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## **EXECUTIVE SUMMARY**

### **Decentralized water supply, distribution and sewage management systems in Serbia-Montenegro and Albania**

Project for the preparation of scientific and technological co-operation between  
Serbia, Montenegro, Albania and Germany

conducted by

ARÖW Business and Consultants Network

funded by the German Federal Ministry of Education and Research (BMBF)

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## **1 Project data**

### **Project Title:**

Decentralized water supply, distribution and sewage management systems in Serbia-Montenegro and Albania

### **Co-ordination:**

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## 2 Executive Summary

In spring 2003 ARÖW accomplished - on the basis of publication and internet analyses - three fact finding missions – to Serbia, Montenegro and Albania in the context of the scientific-technological cooperation project *Decentralized water management in Serbia-Montenegro and Albania*.<sup>1</sup>

Within these fact finding missions in every of these three countries a workshop of several hours was organized, as well as several discussion circles and bilateral discussions with representatives of public and private research institutions, of universities, with experts from water supply and waste water disposal plants, as well as from responsible Ministries (e.g. Ministry of Research / Environment / Agriculture / Tourism / Infrastructure) and authorities. The objective of these workshops and discussions was to get information about the respective country and the specific regional situation in water management. Besides, possible starting points for concrete scientific-technological cooperation projects in the context of water management should be identified.

The local analyses and discussions show that the situation of the water supply and waste water disposal in the three countries can be characterized as follows:

- The basic problem in all three countries are the urgently needed **investments** for the reorganization and the development of already existing, as well as for the building of new water supply and sewage systems. Presently an improvement of the existing situation without any external subsidies cannot be done due to the lack of financial means.
- The quantity and the quality of the **water supply** differ from region to region. In the rural regions only wells for the water supply exist. In many regions the water quality is insufficient. Beyond that the losses in the supply networks are high.

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<sup>1</sup> We thank all experts involved in the project for their valuable contributions. Without their helpful support a successful conduction of the project would not have been possible. We would like to mention in particular Dr. Alexander Belic and Prof. Dr. Milorad Miloradov from the Serbian Ministry of Science, Technology and Development, Ljiljana Mugosa from the Montenegrinian Republican Agency for International Scientific, Educational, Cultural and Technical Cooperation, Prof. Dr. Zdravko Krivokapic from the University of Podgorica, Center of Quality, Prof. Dr. Edmond Hajderi and Jonka Ceka from the Albanian Ministry of Education and Science, which coordinated the fact finding missions in the three countries.

- The existing waste water treatment plants in Serbia are not sufficient to cover the need; many waste water causers are attached to treatment plants that do not function in a proper way. In Montenegro and Albania a waste water treatment is not existent at all.
- **Decentralized water and waste water management systems** for small and smallest settlements and the appropriate competence development for planning, building, operation as well as the maintenance of such decentralized systems are missing.
- In some regions the missing **surface and ground water protection** leads to substantial health and environmental problems. Without the introduction of waste water treatment plants or integrated environmental protection technologies for the saving of water/waste water, the increase of industrial activities, expected for the future in all three countries, will aggravate the existing problems within the area of waste water management and of water protection – connected with negative consequences for the environment and the public health.
- Due to the extremely low water prices, the public **institutions of water supply and waste water disposal** have only small incomes (if they have incomes at all) – so that neither the urgently needed investments in the infrastructure can be made from own sources, nor the operating costs can be covered. Besides, in these institutions competences regarding the development and implementation of sustainable water supply and waste water disposal systems, the implementation of innovative technologies and the possibilities of economic management are missing.
- The missing harmonization of the **legal framework**, in connection with fragmented responsibilities between the different public institutions (Ministries, authorities, public water suppliers and waste water disposers etc.), leads to inefficiencies.
- The **competence** of the scientific institutions in Serbia can be evaluated as exceptionally good. Actually the national research and development program *Development, protection and use of water resources in Serbia* is implemented.<sup>2</sup> However, in Montenegro and Albania deficits concerning the competences in the universities and the research institutions in subranges of the water management (in

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<sup>2</sup> A first call for the submission of project proposals was issued in June 2003.

particular within the area of waste water disposal) exist. Regarding the possibilities of decentralized water management, in all three countries only isolated individual competences within responsible authorities, municipalities, research institutions and enterprises are to be found. In all three countries **education and vocational qualification/training** for the planning and the operation of sustainable water supply and waste water disposal systems – as well as innovative technologies (including monitoring systems) – are missing.

According to these deficits, the following **areas of highest priority** – which (partially) at the same time represent starting points for the scientific-technological cooperation of the three countries with Germany – have been identified:

- Supply and protection of clean water resources, as well as building of supply networks for drinking water, for the irrigation of agricultural surfaces, as a condition for the economic development (e.g. the tourism), etc.;
- Building of waste water treatment plants for public waste water and different industrial waste water; building of waste treatment plants in order to secure a high water quality and to protect the surface waters and the groundwater;
- Development and implementation of decentralized water supply and waste water disposal systems, in particular for rural and suburban regions. These measures have to be accompanied by education in universities, colleges etc. and vocational qualification/training of the local service personnel in order to guarantee a suitable development, operation and maintenance of the individual technologies (for example „easy“ decentralized technologies as vegetative purification sewage treatment plants);
- Introduction of monitoring and information systems (e.g. within the area of water protection);
- Improvement of the development of competences in the area of academic education and vocational training/qualification;
- Harmonization of the non-uniform legislation and demarcation of clearly defined responsibilities of the individual authorities;
- Improvement of the cooperation between research institutions among themselves and with as well as between Ministries and authorities.

In particular the importance of the development and the implementation of decentralized water supply and waste water disposal systems was stressed by all experts met during the fact finding missions. The topographic and geological basic conditions, as well as the settlement structures in Serbia, Montenegro and Albania require innovative decentralized water supply and waste water disposal concepts, including the integration of further decentralized supply and disposal systems (e.g. decentralized energy production, waste disposal):

- In all three countries there are expansive mountain massifs, which separate entire regions. Usually the geology can be characterized as karst region, where water seeps very fast.
- The settlement structures are in particular characterized by sparsely populated regions, i.e. by single houses and farms, as well as small and smallest villages:
  - In Serbia 10 millions inhabitants live on an area of approximately 88,000 km<sup>2</sup>. Beside Belgrade with 1.6 – 2 millions inhabitants there are only 4 larger cities (Novi Sad, Nis, Kragujevac, Subotica), of which no one counts for more than 300,000 inhabitants. The average population density amounts to approx. 110 inhabitants/km<sup>2</sup>.<sup>3</sup>
  - In Montenegro altogether ca. 650,000 inhabitants live on an area of approx. 14,000 km<sup>2</sup> (approx. 96,000 inhabitants live in the capital Podgorica). Meanwhile 58% of the Montenegrinians live in the Montenegrinian cities. The average population density amounts to approx. 46 inhabitants/km<sup>2</sup>.
  - In Albania ca. 3,1 millions inhabitants live on an area of approx. 29,000 km<sup>2</sup>. The capital Tirana counts for approx. 250,000 inhabitants, the cities Durres and Elbasan count ca. 85,000 respectively 83,000 inhabitants. The average population density amounts to approx. 107 inhabitants/km<sup>2</sup>.

Considering these basic conditions, centralized solutions do not represent ingeniously applicable, efficient and effectively convertible, as well as sustainable concepts for these regions. Rather decentralized water supply technologies are an important key for the solution of the present problems in the water sector, for example

- rain water collection and treatment,

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<sup>3</sup> To draw a comparison: In Germany the population density amounts to 230 inhabitants/km<sup>2</sup>.

- supply by bank respectively river water filtrate (e.g. by using membrane systems),
  - fresh water filtration on places where water is drawn (e.g. coal filtration),
- as well as decentralized waste water disposal technologies as
- membrane bioreactors,
  - vegetative purification sewage treatment plant,
  - the separate collection of black and grey water etc.

Considering the limited financial resources these decentralized techniques are of great importance, especially since they are partly convertible in a „do-it-yourself-procedure“ (e.g. plant purification systems), with comparatively small investment and operating costs.

The implementation of particular **infrastructure projects** for the water supply and waste water disposal depends substantially on the financial and legal basic conditions in the three countries, as well as on the existence of technology/research and subsidy programs on the European and international level. Up to now infrastructure projects of German institutions (e.g. financed by the KREDITANSTALT FÜR WIEDERAUFBAU - KfW) in Serbia and Montenegro are individual cases. In Albania the activities of German institutions are more intensive: there are several projects for the construction of centralized and, in individual cases, decentralized water supply and waste water disposal systems, which are financed by the KREDITANSTALT FÜR WIEDERAUFBAU - KfW.

For the area of **scientific cooperation** experts from the different research institutions involved in the project made the following project proposals:

- **Serbia:**
  - *Great Morava alluvial aquifer pollution by nitrate and possibilities for integrated ground water protection measures and management*  
(INSTITUTE OF WATER MANAGEMENT „JAROSLAV CERNI“)
  - *Management and sustainable use of Great Hungarian Plain transboundary groundwater aquifer (Vojvodina)*  
(INSTITUTE OF WATER MANAGEMENT „JAROSLAV CERNI“)
  - *Improved water management by use of automatic control and information technologies*  
(UNIVERSITY OF NOVI SAD, FACULTY OF MECHANICAL ENGINEERING, Dep. of Automation and Decision Systems)

- **Montenegro:**
  - *Model of drainage and irrigation in Bjelopavlicka plain by applying of GIS*  
(BIOTECHNICAL INSTITUTE, UNIVERSITY OF MONTENEGRO, Podgorica)
  - *Protection of the coastal Montenegrin Sea from the land-based sources*  
(INSTITUTE OF MARINE BIOLOGY, UNIVERSITY OF MONTENEGRO, Kotor)
  - *Decentralized integrated water supply in the Zeta Plain*  
(INSTITUTE OF HYDROMETEOROLOGY of the Republic of Montenegro)
  - *Research of surface water quality of Montenegro from aspects of tourist potential and its possible negative impact on the health of the users*  
(INSTITUTE FOR PUBLIC HEALTH of the Republic of Montenegro)
  
- **Albanien:**
  - *Organization of decentralized integrated water supply and waste water management systems in the villages of south coastal Albania*  
(ITA CONSULT, Tirana)
  - *Territorial development plan of the catchment basin of Bovilla, aimed at using water for drinking*  
(UNIVERSITY OF TIRANA, Dep. of Biology)
  - *Biological methods of cleaning organic polluted fresh water*  
(NATIONAL ASSOCIATION OF CO-OPERATION, ECOLOGY AND RURAL AND AGROFOOD DEVELOPMENT)

German partners interested in these cooperation projects were already partly found and mediated. Thus, it becomes evident that the scientific cooperation between Germany and the three countries depends on the existence of public subsidy measures. In principle on all sides there is an interest in the exchange of experience, but without a public subsidy the realization of specific common research projects does not take place – due to the missing money in the German, as well as in the Serbian, Montenegrin and Albanian universities and non-university research institutions.

This is also visible in the past scientific cooperation of German institutions with Serbian, Montenegrin or Albanian research institutes in the area of water management: In the course of its analyses AROEW found only two scientific cooperation projects. On the one hand the university partnership between the TECHNICAL UNIVERSITY OF HAMBURG-HARBURG, the UNIVERSITY OF BELGRAD and the UNIVERSITY OF MONTENEGRO for the development of curricula in the departments of hydraulic engineering and water management – financed by the DEUTSCHER AKADEMISCHER AUSTAUSCHDIENST (DAAD -

GERMAN ACADEMIC EXCHANGE SERVICE). On the other hand a project of the HOCHSCHULREKTORENKONFERENZ (HRK - ASSOCIATION OF UNIVERSITIES AND OTHER HIGHER EDUCATION INSTITUTIONS IN GERMANY) for the integrated monitoring of the Shkodra lake, in which the universities of Heidelberg, Graz, Montenegro and Shkodra participate.

Here it will be necessary to evaluate more detailed, which national and international subsidy programs exist, so that the scientific cooperation of German institutions with participants from the three countries in the area of water management could be (co-) financed.

As a further important follow-up activity of the project, AROEW initiated and realized a project proposal for the *FP6-INCO-Western Balkan Countries Call* of the EUROPEAN COMMISSION. The title of the proposed research project: *Management system for decentralized waste water treatment and reuse technologies for rural, poor urban and coastal settings in the Western Balkan Countries* (SUSSEWEB).

The main scientific and technological objective of SUSSEWEB is the development of innovative strategies, technologies and measures for waste water management in typical rural, poor urban and coastal zones in selected Western Balkan Countries (WBC) focusing on local problems and specific socio-economic conditions. The main innovation-related objective is the development of an internet-based waste water management system to support the implementation of the activities on a local level.

SUSSEWEB will take up the substantial starting points of the scientific-technological cooperation in the area of decentralized waste water management, as well as the needs and interests of the research institutions in the three countries, and it will supply substantial solutions for the removal of the existing deficits. SUSSEWEB will contribute to solve societal problems of poor waste water management in WBC and refers to the EU Water Initiative and other EU policies like the CARDS program.

SUSSEWEB combines expertises of 15 partners from 3 WBC, 2 Member States and 1 Associated Candidate Country<sup>4</sup>. Nearly all research institutions, which were contacted in the context of the fact finding missions to Serbia-Montenegro and Albania – are involved

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<sup>4</sup> 2 research institutions from Germany, 1 from Greece, 1 from Romania, 2 from Croatia, 2 from Serbia, 3 from Montenegro, 4 from Albania.

in the project. More than 70% of the tasks and 50% of the funds are directed to WBC partners. The strategic impact of SUSSEWEB consists of

- international technology transfer effects, providing access to scientific and innovation-related knowledge,
- acceleration effects of solving the substantial problems of waste water management in a shorter period of time,
- innovation effects of providing tailored and economic feasible solutions,
- reinforcements and stabilization of local capabilities, research knowledge and experiences.

The project will produce added value on the EU level, since the problems are expected to be similar in selected WBC and blueprints for innovative waste water management systems may be disseminated also towards other Eastern Europe Countries.

At present the project proposal is in the evaluation phase.

To sum up it may be noticed, that the topic *sustainable decentralized water management* – as a promising concept for the handling of the various deficits within the area of water supply and waste water disposal – meets with great interest in the three countries. The demands for further measures supporting the setting up and realization of bi- and multilateral cooperation projects are various.

However, a lasting project structure, as well as stable relationships between partners, which could integrate and develop the ongoing projects, do not yet exist. So the current activities of German scientific institutions, as well as the initiated follow-up activities of the project *Decentralized water management in Serbia-Montenegro and Albania* still can be characterized as single activities.

For that reason ARÖW has started the project *Transnational Innovation Network „Sustainable Decentralized Water Management“ between South-Eastern Europe and Germany (TRINOWA)*. The project is funded by the BUNDESMINISTERIUM FÜR BILDUNG UND FORSCHUNG (BMBF) and administrated by the INTERNATIONAL BUREAU OF THE BMBF.

The aim of the project is to initiate an innovation network, which should function as a basis for bi- and multilateral projects, conducted by the participants of the network and funded

by national, European or international institutions. In a first phase, the focus will be on scientific collaboration between universities, research institutions and other experts from industrial, governmental or municipal institutions. Since the deficits in the area of sustainable decentralized water management in Serbia-Montenegro and Albania are prototypical for the entire region of South Eastern Europe, further countries of the region will be integrated in the innovation network.

For that reason it is planned, that the core of the innovation network includes the most excellent knowledge of different - mainly scientific - institutions from the following countries:

- Albania
- Bosnia-Herzegovina
- Bulgaria
- Croatia
- Germany
- Greece
- F.Y.R. Macedonia
- Serbia and Montenegro
- Romania

In its further development the innovation network should

- strengthen the relations between the partners,
- develop particular mechanisms for the national transfer of technology and knowledge within the network and with external actors,
- connect ongoing projects and bring the participants involved into a continuous exchange of experience and into concrete cooperation projects,
- provide a definite project profile – based on the regional needs and on the potentials of scientific, economic and public institutions – for the further development of the area „sustainable decentralized water management“ and
- above all build a bridge to German participants from science, research and economy to solve the regional water supply and waste water disposal problems within the framework of bi- and multilateral cooperation projects.