

TRANSBOUNDARY AQUIFERS IN CROATIA

D. MALUS

Faculty of Civil Engineering, University of Zagreb, 10000 Zagreb CROATIA

1. COLLECTION OF DATA ON TRANSBOUNDARY AQUIFERS IN CROATIA

As a requirement for the UNESCO-ISARM-MED programme entitled the Key Issues for Sustainable Management of Transboundary Aquifers in the Mediterranean and in South Eastern Europe, a database on transboundary aquifers in the Republic of Croatia was prepared on the basis of available data and time. A formerly developed questionnaire [1] was filled out for the aquifers in the following river basins: the Sava River and its tributaries, the Kupa and Una, which are a part of the Danube River catchment area, and for the Cetina, Neretva and Trebisnjica Rivers, which belong to the Adriatic catchment area. The data on river basin properties, monitoring data, significant issues affecting the aquifer system, policy and legislative properties were collected and discussed. Written data have been supplemented by maps of the watercourses as well as the network of hydrological stations and water quality monitoring stations.

The used data sources include Croatian Waters, the national water management agency, i.e. the National Water Management Master Plan (in preparation), the State Water Directorate, the Report on the State Budget, the Internet as well as private sources. Of the requested data some definitively do not exist, the existence of some is not possible to verify, whereas the majority of data can be located in various sources, but present a very time-consuming task. The data were collected by a single person who is not employed by the state institution in charge of water management, in a limited time period and with a limited access to data, which has resulted in the fact that the quality of data collected in such manner is probably not of the optimum scope and content.

2. KEY ISSUES IN TRANSBOUNDARY AQUIFER MANAGEMENT IN CROATIA

2.1. CURRENT STRATEGY

The general consensus in the Republic of Croatia is that the existing state and practice in the field of water management should be improved. The Republic of Croatia lags significantly behind in the achievement of EU standards in water management [2]. In order for it to become a member-state as soon as possible, it has to make up for it, which requires considerable funds.

The national policy has not fully addressed the issue, i.e. defined the priorities in accordance with the potentials of the country's economy. In the field of transboundary aquifer management, the activities are currently limited to signing bilateral framework agreements, regulation of state borders and interstate land and river traffic and solving day-to-day problems of population in border areas.

2.2. PUBLIC AWARENESS

Public awareness of problems resulting from the water management process in the Republic of Croatia can be generally considered quite lacking or insufficient. The general public is generally unfamiliar with the concept of integrated river basin management, particularly if shared by two or more countries. The majority of population holds the belief that within the country, the competences of democratically elected authorities are sacrosanct and absolute.

However, one cannot say that people are not aware of the issues one way or the other, although the majority sees this very generally, as information not directly related to them. Traditionally, people are used to others solving their problems, without consulting them in the process.

The most deserving for the task of informing and educating the general public are the media, i.e. television, radio and print media, with documentary programmes, both foreign and domestic, being particularly instructive. Public awareness is more developed in urban areas than in rural settlements, which account for about 40% of the country's population, as well as in economically more developed communities.

2.3. NGOs

NGO members consist of predominantly young people and a very small group of experts. Such organizations act legally and have no problems with the authorities; they, however, receive very modest financial support. The largest number of organizations is mostly of local character, established as a consequence of a disputed local project. A large number of organizations are disbanded, or virtually inactive. NGO activity in the Republic of Croatia is concentrated in the circle of their members, with a weak influence on the general public.

The professional community is inadequately organized, although professional associations do exist. In potentially controversial cases it is very rare that respectable experts step out as supporters or opponents of a proposed project, rarer still to do so with arguments. The reasons vary from narrow interests, fear of losing future business, insecurity or fear of being disqualified by their colleagues or politics. Some experts are related to specific political groups, which lessens their credibility. The most dynamic NGO activity is related to the Drava, Neretva and Sava Rivers.

2.4. STAKEHOLDER PARTICIPATION

The most influential stakeholder groups are in the fields of power generation, water supply, transport and agriculture. They strongly support all projects, which improve their positions and their prospects of greater profits. They are, in fact, initiators of such projects. The influence of "ordinary" people, small family businesses, scientific and professional experts and institutions is frequently marginalized and obstructed. In case of transboundary projects, the Parliament and special expert commissions appointed by the Government have the final word, which significantly reduces potential stakeholder influence.

2.5. CAPACITY BUILDING

Current situation, probably also the near future, is dominated by the lack of experts, particularly planners, technologists, lawyers and economists at all levels of water management. This lack is particularly critical in the circumstances when the country is faced with a huge task of harmonizing the national legislation and work practice with EU criteria. Aside from the necessary preparation and development of general organization and changes in legislation, expert infrastructure must also be developed at all levels to ensure a full implementation of legal and other decisions until the completion of each project.

Regarding issues of transboundary nature, a quality political support aimed at coordination and articulation of joint interests and obtaining of funds necessary for their solution is needed.

River basin management issues include not only the fulfilment of needs and economic interests, but also the achievement of sustainable development principles. This necessarily involves gaining knowledge about natural patterns existent in the river basin, the area best known to the experts, but which should, to a certain extent, also be known to decision-makers and other participants in the decision-making process. In this sense, a wide support by the general public is vital, and can be achieved only by adequate education.

2.6. POLITICS

In the past, politics often used environmental protection issues to its own purposes, most frequently promising the solution of vital problems to the population. Projects were presented to the public as such, but not implemented according to promises, or done so only partially. A new administration would then give priority to their own projects, while others were relegated to secondary importance or even abandoned.

In recent times, there is a continuity in politics with regards to environmental protection, proven by projects and invested funds, which is mostly motivated by the general desire of the majority of political groups to see the Republic of Croatia becoming an EU member-state as soon as possible. Thus support is given to all projects, which lead to the harmonization of the national legislation with the EU legislation.

There is also active participation in international organizations as well as acceptance of obligations and signature of international agreements. Each new agreement or implementation of a project with a neighbouring country, particularly those that Croatia was in war with, is considered a general contribution to the establishment of permanent peace and good neighbourly relations. Adequate political activities open up room for professional activity and decision-making at lower levels.

2.7. INTERNATIONAL DONORS

The activity of international organizations from the EU and other developed countries is evident, with a number of smaller or larger projects either under way or completed. Some projects are registered through government institutions, some at local community levels, scientific institutions, state or private companies. Some programmes are organized and implemented through NGOs. By inclusion in the CARDS and ISAP programmes, the potential of larger investments in environmental protection in Croatia is significantly increased. It is equally clear that the scope and quality of help will greatly depend on the capability of Croatia and its neighbours to prepare suitable programmes and projects. Such efforts should absolutely be welcomed as beneficial and useful.

3. SHORT STATUS OVERVIEW PER WATER BODIES

3.1. THE SAVA RIVER BASIN

The Sava River basin, including its tributaries, covers nearly half the territory of the Republic of Croatia (25,374km²), an area in which approximately one half of Croatian population resides (2.2 mil), and forms a 313 km long border with the Republic of Bosnia-Herzegovina [2.] To preserve the desired water quality of the Sava and its alluvium in the entire territory, it is crucial to control pollution from major cities, such as Zagreb and Slavonski Brod, as well as from agricultural surfaces and farms in the fertile Pannonian plane. Naturally, it is equally important that the Sava entering Croatia from the Republic of Slovenia is of adequate water quality. The Lower Sava is vitally influenced by its tributaries from Bosnia-Herzegovina - the Una, Vrbas and Bosna Rivers.

All settlements in the Sava alluvium use groundwater resources for water supply, whose quality is endangered by sewage and solid waste from large towns, farms, agriculture and transport. Transboundary aquifers in the Sava River basin have not been sufficiently researched in terms of their distribution, dynamics of recharge and discharge and water quality. Floods or draughts often endangers large surfaces of arable land surrounding smaller rural settlements, whereas the risk from accidental spills and illegal dumping is significant.

3.2. THE KUPA RIVER BASIN

The Kupa River is a tributary of the Sava, with a part of its river basin in Slovenia and a part in Bosnia-Herzegovina. The most important problem affecting the shared part of the Kupa River basin is the preservation of a rather good situation. The sections in Croatia and Slovenia are not densely populated, with any intensive agricultural or industrial activities.

A potential problem is the pollution from the Zagreb-Karlovac-Bosiljevo-Rijeka highway (drainage with BMPs is in operation) as well as from the local road, Cabar – Brod na Kupa. The Kupa River basin is very poorly researched in its upper and lower flow, although the quality of groundwater and surface waters is essential for water supply of a number of settlements.

3.3. THE UNA RIVER BASIN

The Una River is a tributary of the Sava. Its source is in the karstic area of the Republic of Croatia, after which it flows through Bosnia-Herzegovina as a river of unique beauty and in its lower stretches forms the border with Croatia in the length of 130 km [2].

The most important problem affecting the shared part of the Kupa River basin is the preservation of a rather good situation. The upper and lower parts in Croatia are not densely populated, with any intensive agricultural or industrial activities.

A potential problem is the pollution from larger settlements in Bosnia, such as Bihac Prijedor or Bosanski Novi. The problem in Croatia is how to maintain good groundwater quality.

3.4. THE CETINA RIVER BASIN

The Cetina River is a karst river belonging to the Adriatic catchment area. Its entire flow is located in the Republic of Croatia, with a part of its river basin in Bosnia-Herzegovina. Due to its steep fall, it is interesting for hydropower generation, while its water quality makes it desirable for water supply.

The most critical problems are the regime of hydropower plant operation, agricultural activities in large karst fields (Sinjsko, Cetinsko, Vrlicko, Hrvatacko), the new highway construction (a bridge over the Cetina) and the preservation of groundwater quality. It is vital to prevent the pollution of the river basin part located in Bosnia-Herzegovina.

3.5. THE NERETVA RIVER BASIN

The Neretva River is a karst river belonging to the Adriatic catchment area. It enters the Republic of Croatia from Bosnia-Herzegovina, forming a large delta with fertile soil and wetland habitats.

The main problem in Croatia is intensive agriculture in the delta and the transformation of natural wetlands into arable land. Navigation, a dense network of roads, the railroad, a new highway (in preparation), other infrastructure facilities and the settlements of Metkovic and Opuzen pose a substantial threat to the existing abstractions of potable water. This markedly karstic river basin is insufficiently researched; therefore, the aquifer boundaries and dynamics of recharge and discharge are unknown.

3.6. THE TREBISNJICA RIVER BASIN

The Trebisnjica River has no visible flow in the Republic of Croatia, only numerous smaller and larger springs. An artificial tunnel to the Plat hydropower plant near Dubrovnik transports the water from the Trebisnjica hydrotechnical system in Bosnia-Herzegovina. The largest spring in Croatia is the Ombla River. The Trebisnjica River basin is most certainly connected to the Neretva via underground flows.

The Trebisnjica system is a project that has the strongest influence in the basin, and the consequences of that project are felt in Croatia's part of the catchment area. The attention is currently focused on the upper part of the basin, with the major threats in Croatia related to possible changes in the Neretva hydrology.

The most critical problems are the construction of the hydropower plant on the Ombla River, inadequate waste disposal in the Dubrovnik area and a change of groundwater quality and quantity.

3.7. FUTURE PREDICTIONS

The real problems in the management of transboundary river basins can be expected in the future, with the initiation of processes of economic growth. The current largest problems are the impacts of large urban agglomerations, due to unsolved wastewater treatment, uncontrolled solid waste deposits and outdated industrial facilities with inadequate technologies, i.e. no wastewater or gas treatment.

In agriculture, the enlargement of surfaces under intensive cultivation, which require more use of mineral nutrients, will increase the pressures on both surface waters and groundwater.

At the same time, the occurrence of problems related to determination of rights to water abstraction from watercourses and the underground for irrigation and water supply can probably be expected. Problems can also occur in the valleys of lowland rivers, where the existing wetland biotopes should be protected from drainage for the purposes of flood protection.

The growth of large settlements and a decrease in groundwater quality in areas surrounding large settlements will create a need for new quality groundwater abstractions, with the resulting increased significance of the currently high quality springs in the karst areas. A particularly great challenge will be to achieve agreements on the land use in the basin parts of the rivers without surface flows in the neighbouring countries (the Kupa and Korana, the Cetina, the Ombla and the Una Rivers). It can be

realistically expected that in the near future all countries will adopt the WFD and criteria for watercourse classification as well as minimum conditions for wastewater treatment.

4. RELEVANT AGREEMENTS

All countries with which the Republic of Croatia shares the Danube River basin are signatories to the Danube River Protection Convention (1994).

The base document of international character is the "Framework Agreement on the Sava River Basin", signed by Bosnia-Herzegovina, the Republic of Croatia, the Republic of Slovenia and the Federal Republic of Yugoslavia (2002), which is in force since June 2004. For decision-making and implementation, the four countries established the International Sava River Basin Commission, consisting of representatives from each country. It co-operates with the ICPDR, the Danube Commission, the UN/ECE and institutions of the EC. Thanks to international involvement (the Stability Pact launched the Sava Initiative to provide a Forum to the four Sava countries), this agreement is giving positive results.

The bilateral agreements relate to all water management issues:

"Agreement between the Government of the Republic of Croatia and the Government of the Republic of Slovenia on Water Management Issues" (1997);

"Agreement between the Governments of the Republic of Croatia and Bosnia and Herzegovina on Water Management Issues", signed by the Federation administration, while the Republic of Srpska has not yet ratified the agreement; therefore, it is not yet in full force. An agreement with the Serbia and Monte Negro has not yet been reached.

A precondition for efficient management of transboundary river basins are good political relations between the countries in the basin as well as resolved legal and property issues. In case of the Republic of Croatia, this has not yet been achieved with all its neighbouring countries. These problems are consequential to unresolved territorial issues in the former Yugoslavia and the homeland war, whose consequences are still acutely felt. To sum it up, for the general public in the Republic of Croatia the most positive changes are still those happening in the political sphere, since they are a precondition for achieving real quality changes in the area of joint management of transboundary river basins. Positive changes are expected particularly in relations with the countries that the Republic of Croatia was not involved in the war conflict with.

4.1. NECESSARY STEPS

Within Croatia, the most significant changes should occur in the key institutions responsible for water resources management. The biggest step forward should be made in the concept of water management, with the priority given to the development of integrated approach to river basin management by creating conditions for the implementation of the EU directives.

The priorities in the Republic of Croatia should be the establishment of a framework agreement on water management with Serbia and Monte Negro and the ratification of the existing agreement by the Republic of Srpska. The existing Danube River Protection Convention and the framework agreements with all neighbouring countries are a good start for joint development of comprehensive, efficient water management plans. Regardless of the dynamics of the EU accession of the interested countries, a necessary preliminary condition for good cooperation is trust building, not only in the greater region, but also at the local community level.

Countries sharing a watercourse should define their development plans in the field of water management, i.e. their long-term interests in all sectors of water use and water protection, which should be followed by mutual negotiations to coordinate interests in the areas where they are conflicted, i.e. initiate development of joint management plans for shared river basins.

It is further necessary to form a database of a shared river basin in the countries, which belong to it. Such databases should be created by applying the same criteria, i.e. according to the WFD, so that data

shortages could be determined and a list of individual or joint research necessary for the development of an efficient RBMP composed. For the execution of this task international expert and financial aid should be used as well. The task could further include a good definition of priority activities in the river basin and a preparation of projects for financing through the EU funds and by other donors.

Much must be done in the area of capacity building, both according to own potentials and within international expert aid programmes. Domestic scientists and experts must be involved in knowledge dissemination to all stakeholders, through various forms of activities, such as seminars, workshops, etc.

In transboundary aquifers joint monitoring stations for water quality, hydraulic and hydrological measurement and phenomena should be installed.

Continuous, objective informing and inspection should be introduced in river basins, so that joint efforts can bear good, fair results.

It is necessary to encourage and strengthen cooperation at the local level, since practice frequently testifies to the fact that this can be much more successful than the institutional cooperation between countries.

If a recommendation to foreign donors or donor institutions were to be given, it would include two slogans:

If helping, help where it is most needed!

Do not give gifts, but invest in a better future!

It is true that the countries receiving help must learn to ask for help where they need it most, and for this purpose they must establish strong teams capable of leadership and active cooperation with international aid programmes. However, when making priority lists, help from the EU experts would be necessary.

As a rule, projects, which require foreign help should be the ones initiated by a help receiving country.

5. CONCLUSION

Interests in transboundary water management are not yet articulated. Cooperation in joint activities is still at the level of first political agreements on cooperation. Problems that are being solved are those related to communication infrastructure and day-to-day problems of the local population.

Due to war-damaged economies, many pollution problems from the former Yugoslavia do not exist nowadays. Economic prosperity, however, will lead to increased pollution loads and interests in the use of water resources. In this respect, institutional and legal changes and modifications will have to be made in countries sharing a river basin to enable development of joint plans for sustainable management of a river basin.

To reach this goal, expert and financial assistance of the international community, mostly the EU, will be needed.

6. REFERENCES

1. ISARM Mediterranean Programme (2004) Questionnaire 1: Transboundary Aquifers in the MED Region
2. Croatian Waters (2004) Water Management Master Plan of Croatia (in preparation)

