Parceria Portuguesa para a Água

UNECE

THE THIRD SERBIAN ENVIRONMENTAL PERFORMMANCE REVIEW
Chapter 7. Water Management

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O Setor da Água em Economias Emergentes Euroasiáticas: Geórgia, Montenegro, Tajiquistão e Sérvia

Lisboa, LNEC 27 janeiro 2016

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Water supply and demand – Water recourses

- International rivers (Danube, Sava, Tisa and other small transboundary rivers) account for 90% of all surface water resources, that amount to some 162 million m3/ year;
- Serbia's groundwater resources are considerable and play an important role in water use;
- Groundwater resources come from different types of aquifers:
  - Alluvial resources (56%);
  - Karstic groundwater (18.1%);
  - Deep aquifers of Vojvodina (17%),
  - Neogene aquifers (about 8.8%), being negligible the discharge rates of fractured aquifers.

Water supply and demand – Drinking Water

Abstracted Drinking Water Supply in Republic of Serbia (2007-2013)

Year	Total (thous. m^3)	groundwater and springs (thous. m3)	Watercourses (thous. m3)	Reservoirs and lakes (thous. m3)
2007	691 839	499 048	135 743	57 048
2010	666 904	480 728	134 875	51 301
2013	657 720	440 672	157 853	59 195

- The amount of water abstraction for drinking water supply from the main sources remains without significant changes since 2007, what is not surprising because the Serbian population, 7.2 million, has a negative growth rate in this period

- Water consumption for domestic purposes is similar in Serbia than in other European countries, and the average daily consumption in 2012 was 143 l/capita

Water supply and demand - Industry

- Total water used in industry, not including hydropower plants, has amounted in 2013 to 3 344 592 thousand m3. Water resources abstracted are mainly from surface water, consisting in self - water supply catchments.
- Industry represents 31.8% of GDP, agriculture 7.9% and services 60.3%
- In 2012, about 54.76% wastewaters from the industry are discharged to rivers, 19.4 % are discharged to the public sewers system, 18.45% to the canal, 3.57% lakes and lagoons.

Wastewater discharged from industry, 2007-2012, thousand m3

	2007	2009	2012
Discharged water from industry	3 047 030	3 134 243	3 158 231
Discharged processing waste water	96 027	102 023	115 954
Discharged cooling water	2 951 003	3 032 220	3 042 277

Water supply and demand - Agriculture

- From the 5.05 million hectares of land used in agriculture in 2011, 1.75 million are protected against floods, which represent 34.6% of total agricultural land.
- To address the drainage problems some 1.98 million ha nationwide have been provided with drainage facilities.

Abstracted water for irrigation, 2009-2013

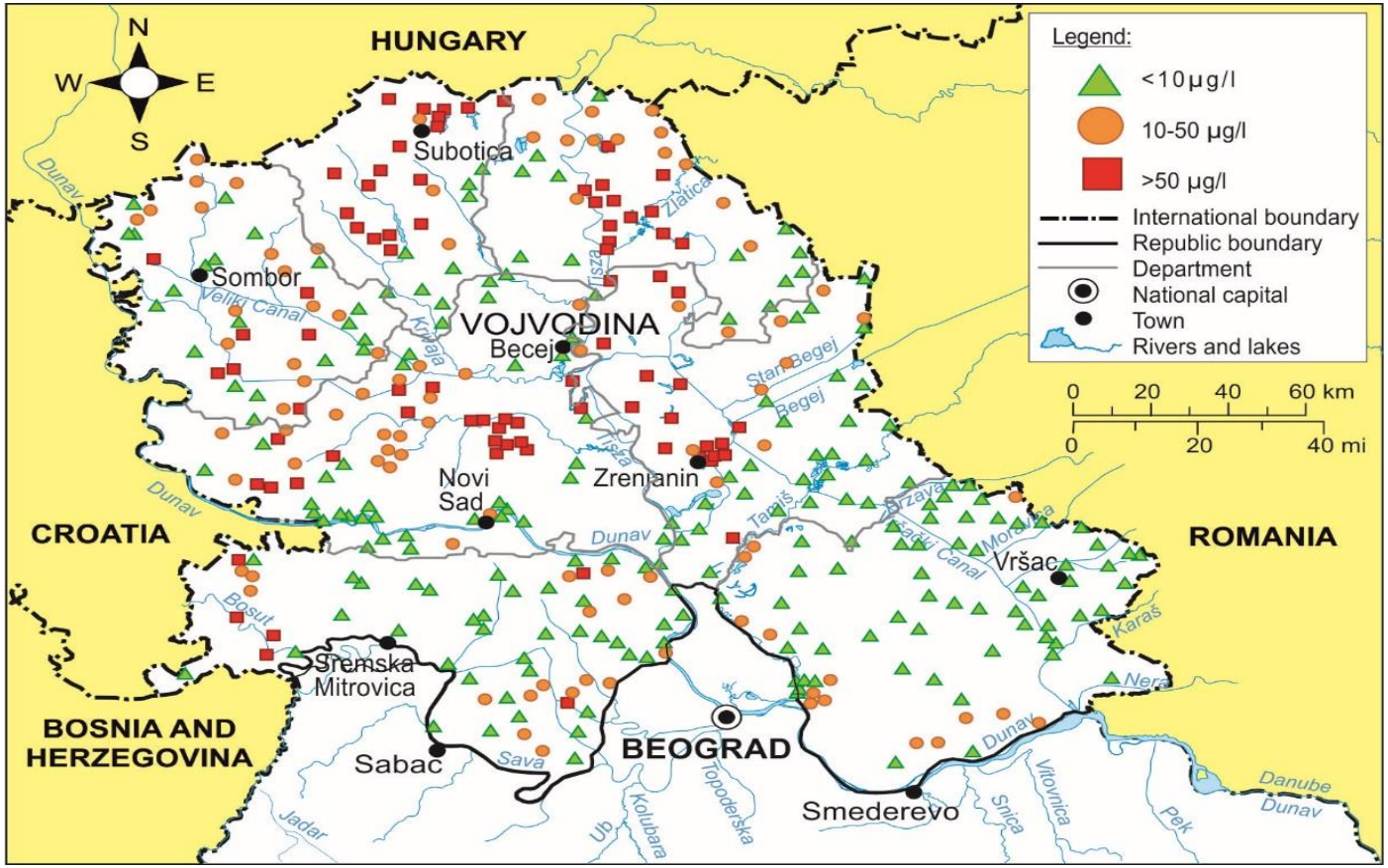
Year	Total (thous. m3)	groundwater and springs (thous. m3)	Watercourses (thous. m3)	Reservoirs and lakes and others (thous. m3)
2009	43 477	1 280	38 602	2 660
2011	66 092	1 400	61 168	835
2013	88 130	4 536	80 026	3 568

Water resources quality, control and monitoring - Rivers

- River water quality is relatively good in Serbia, particularly that of the Danube, Sava and Tisza, result of measures undertaken in upstream countries, and strong reduced industrial activity in both Serbia and the Balkan region.
- The self-purification capacity of Serbia is significant, testified by the evolution of basic parameters of the Danube (BOD5) in the period 1971-2013:
  - point of entry (Bezdan) – BOD5, g/m3 - 5.5 (1971); 2.3 (2013)
  - point of exit (Radjevac) – BOD5, g/m3 -2.5 (1971); 2.3 (2013)
- The situation with regard to national rivers is often worst, above all that of Velika Morava, and especially of small rivers whose riverbanks are occupied by large urban centers.
- The Danube-Tisa-Danube canal and secondary irrigation and transport canal are also very much polluted in Vojvodina due to discharges of untreated industrial and municipal wastewaters and run-off waters from agriculture.

Water resources quality, control and monitoring - Groundwater

- Arsenic high contents found in groundwater resources in Vojvodina place a serious threat to guarantee appropriate quality on drinking water

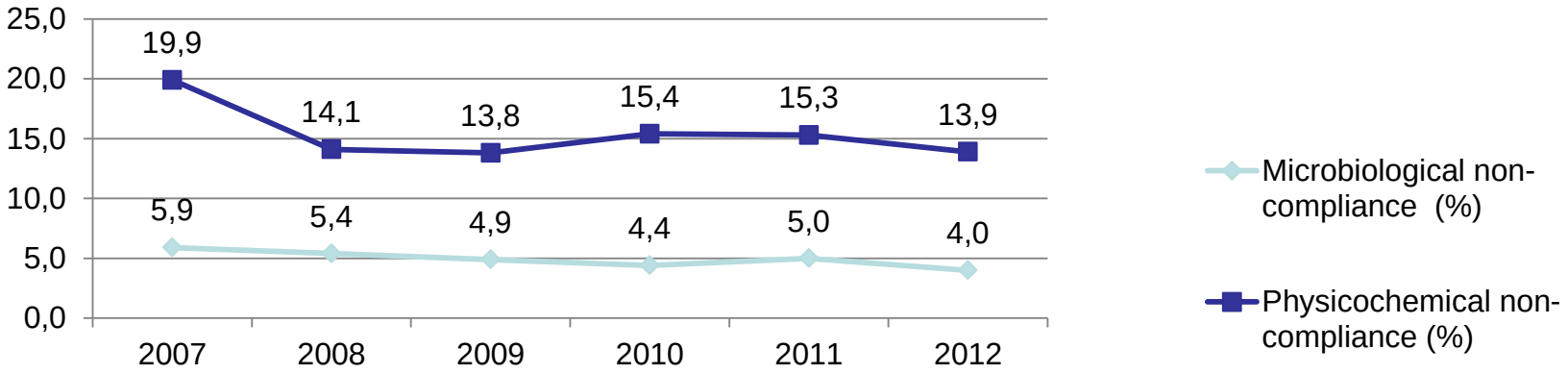


Water resources quality, control and monitoring – Drinking water

- At national level monitoring of drinking water quality is conducted by the network of 24 institutes of public health under the Ministry of Health;
- In Serbia drinking water is considered as a food;
- There are on average 154 water supply systems in urban area and 2,198 water supply systems in rural areas, in which monitoring of drinking water quality are conducted on a regular basis both by health institutes and operators;
- From 2007 to 2012 drinking water from on average 4600 individual water supply facilities (public standpipes, schools, health centers, facilities for food production and restaurants with their own water sources) were analyzed.

Water resources quality, control and monitoring – Drinking water

- In the period 2007-2013, approximately 60 000 drinking water samples each year were analyzed for physical, chemical and microbiological quality parameters in urban areas. The average microbiological and chemical non-compliance were 4.9% and 15.4% respectively.



- The most common parameters of physical and chemical non-compliance are turbidity, color, iron, manganese, ammonia, nitrates, nitrites, arsenic (Vojvodina) and organic matter.
- The most common causes of microbiological non-compliance were number of total colony count, total coliform bacteria and presence of fecal coliform bacteria.

Water resources quality, control and monitoring – Drinking water

- In the period 2007-2012, approximately 18800 drinking water samples were analyzed each year for physical, chemical and microbiological quality parameters in rural areas;
- Average microbiological and chemical non-compliance of drinking water from water supply systems in rural area were 22.9% (ranged from 21.4% to 25.1%) and 50.5% (ranged from 44.8% to 53.7%), respectively. The most common parameters of physical, chemical and microbiological non-compliance are similar to the urban systems;
- Drinking water quality of Belgrade's public water systems is evaluated in 300 points of the network by the Belgrade's Public Company and by the Institute of Health, in a total amount of 10 000 analyses a year.
- The results show that in 2013, 0.5% of the samples did not meet physical, chemical and biological requirements, better than in 2005.

Water services

- There are on average 154 water supply systems in urban areas and 2 198 water supply systems in rural areas in Serbia.
- In 2012, the raw water for drinking purposes comes from ground (69%) and surface (31%) waters.

Public water supply systems, 2007 – 2012

	Population connected (%)	Number of households connected to public water supply systems
2007	78.25	1 957 993
2009	84.71	2 067 260
2012	88.60	2 044 583

- Average water losses in Serbia are approximately 35% of total distributed water, being 38% the Non-Revenue Water (NRW).
- Water losses in Belgrade reach 25 % of total distributed water, but it is necessary to consider more 10 % of unbilled water, what represents a NRW of 35%.

Wastewater services

- Of the 310 million m3 of wastewater discharged in 2012, 71% was from households, 16% from industry and 13% from other sectors.

Public Sewage Systems evolution between 2007 and 2012

	Population connected to public sewage systems, %	Population connected to public sewage systems, with UWWTP, %	Number of households connected to public sewage systems
2007	48.64	8.54	1 217 070
2009	54.07	10.00	1 319 097
2012	59.24	11.12	1 466 334

- There are 2 252 016 inhabitants in the rural areas and 593 813 inhabitants in the urban areas using septic tank to treat wastewater.
- In 2013, total length of the sewage network is 12608 km, 23 WWTP are functioning, 9 not functioning and 18 under construction or reconstruction.
- 77% of the treated domestic sewage has secondary treatment, 11% primary treatment and 12% tertiary treatment.

River basin management – Danube river basin

- Large international rivers (Danube, Sava and Tisa) and small transboundary rivers account for 90 % of all surface water resources that amount to some 162 billion m3/year
- The Danube River is the 24th largest river in the world and the 2nd largest in Europe.
- The Danube River flows through Serbia for 588 km and is joined by three major tributaries: Tisa, Sava and Velika Morava rivers, and some minor tributaries.

River basin management – River basin

River basin management - multilateral and bilateral cooperation

- Serbia is a member of the ICPDR – International Commission for Protection of the Danube River
- ICPDR has implemented the DRBM – the Danube River Basin Management 2009/2015, involving 14 countries in cooperation, giving a detailed strategic vision and an integrated program of measures for the 25117 km of the river network;
- Bilateral agreements were also established with some countries in the basin, namely Albany, Bulgaria, Hungary and Romania and also a Framework Agreement to Pollution Prevention of the river Sava;

River basin management – May 2014 floods

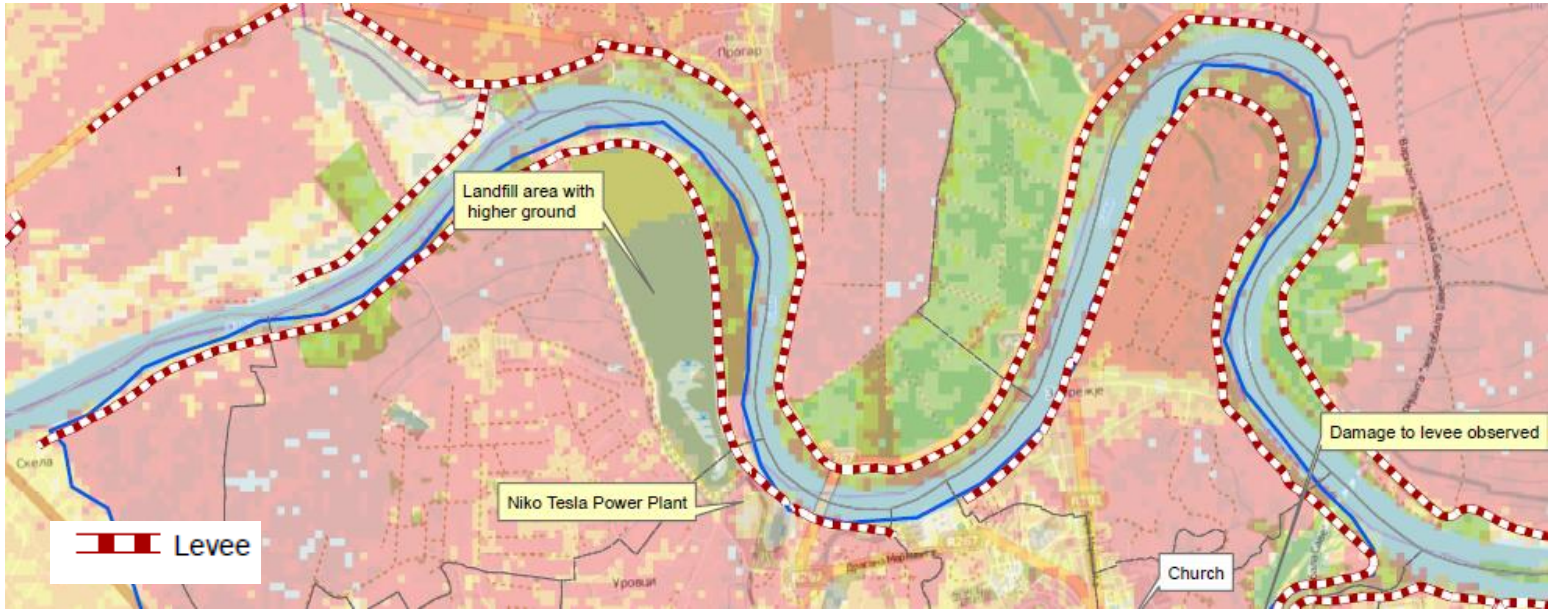
- A recent severe storm event has strongly hit the Balkans region, affecting Serbia, manly in area of river Sava.
- In about a four day time started on 13th May 2014, a record high rainfall has occurred, more than 200 mm of rainfall has been recorded in a week time, equivalent to the average of rainfall in three months.
- As a result of the flooding, 34 persons dead and over of 30 000 were evacuated from their homes.

May 2014 Floods - Most affected areas in the Balkans region

River basin management – Flood Protection

- Serbia has a General Plan for Flood Protection for the period 2012-2018 and adopts annual operational plans for flood protection.
- Total length of embankments is 3446 km and to address the drainage problems there are 249 pumping stations and 5336 km of drainage canals, nevertheless a large portion of the territory remains potentially threatened by floods.

The Obrenovac city with the representation of the existing embankments



Water policy and reforms

Legal Framework

- **Serbia still lacks an appropriate framework on water sector** to achieve a sustainable approach to water and wastewater management policies such they are regulated by the WFD.

- No programme for **"efficient use of water"** has been implemented neither innovative solution in a national scale. However, long term directions will be established by **Water Management Strategy** expected to have been **adopted in 2014**;

- According to transposition and approximation strategy, estimates suggest that **9-10 billion € will be needed** to meet the requirements to the EU water-related directives;

- Most relevant strategic legislation adopted in the first decade with regard to water management includes **Law of Environmental Protection (2009), Law on Waters (2010**) and **Law on Navigation and Ports on Inland Waterways (2010)**.

- **The Law of the Establishment of Specific Competencies of the Autonomous Province of Vojvodina, adopted in 2002**, also includes significant water related provisions for this territory.

Water policy and reforms

The Law of Waters

- **The Law on Waters** regulates legal status of waters, integrated water management, the management of water infrastructure and status of water land and financing of water sector activities;
- **Covers surface and groundwater**, including water supply, thermal and mineral waters and transboundary waters;
- There are **seven water districts** defined in accordance with both hydrological and administrative boundaries;
- **Defines planning documents to be adopted in the water sector**: the water management strategy; water management plans for the Danube River Basin and for each water district; annual water management programme; and plans which address protection against the adverse effects of water, including the flood risk management plan, the general flood defense plan, the operational flood defense action plan, as well as plan of protection from water pollution and the monitoring programme. Most of these are in the process of elaboration;
- **The fully integrated approach to water management planning is the core principle** behind the approval and adoption of the **Law on Waters 2010 – planned revision in 2014** – which should be added by the transposition of other important EU legislation related to water pollution prevention and flood risk management.

Water policy and reforms

By- Laws

- **More than 30 by-laws** have been adopted accordingly, but the harmonization process has not yet been completed;

- **Serbia still has to align with the directives that have been transposed into national legislation only to some extent** such as:

  - **the Nitrate Directive** (91/676/CEE),
  - **the Urban Wastewater Treatment Directive** (91/271/EC),
  - **the Flood Risk Directive** (2007/60/EC), almost fully transposed,
  - **the Industrial Emission Directive** (2010/75/EU).

- **These directives largely coincide with the needs of Serbia's water sector**, therefore the EU accession process requires that deadlines be set for their implementation for which a number of infrastructures projects need to be built.

Water policy and reforms

Policy framework: current situation, future reforms

- The major strategic document in the water sector, the **Master Plan of 2002 for 10 years**, which is still used, has started to be replaced by a national **Water Management Strategy for the development of water sector till 2030**, covering water resources management, water supply and wastewater services

- In practical terms **Serbia still faces substantial constraints in achieving compliance** with the key requirements of the investments related **to implement Directives for Urban Wastewater**, **Drinking Water and Nitrates**, concerning namely drinking water and wastewater:

  - **Poor infrastructure condition** due to neglected maintenance and inadequate reinvestment and insufficient coverage of rural settlements;
  - **Contamination of supplied water** as a result of source contamination and **high level of leakage and losses** due to poor network condition;
  - **Inadequate coverage of agglomerations with wastewater collection networks** and inadequate number of wastewater treatment plants, low levels of treatment at those plants that remain operational and as well large number of inoperative treatment plants.

Water policy and reforms

Policy framework: current situation, future reforms

- Meanwhile, the **Approximation Strategy for the Water Sector (2011**) subordinated to **NEAS – National Environmental Strategy -** is one important tool to push on the achievements of national targets in the context of accession of EU.

- **Proposing a set of measures to respond in the transition period of EU accession** to the concerns of the water sector in the fields of:
  - **integrated planning,**
  - **infrastructures and financial support**
  - and what must be done to **transpose and to implement the requirements for change at legal, institutional, practical financial and economic frameworks.**

- **The Water Management Programme for 2014,** already adopted, prescribes **how funds to be used for the improvement of regional water supply systems, pollution prevention, protection from harmful effects of water, preparation of planning documents, implementation of projects, and participation of Serbia in international cooperation on water.**

Economic sustainability

- Regarding investments the basic problem is the wide gap between financial demand and current investments in the water sector **(3-4 times less than needed**);
- The draft of **Water Management Strategy for 2030** includes preliminary estimates of funding needed by the water sector. In summary the capital investment challenge in water sector is estimated to be **€ 9.08 billion (2010 current prices):**

  - **€ 2.88 billion** for Water Use, including € 1.3 billion for Drinking Water;
  - **€ 5.4 billion** for Water Protection, including € 3.3 billion for Urban Wastewater Collection and Treatment;
  - **€ 0.8 billion** for Protection against the Adverse Effects of Water, namely Agricultural Pollution (Nitrates).

Conclusions and Recommendations

No significant progress in coverage of water supply, sewerage, wastewater treatment and water resources management has been made since the 2nd EPR.

According to official data, the situation can be considered acceptable only in drinking water supply.

Serbia lacks an efficient framework on the water sector to achieve an improvement in the long-term on water and wastewater management systems.

Conclusions and Recommendations

Most of the relevant measures to materialize, taking into account that water is the largest environmental subsector in terms of EU approximation costs, are :

- **Providing investments in new infrastructure and equipment and replacement of portions of existing assets;**
- **Extending coverage and care to all Serbian population;**
- **Promoting an integrated planning and implementation for water resources;**
- **Improving and preserving water quality;**
- **Ensure the economic and financial sustainability of water services companies.**

Conclusions and Recommendations

Recommendation 1 - The Government should:

- **Complete, adopt and implement** the long-term Water Management Strategy (2030) for the development of water sector;
- **Launch a program of investments** in projects and construction of new infrastructures and maintenance or replacement of deteriorated existing ones and other strategic assets, implementing in the meantime asset management procedures;
- **Attract and collect adequate financing resources** from various sources to allocate to the long term water strategic objectives;
- **Adopt the necessary subsidiary legislation to the Law of Waters,** namely Water EU Directives and other EU legislation to accomplish water EU demands.

Conclusions and Recommendations

Large financial resources will be needed to reach sustainability on water management in Serbia;

In accordance with IPA – Instrument for Pre-Accesion, some amount of european funds will be allocated to this process to suport investments in new infrastructures and to guarantee provisions for self-sustainability of operations;

Efficient procurement of more funds will be strongly dependent from a clear prioritizing of water sector in the context of national macroeconomic perspectives and from the capacity to acess to external sources;

Water Management Strategy 2030 will be one of the crucial tools to get both capital investment and significant rising in the financial, environmental and operation performance of water services to reach good governance.

Conclusions and Recommendations

Recommendation 2 - The Government should act to:

- **Improve a financial planning for the sector** at national, regional and local level, and the establishment of an effective an efficient project development system ("Pipeline");
- **Provide for self-funding of water sector** setting up of adequate national funds allocated to water sector;
- **Reduce strongly the existing gap of tariffs** in the country and adopt an harmonization strategy, taking into account the principle of "**sustainable cost recovery**";
- **Reinforce mechanics of supervision, accountability and regulatory** instruments to provide an oversight of water sector performance, through an "**independent regulatory body for water**";

Conclusions and Recommendations

To adopt a comprehensive political and administrative reform to reinforce water management and water resources management at institutional level, policy and legal levels, adequate measures must be taken involving the levels of public administration, in order to design a consistent model of organization at national, regional and local level.

A strong dispersion at municipal level of a big amount of small public companies and the lack of coordination among them and with regard regional Public Water Management Enterprises places seroius problems of inefficiency and unsustainability.

Taking advantage from expected scale and economic synergies will be crucial.

Conclusions and Recommendations

Recommendation 3 - The Government should legislate to:

- **Eliminate still existing critical fragmentation functions and responsibilities at national and regional level, designing and implementing water policies at the relevant level and scale;**
- **Integrate into the existing PWME and further regional bodies, functions and responsibilities on management water and wastewater services;**
- **Stimulate and implement at Self Local Government, aggregation and integration of small municipal water and wastewater systems;**
- **Implement the integration of water resources into territorial management, contributing to a better land use management.**

Conclusions and Recommendations

Serbia is a rich country in water resources. However, more efficiency must be a key goal at national, regional and local level;

A high level of losses in water distribution networks severely affects the level of efficiency of water services. Establishsment of a minimum indicator of losses for the economic purposes of the utility managers, and improvement of internal and international "benchmarking", already initiated, are very useful;

As well, international cooperation at EU level, such as European Innovation Partnership on Water would bring expertise and shared experience;

Community empowerment, through the significant participation of water stakeholders and creation of institutional bodies to frame it, has been strongly claimed by civil society organizations.

Conclusions and Recommendations

Recommendation 4 - The Government should:

- **Implement a national programme of improving "efficient use of water resources towards a sustainable management of water", involving public and private stakeholders, ensuring proper framework conditions for their effective engagement into water decision-making;**
- **Adopt innovative and safe solutions for an extensive reuse of treated wastewaters;**
- **Implement a national programme of reducing water losses and non-revenue water in distribution networks of utilities, including pipe rehabilitation, replacement investments and innovative techniques of network management;**
- **Create and implement an Advisory Board Body ("National Water Council") to advise the Government and other policy makers to the most important developments in water and wastewater services and water resources management.**

Conclusions and Recommendations

- To guarantee water supply and waste waste water services for all urge to ensure good quality water in sufficient quantities for all legitimate uses, mainly safe drinking water, aquatic ecosystems and biodiversity conservation;
- For this eco-innovation procedures should be selected to achieve the security of water quality supply "from source to tap" and water protection from adverse situations;
- Climate change also imposes a significant growth of uncertainties and vulnerabilities on water resources. Adaptation and mitigation measures must to be reinforced;
- "Combined Approaches to Water Pollution Prevention, 2010 to 2012" had been implemented as preliminary solutions to develop policy options.
- It is necessary to go further!

Conclusions and Recommendations

Recommendation 5 – The Government should:

- **Adopt a National Water Pollution Protection Plan to control at source and permanent check of the outlook sustainability and vulnerability of water resources;**
- **Act to achieve a good ecological and chemical status of surface water bodies and good chemical and quantitative status of groundwater bodies;**
- **Develop a national action plan for the construction of wastewater treatment plants (WWTP) and allocate corresponding funds in the budget;**
- **Promote the implementation of Water Safety Plans by the operators;**

Conclusions and Recommendations

Most of Serbian territory lies in the Danube River Basin and a significant amount of the populations lives in transboundary basins where countries have established multilateral water management coordination and cooperation;

Taking into account the climate change impacts on water-related issues in the Danube River Basin, key issues to be carefully followed are: water availability, water security, water demand and scarcity, floods and impact of low flows, surface and groundwater conservation and quality, droughts, shortages and health protection.
Appropriate secondary legislation to govern these issues is lacking;

Although the present state of flood protection infrastructure can be assessed as satisfactory, a large portion of the territory of the country still remains potentially threatened by floods;

Taking into account the severe floods of May 2014, the need to achieve in short or medium time the full compliance of the aims of EU Flood Risk Directive is still crucial.

Conclusions and Recommendations

Recommendation 6 - The Government should, taking into account floods of May 2014:

- **Define a long-term flood risk reduction strategy for the Sava river system specifically, including multilateral cooperation between the various countries of the basin, and to carry out a careful check on the entire flood protection system along the Sava and its tributaries to define potential no-regret improvements to the dyke system;**

- **Implement adequate measures by the existing system of flood risk management, namely at urban settlements, establishing flood hazard maps and flood risks assessment;**

UNDAC: United Nations Disaster Assessment and Coordination Team, Mission to Serbia Floods, 18-31 May 2014

Conclusions and Recommendations

Recommendation 6 -The Government also should:

- **Ensure protection from floods, water logging erosion and torrential streams and develop appropriate policies and economic instruments to assure the managing of water risks at the least costs to society;**

- **Reinforce international cooperation on water resources at multilateral and bilateral level on river basins, ensuring appropriate flood protection and good ecological quality of Serbian watercourses;**

- **Review of water scarcity and drought strategy at the light of climate change adaptation measures;**

Conclusions and Recommendations

To establish a consistent improvement of basic and reliable data and information at national level and adoption of European Water Information System requirements to include Serbian policy relevant indicators shared in EU under a common basis will provide to water professionals and Serbian water institutions easy access to relevant information to their work and places their own utilities performance in a European perpective;

To strengthen human resources at all levels is absolutly strategic, generating more specific expertise, capacities and advanced knowledge in water management and water resources as a support to sustainable water and wastewater development.

Conclusions and Recommendations

Recommendation 7 -The Government should:

- **Ensure better and stronger statistics on pressure on water resources;**
- **Implement mechanisms of certification of reliable statistics, secured by one national governmental department, to guarantee available water data at national and international level;**
- **Implement a roadmap for an extensive capacity building program and water research, allocating adequate resources, to build up high level technical and scientific capacities, through the involving of Universities, Research Institutes and Professional Associations.**