONS WERE FORCED ON BULGARIA. ASSETS ARE NEEDED TO BE SELECTED FOR THE FOUNDATION, CHANGE, EXTENSION AND SUBSTITUTION OF ITS SEWER, WATER SUPPLY AND WATER/WASTEWATER TREATMENT SYSTEMS. WHILE THE WATER SECTOR IS FUNDAMENTALLY STATE-POSSESSED, THE BULGARIA GOVERNMENT ALREADY PERMITTED PRIVATE SUPPORT DUE TO THE ENACTED LEGISLATIVE CHANGES. POSITIVE FORECASTS SUGGEST THAT APART FROM PRIVATE INVESTMENT, FURTHER EU FUNDING WILL BE AVAILABLE FOR DRINKING WATER PROJECTS IN THE COMING YEARS AND NUMBERS OF MEASURES FOR SUSTAINABLE UTILIZATION OF NATURAL WATER SOURCES WILL BE UNDERTAKEN.

ABSTRACT: WATER SUPPLY & SANITATION (WSS), REGULATORY FRAMEWORK, BULGARIA

1. Introduction on drinking water systems in Bulgaria

Bulgaria joined the EU on January 1st, 2007. In the pre-accession period the country harmonized its legislation with EC directives and started strictly to implement Water Framework Directive (WFD) ^[1, 2] in respect to the main objectives of environment protection, ensuring drinking water supply and other uses, applying environmental standards and regulations. Until 2008, the economic development of the country was marked by sustainable growth, increased investment, high employment, and real income increase. However, towards the end of 2008, the global financial crisis took a heavy toll on Bulgarian economy. In 2009, Gross Domestic Product (GDP) fell by 5.5 percent. A slow economic recovery has lately started, driven mainly by export. In 2011 GDP increased by 1.7 percent and approximately 1 percent in 2012. During the period 2014–2020, GDP is expected to grow by an average of 3.4 percent in real terms and the average increase of the Bulgarian economy will follow the traits

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of the EU ^[3]. Nevertheless, there are big differences between Bulgarian regions. The Southwest planning region has the best economic indicators, while the Northwest and North-central are the two poorest planning regions (NUTS2) in Europe.

Thus, careful determination of the population extent agglomerations is strongly necessary in order to reduce the risk of overinvestment in wastewater infrastructure. The population and economic activity in agglomerations greater than 2,000 person equivalents (PE) determine the wastewater infrastructure investment needs. As of the end of 2011, 75 % (about 5.5 million people) of the population of Bulgaria lived in agglomerations greater than 2,000 PE. Based on estimated trends, the future economic activity and population in these agglomerations will decrease. While the legal requirement to provide wastewater collection and treatment to these agglomerations is clear, the Water Supply & Sanitation (WSS) strategy recommends specific measures to reduce the risk of overinvestment ^[2, 3].

Funds were allocated for the creation, development, growth and replacement of its sewer, water supply and water/wastewater treatment amenities (Fig. 1). The water resources used by sectors with special attention on household's consumption as well as the measures needed for overcoming of water shortages and distribution of drinking water with good quality are of special attention of the government. A health risk impact of residual aluminum in drinking water and alternative investigations for minimizing its coagulants in it is discussed.

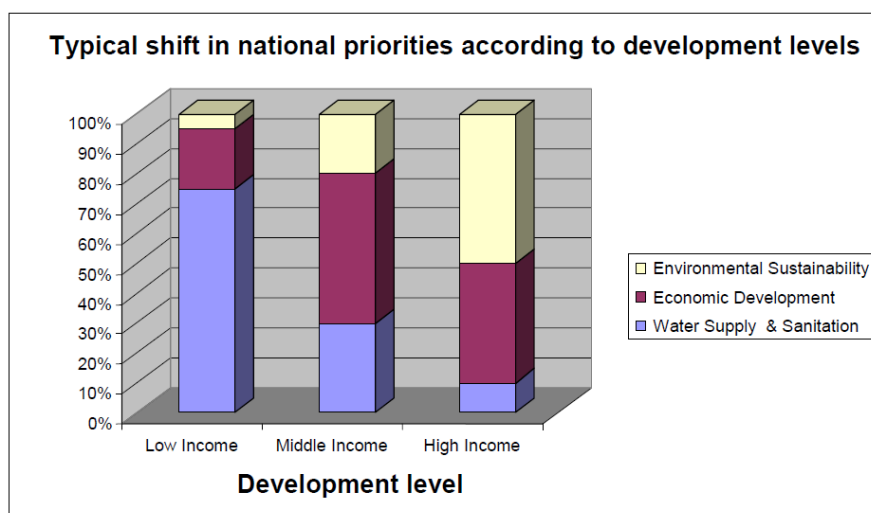


Fig. 1. *Development of WSS sector*

Recently, the Bulgarian government allows besides primary state-owned water sector, a private participation to take place due to recently enacted legislative changes. The challenges, which the country faces due to the fact that Bulgaria has one of the poorest records of water resources availability, compared with other EU countries. The water supply infrastructure is relatively well developed and the majority of the population (98.4%) possesses access to running water, but the sewage network and the urban treatment plants are not enough. Approximately, 95% of the towns have a sewer network but only 3.2% of the villages have access to the sewerage system ^[3].

In addition, a lot of already working wastewater treatment plants (WWTPs) do not meet the minimum standards under EU directives ^[2]. The National Program for Priority

Construction of Urban Waste Water Treatment Plants and the Implementation Program of Directive 91/271/EEC stipulate that Bulgaria is obliged to build more than 400 WWTPs for populated areas of above 2000 PE by 2014^[2, 3]. The deadline will be extended as a result of program delays.

Funding for the water sector will be provided through EU post-accession instruments. Priority will be provided to construction of WWTP and sewerage networks of areas of more than 10,000 PE. Currently, the national budget is very limited for developing water infrastructure projects. Water losses remain a major problem, and vary between 40% - 79% of supply, with an average of 59.5%. These data indicate that Bulgaria need to purchase devices and appliances for leakage detection, reconstruction of the distribution water supply network and water supply system connections to diminish of water losses.

Notwithstanding the high level of water losses in Bulgaria, the water quality is relatively good due to the use of disinfection for all drinking water in the country^[4, 5].

According to the Ministry of Environment and Water, there is a tendency toward growing water consumption, which will lead to water deficits in the near future. There is an average of 2,400 m³ of water resources per capita annually^[3].

Some of the main polluters of surface water include domestic water from the urban sewerage system in the big settlements and industrial wastewater, which is discharged untreated into the rivers. Nitrates are the basic pollutants of underground water in all river basins^[6, 7].

According to the national strategies for the development of the water sector, there is a need to construct 120 drinking water treatment plants^[2]. The data has shown that 18 from Bulgaria's 28 districts have low standard drinking water, according to an analysis of the country's water resources demanded by the Ministry of Environment and Water. Since Bulgaria's accession to the EU in 2007, prohibitions have been issued for four drinking water sources (Merichleri, Tatarevo and Poibrene), according to data of the Health Ministry. Water quality is worst in the southern district of Pazardzhik, where the 5% norm for deviations from the standard recommended by the World Health Organization (WHO) has been exceeded over two-fold, according to reports of mass-circulation 24 hours daily^[5].

2. Water Resources in Bulgaria

The important issues are River Basin Management Plans. They provide key linkages between the drinking water sector and the larger one, including measures giving opportunity for good water quality in surface and groundwater. In relation to the drinking water sector, the emphasis is on the construction of wastewater collection and wastewater treatment plants following the Bulgarian and EU legislation. These river basin management plans integrate efficiency and cost-recovery measures to decrease water losses in the water supply networks, increase water metering, and introduce volumetric pricing. This drinking water strategy is consistent with the existing river basin management plans.

Currently the data for Bulgaria show that there is a low water stress. The projected total domestic water consumption of 3,340 million cubic meters in 2035 (excluding hydro-energy and nuclear power plants) is much less than the multi-year average internal water resource of 18,547 million cubic meters (excluding the Danube River) for the period 1974–2008^[7]. Prior to 1990, Bulgaria was considered to be close to the threshold of a water-scarce country. Since then, abstractions have fallen drastically for both agricultural and industrial purposes, and today Bulgaria overall is non-stressed. Nevertheless, there are some areas in Bulgaria where

water scarcity exists, especially during dry summers. The most vulnerable areas with rainfall below 300 millimeters are: Vidin to Lom and Montana, Pavlikeni, and Sofia in the Danube region; Shabla and Varna in the Black Sea region; Sliven, Plovdiv, Sadovo, Pazardzhik, and Panagyurishte in the East Aegean Sea region; and Blagoevgrad, Sandanski, and Kyustendil in the West Aegean Sea region.

These peculiarities are due to the climate change in Southeastern Europe. Climate changes devoted scenarios were prescribed for the period up to 2035. They concern the National Strategy for Management and Development of the Water Sector for the changes in precipitation and water availability. The average temperature is expected to increase by 1.8 to 2.1°C with a particular decrease in the number of frost days. Precipitation and run-off will decrease only slightly, while the intensity and variability of rainfall and the intervals between wet days will increase, and heat waves will become more frequent. As a result, the risk of flooding will increase, as well as the risk of seasonal water scarcity in selected areas.

In response to these climate risks, this water supply strategy needs flexibility. It includes connection of the currently isolated water supplies, as well as a review of the construction standards for buildings and for water supply system.

3. *Bulgarian National Water Strategy*

The National Strategy and Action Plan for Water Sector Management and Development were approved by the Parliament in November, 2012^[2, 3]. They outline the overall vision for the water sector, including water resources management, hydropower, flood protection, irrigation, and water supply and sanitation. This defines a more active role of the public authorities in developing and managing the sector. It also specifies the responsibilities of the various institutions in the preparation and implementation of the sub-sector strategies and plans^[3].

The Water Strategy objectives are as follows:

Objective 1. Guaranteed water supply to the population and business under climate change conditions leading to drought;

Objective 2. Protecting and improving the status of surface and ground water;

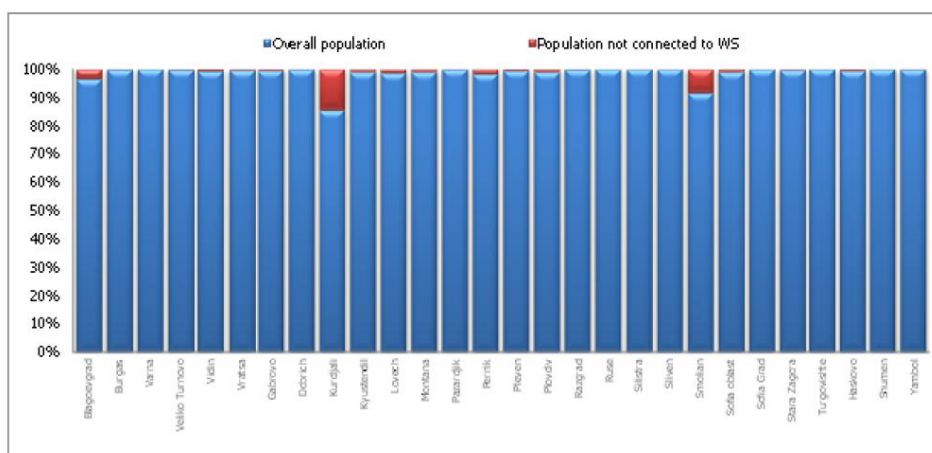
Objective 3. Improving the efficiency of integrated management of the water as an economic resource;

Objective 4. Decreasing the risk of and damage from floods.

This document defines the responsibility of the Ministry of Regional Development (MRD) in elaboration and implementation of a Strategy for Development and Management of Water Supply and Sanitation Sector as stipulated in the Water Act. The present WSS strategy is consistent with the National Strategy and Action Plan for Water Sector Management and Development.

4. *The Water Supply & Sanitation (WSS) sector*

WSS service in Bulgaria was covered by 28 regional utilities or water supply and sanitation companies (WSSC) and one municipal WSSC (Sofia) until 1989 year. The number of these companies correlated to the country's subdivision into 28 administrative districts (Fig. 2). All WSSCs were state-owned, with the exception of the Sofia WSSC which belonged to the municipality.



Source: Analysis prepared by the World Bank for the development of the Strategy.

Fig. 2. Water supply in Bulgaria by district

((“Strategy for Development and Management of the Water Supply and Sanitation Sector in the Republic of Bulgaria 2014 – 2023”, Ministry of Regional Development^[31])

In 1990s, a general economic restructuring and decentralization took place and some of the water companies were split; they were transformed into jointly-owned by the state and by municipalities companies. This period is characterized with significant increase in the number of WSSCs. Some companies remained 100 percent state-owned, while others (usually the smaller ones serving one municipality) were wholly transferred to the municipalities. This resulted in inconsistencies of the ownership of regional water storage and transmission infrastructure.

The WSS services in the capital Sofia were improved through creation of the “Sofiyska Voda” concession in 1999. Since 2010, it is jointly owned by Veolia Water and Sofia municipality and in this way the water supply and sanitation fixed assets are public municipal property.

Meanwhile, joint water and energy regulator (State Energy and Water Regulatory Commission–SEWRC) was established in 2005. Then, it was planned all WSSCs to submit and implement approved business plans as a prerequisite to continue their operation. The Water and Sanitation Services Regulation Act is the basis for the regulation of WSSCs and at this time 66 WSSCs provide necessary services to customers. In total, 65 companies have submitted business plans for the current period (2009–2013). In fact the WSS sector in Bulgaria is complex in respect to asset ownership and management (Fig. 3). The latest changes in the Water Act concerning the WSS sector (in force as of September 24th, 2009) threat these issues. They mandated the transfer of management rights from the state and the municipalities to the Water Supply and Sanitation Associations (WSSAs). These associations are responsible for contracting public, public–private or private water operators under the Water or Concession Acts. The beginning of this activity is a creation of a fixed assets inventory currently operated by the existing WSSCs. In November, 2013 amendments to the Water Act were adopted marking the beginning of transfer in ownership of WSS infrastructure.

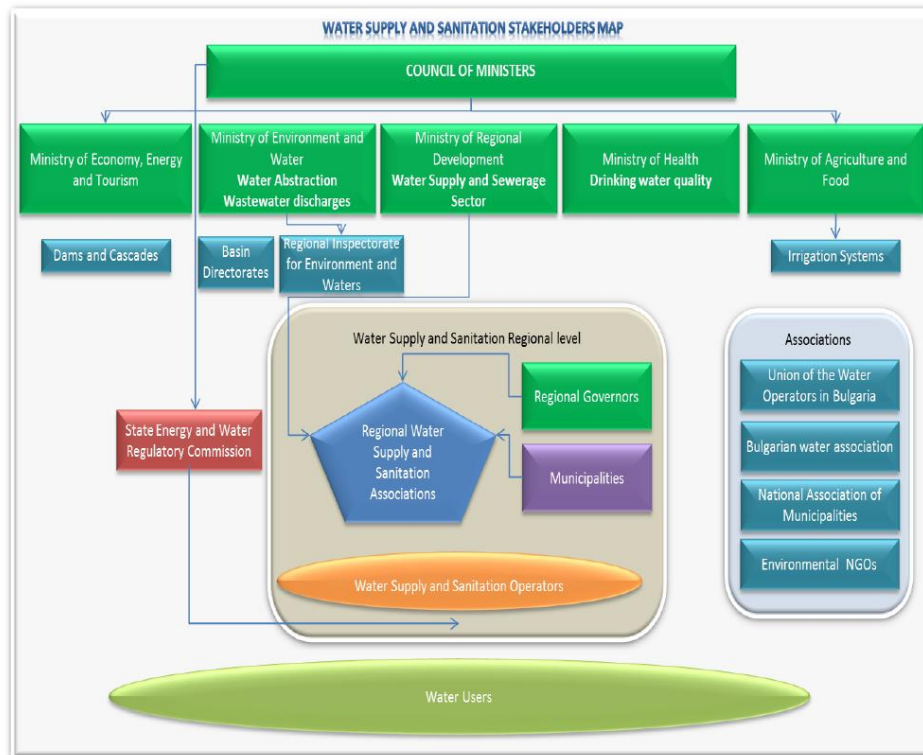


Fig. 3. Key WSS sector stakeholders in Bulgaria

(“Strategy for Development and Management of the Water Supply and Sanitation Sector in the Republic of Bulgaria 2014 – 2023”, Ministry of Regional Development ^[21])

According to the proposed amendments to the Water Act, there should be one WSSA per administrative region and one water supply and sanitation company (WSSC) per WSSA. Such consolidation would have followed if the Parliament had amended the Water Act as proposed by the government in 2012. Without these amendments, consolidation must be voluntary.

5. EU and National Legislation, Regulatory Issues

5.1. European legislation

As a member state of the European Union and as part of its Accession Treaty, Bulgaria has committed to certain obligations regarding the EU legislation and reaching compliance within the national one ^[8, 9]. The process of harmonization is already performed and all European directives concerning water and wastewater are fully implemented into national legislation (Fig. 4). Bulgaria is obliged to ensure that wastewater is collected and the necessary treatment is performed, before their discharge into water bodies, by December 31th, 2010 for all agglomerations with over 10,000 PE, and by December 31th, 2014 for all agglomerations with 2,000 to 10,000 PE ^[10].

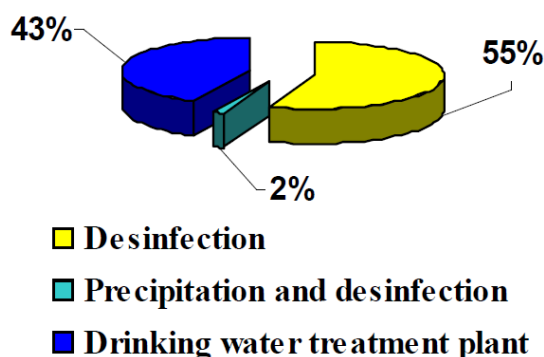


Fig. 4. Treatment of drinking water in Bulgaria

The key issues concerning water supply and sanitation management and legal regulation are not addressed by the EU legislation and are an object of the national legislation. They concern the types and management models of the water supply operators, the methods and instruments to regulate water service tariffs and the ownership of these systems and facilities.

5.2. National legislation

The Water Act (WA) ^[11] is the principal part of Bulgarian general legal framework, which regulates the ownership and management of water as a national natural resource as well as the ownership of water development systems and facilities. A comprehensive system of secondary legislation has been developed on the basis of the WA to ensure its implementation. The WA also regulates the management, planning, and construction of water and sewerage systems. It also governs provision of water supply and sewerage services, as well as registration of Water Supply and Sewerage Associations (WSSAs) and Water Supply and Sewerage Companies (WSSCs).

The WA regulates the right of the state, municipalities, and natural persons to possess waters, water bodies, and water development systems and facilities. The basic principle in the act is the type of the property of that water-supply and sewerage systems serving public needs and it can be a state, public, or municipal public one. In this respect a clear distinction is made between state and municipal ownership, based on the principle that systems operating in the territory of only one municipality and meeting its own needs is a public municipal property. Water and sewerage systems, or parts, servicing more than one municipality constitute state public property. Exceptions are only provided for water and sewerage systems financed and built with EU funds.

In 2009, the WA was amended to define principles for management, planning, and development of WSS services and systems as follows:

- Provisional division of the country into “designated territories” and definition of the process for designating and amending their boundaries;
- Establishment of WSSAs with the role of a union of the owners of the WSS systems;
- Assignment of responsibilities for planning and management of the WSS systems, rendering of water and sewerage services, and transferring the management of assets to the WSSAs;

- Assignment to the WSSAs of the right to contract water operators that will own private assets (e.g. offices, equipment, etc.), operate public assets, and provide services (through concession or direct award contract between the utility and the WSSA);
- Preparation of Regional Master Plans as the main tool for planning the development of the WSS systems.

5.3. Regulation of the Water Supply & Sanitation Sector

The said objective of the mentioned above Water Act is to establish an integrated water resources management in community interest and protection of public health. The main goal is provision of sufficient quantity of surface and ground water of good quality for sustainable, balanced and reasonable water uses (*Ministry of Environment and Water, 2008*). A Regulation No. 12 of 18 June 2002 on the requirements for quality and safety of surface water intended for drinking purposes and household supply (*Prom. SG 63/28.06.2002*) corresponds to the Directive 75/440/EEC ^[12]. It threatens the quality requirements of surface water intended for the abstraction of drinking water, amended by Directive 79/869/EEC ^[13]. The directive listed the methods of measurement and frequencies of sampling and analysis of this type of water (*Ministry of Environment and Water, 2008*). The Regulation No. 12 concerns all surface water resources designed for human consumption and supplied by distribution networks for public use. In accordance to this Regulation surface water is divided in three categories (A1, A2 and A3), corresponding to the standard methods of treatment as follows:

- **Category A1:** simple physical treatment and disinfection, e.g. rapid filtration and disinfection,
- **Category A2:** normal physical treatment, chemical treatment and disinfection, e.g. pre-chlorination, coagulation, flocculation, decantation, filtration, disinfection (final chlorination),
- **Category A3:** intensive physical and chemical treatment, extended treatment and disinfection, e.g. chlorination to break-point, coagulation, flocculation, decantation, filtration, adsorption (activated carbon), disinfection (ozone, final chlorination).

The companies working in water supply & sewerage sector have to construct the relevant utilities in order to be able to apply the appropriate methods of surface water treatment in accordance to Regulation No. 12 by 1 January, 2007. Regulation No. 9 of 16 March, 2001 on the quality of water intended for human consumption (*Prom. SG 30/28.03.2001*) is harmonized with Directive 98/83/EC ^[14] (*Ministry of Environment and Water, 2008*). The objective of this Regulation is to protect human health from the adverse effects of any contamination of drinking water through the introduction and provision of requirements to water quality and safety. Because of the on-going processes in the WSS sector the government is considering to extend the current regulatory period by two years. In this case the next regulatory period would cover 2016 – 2020. The Regional Master Plans (RMP) are approved by MRD by the end of 2013; the WSS assets change of ownership process should be completed by mid-2015 and WSSAs should select and sign up with WSSC by the end of 2015. This would be consistent with the approval of WSSC Business Plans by SEWRC for the next regulatory period covering 2016 – 2020.

The strategy includes specific objectives that are relevant to achieve a compliant WSS sector that remains financially, technically and environmentally viable:

- Coverage of piped water supply remains at 99 percent of the population;
- Seasonal water rationing is experienced by less than 2 percent of the population;

- WSSCs are technically capable of meeting future WSS service requirements;
- Financing is available for WSS system renewal and replacement;
- Required operational expenditures can be fully financed by revenues for all WSSCs;
- Efficient use of natural resources is in line with Bulgarian and EU policies;
- Established sustainable technologies mechanisms in the design, construction and operation of WSS systems and facilities.

6. Future Trends and Goals

Some of the challenges in the water sector have been delays in the design and construction of the sewerage networks and WWTPs, lack of sufficient data for the design phase of the projects, financing of non-priority projects, partial financing of the projects and non-existing funding for drinking water projects in 2010.

The Ministry of Environment and Water - currently managing the funds under the EU Operational Program on Environment - is trying to move forward with a number of priority projects for Bulgaria. The European Union has granted trust to the current government, which has been in power for one year and the Bulgarian Ministry of Environment and Water has already spent about 350 million euros of the EU funds for WWTP/sewerage networks projects.

The forthcoming private participation in the water utility companies will be innovative for the sector as well. Despite pressing infrastructure challenges, that are common to other Eastern European countries, the future looks bright. Positive forecasts suggest that further funding will be available for drinking water projects in the coming years. The following measures are intended:

1. The pollution level of the ground, surface and coastal waters will be monitored, pollution level will be reduced to minimum, and further pollution will be prevented through:
 - establishment of a monitoring network for national water sources regarding ground, surface and coastal waters;
 - informing the public about water pollution.
2. Sewage systems and treatment plants will be installed according to the By-law on Urban Waste Water Treatment.
3. The pollution sourced by agricultural nitrate in the water and the soil will be monitored, minimized and prevented.
4. Sustainable utilization from natural water sources and water ecosystems will be ensured.
5. Drinking water will be provided to be reached by more people in sanitary conditions.
6. Pollution arising from the discharge of dangerous substances in waters will be determined, prevented and gradually reduced.
7. Bathing waters and the waters utilized for recreational purposes will be prevented to be polluted by any types of pollutants - mainly by microbiological pollutants - and the pollution on these areas will be monitored, controlled and reported.
8. Treatment and controlled usage in the soil and final disposal of the sludge from treatment plants through appropriate technologies will be provided.

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