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ASSESSMENT AND DEVELOPMENT OF MUNICIPAL WATER AND WASTEWATER TARIFFS AND EFFLUENT CHARGES IN THE DANUBE RIVER BASIN.

Volume 2: Country-Specific Issues and Proposed Tariff and Charge Reforms: Croatia – National Profile

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WORKING FOR THE DANUBE AND ITS PEOPLE

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PREFACE

The Danube Regional Project (DRP) consists of several components and numerous activities, one of which was "Assessment and Development of Municipal Water and Wastewater Tariffs and Effluent Charges in the Danube River Basin" (A grouping of activities 1.6 and 1.7 of Project Component 1). This work often took the shorthand name "Tariffs and Effluent Charges Project" and Phase I of this work was undertaken by a team of country, regional, and international consultants. Phase I of the UNDP/GEF DRP ended in mid-2004 and many of the results of Phase I the Tariffs and Effluent Charges Project are reported in two volumes.

Volume 1 is entitled *An Overview of Tariff and Effluent Charge Reform Issues and Proposals*. Volume 1 builds on all other project outputs. It reviews the methodology and tools developed and applied by the Project team; introduces some of the economic theory and international experience germane to design and performance of tariffs and charges; describes general conditions, tariff regimes, and effluent charges currently applicable to municipal water and wastewater systems in the region; and describes and develops in a structured way a initial series of tariff, effluent charge and related institutional reform proposals.

Volume 2 is entitled *Country-Specific Issues and Proposed Tariff and Charge Reforms*. It consists of country reports for each of the seven countries examined most extensively by our project. Each country report, in turn, consists of three documents: a case study, a national profile, and a brief introduction and summary document. The principle author(s) of the seven country reports were the country consultants of the Project Team.

The authors of the Volume 2 components prepared these documents in 2003 and early 2004. The documents are as up to date as the authors could make them, usually including some discussion of anticipated changes or legislation under development. Still, the reader should be advised that an extended review process may have meant that new data are now available and some of the institutional detail pertaining to a specific country or case study community may now be out of date.

All documents in electronic version – Volume 1 and Volume 2 - may be read or printed from the DRP web site (www.undp-drp.org), from the page Activities / Policies / Tariffs and Charges / Final Reports Phase 1.

We want to thank the authors of these country-specific documents for their professional care and personal devotion to the Tariffs and Effluent Charges Project. It has been a pleasure to work with, and learn from, them throughout the course of the Project.

One purpose of the Tariffs and Effluent Charges Project was to promote a structured discussion that would encourage further consideration, testing, and adoption of various tariff and effluent charge reform proposals. As leaders and coordinators of the Project, the interested reader is welcome to contact either of us with questions or suggestions regarding the discussion and proposals included in either volume of the Project reports. We will forward questions or issues better addressed by the authors of these country-specific documents directly to them.

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1 INTRODUCTION

1.1 General Scope of the Report

This report is, first of all, a compilation of information and data that describing the institutions and conditions that shape and characterize the provision of municipal water and wastewater service in Croatia. The purpose of this compilation is to provide background and inspiration for proposals to reform both the current system of water and wastewater tariffs and effluent charges and coincident proposals to adjust or modify the legal and regulatory system within which the these tariffs and effluent charges function in Croatia. Indeed, some chapters include brief analyses suggesting such reforms and Chapter 9 concludes this report with preliminary proposals for reforms in the institutional setting and design of these tariffs and charges. The aim of the these proposals is to improve the management of water and wastewater resources used in the municipalities of Croatia generally and, including protection of water resources from nutrient loading and toxic substance originating from municipal systems.

1.2 General Information on the Republic of Croatia

The Republic of Croatia is one of the youngest Europian countries and democratic parlamentary republic. The total area of the country is 87,609 sq.km (land area is 56,542 sq.km and surface area at teritorial sea and interior sea waters is 31,067 sq.km).

It consists of two geographic parts: Danube basin (Black Sea catchment area - 60%), and the Mediterranean part (40%). Today's total population of Croatia is 4,437 milion inhabitans according to the 2001 census (population density 78.5 inhabitants per sq.km). In the territorial and administrative sense Croatia is divided into 20 counties and the capital Zagreb (which also enjoys the status of the county. The counties are further divided into towns (122) and municipalities (424).

Croatian GDP was 19,536 million USD (at current prices) in 2001 (4,403 USD per capita). The end year inflation rate (for the same year) was 3.8%, while the average net monthly salary amounted to 3,541 HRK (425 USD).

With respect to its natural resources and the existing economic potential, Croatia is an export-oriented country. The major features of the Croatian economy are the geographic strategic position, the potential of agriculture and food-processing industry, tourism and educated and qualified population. The gross national product is realised 55 percent in tertiary, service sector, 32 percent in industry, and less than 13 percent in agriculture.

Traffic and communications contribute 8 percent of gross national product, which is the result of the exceptional position of Croatia in the centre of the European communication area and on the crossroad of routes leading to various directions - northern Europe, south-eastern Europe, Middle East and the Adriatic Sea. The power production in Croatia is based on coal, oil, natural gas and water. Croatian agricultural land covers a large area, out of which 48.0 percent are ploughland and gardens, 33.0 percent are pastures, and 19.0 percent are meadows, orchards and vineyards. The major industrial branches are textile, food-processing, chemical industry, shipyards, wood processing, metal-processing industry, tobacco production and processing.

The Danube basin is rather urbanised, with developed industry and valuable agricultural land. International communications also pass through this area.

The Mediterranean region includes the Adriatic coast (islands, coast and hinterland). In addition to transport and industry, tourism and service activities are developed in this area. The mountain area separates the Mediterranean from the Danube basin catchment area. Through this area important

transport communications pass towards the North and South, and the area is also covered with valuable forests and with corresponding industry.

1.3 Purpose of the National Profile for Municipal Water and Wastewater

On the state level, depend on size and type of project, main role in the decision making process for investments in water sector and water pricing have:

State Water Directorate is in charge of all the activities related to water management. It plans, monitors and co-ordinates development of the water management system, while accommodating for the needs of the overall economic development.

Within its legal powers, Croatian Waters, a Government agency for water management, passes administrative and other acts and makes decisions on issues important to water management. These include preparing of basic plans for water management, maintenance of water-related structures, protection from detrimental effects of water, water use, water pollution control, etc.

There are more about 130 water utilities in Croatia, that a usually organised as public companies, as far the ownership structure 99% of these are companies with limited liability where local government units hold at least 51% of the shares.

These 130 companies, mainly located in larger urban areas, provide water supply and wastewater treatment services. They were either founded by local government units, or have emerged in the process of transformation of former public enterprises under the Municipal Services Act of 1995., all of these activities provide by the Ministry of Zoning, Construction and Housing.

Participation of private capital in these companies may ot exceed 49% of the shares, and there are still no examples of fully privatised companies providing municipal services in the water sector.

Very often, specially in smaller municipalities water supply and sewerage are only one among many other responsibilities of the utilities, but in bigger cities of which Croatia have eleven there are dedicated companies for water and wastewater management.

Table 1 Population of the Largest Cities in Croatia

Cities	Inhabitants
Zagreb	770,085
Split	173,692
Rijeka	143,395
Osijek	91,046
Zadar	69,239
Pula	58,342
Slavonski Brod	57,199
Karlovac	49,228
Varazdin	41,252
Sisak	37,491
Sibenik	36,886
Total	**1,527,855**

The City political bodies are

- City assembly
- Mayor
- City government

The assembly of the city yields the statute, general acts, resolutions, and elects and relieves of the mayor and the members of the city government. The city assembly established the public institutions and other legal institutions for performing economic, social and other activities in the interest of the city.

City government conducts the executive works of the city. City government manages the properties in the city ownership, as well as the city incomes and expenses, and also prepares the prepositions of the general acts. City government executes or insures the exectuion of the city assembly's general acts. The City assembly on the Mayor's preposition elects City government. The members of the City government are, as a rule, also principals of the City government's administrative departments.

The incomes and expenses of the City are defined by the annual budget.

The quality of life of every citizens, first of all, depends on the communal services. For that reason, there are several corporations fulfilling the communal needs citizens.

Corporation low defines the work of those corporations.

One of the corporations in the City ownerships is Water Supply and Sewerage. Water supply and sewerage is working according to corporations low, and the only member of that corporation is City.

The highest level of the conducting the corporation is:

Assembly, which, by authorization of the Assembly of City makes all relevant business decisions, from future investments to the nomination of the management.

In addition to the assembly, other management organs are: Supervisory board, which is appointed by the Corporation Assembly, as an organ of the Corporation's transactions control and the Director, which is also appointed and revoked by the Corporation Assembly. The Director represents the Corporation and preforms other activities according to the Corporation low. Director of water company suggest changing the prize of water but City government must accept it.

State plan for water protection requires building of Treatment plants for wastewater for cities bigger than 50 000 inhabitants.

Croatian lows allowed concession and BOT public - private partnership models, but there is one pilot project known till now - Treatment plant of Zagreb.

A strategy from the government could be to combine and organisations engaged in utility water supply, wastewater collection and treatment. This can be done either by laws or setting conditions, which can only be fulfilled by large organisations.

1.4 Future Direction

Starting from the above, it will be necessary to review all legislation related to water management, adjust it to EU requirements and define the possible deadlines for fulfilment of commitments towards EU, because the Republic of Croatia is oriented towards joining the EU. At present, the major problem in meeting these objectives is lack of funds.

The most important objective of water management system in Croatia is to provide adequate quantity of water of required quality for the needs of population and the economy. The development plan developed to meet this objective included: defining of objectives, analysis of technical and technological issues included implementation of effective systems of water polution charges, the method of managing of water supply systems, application of market principles with policy reform and legislation measures for the development of cost covery concepts for water and wastewater tariffs,

environment protection, implementation schedule and investment requirements.

The general water supply development program for the period up to 2015 was based on the elements and objectives of the social and economic development plan. The objective of this program is to achieve the level of 95 percent of population supplied from public water supply systems, and to meet the requirements of industry.

2 LEGAL AND INSTITUTIONAL SETTING

2.1 National Laws and Regulations Governing Provisions of Municipal Water and Wastewater Service

The orientation of the Government of the Republic of Croatia is adjusting of all the regulations with EU legislation, including regulations related to water management. In line with this strategic goal, the Republic of Croatia has ratified numerous international conventions, and taken part in the implementation of the EU Water Framework Directive which is adopted by the EU Parliament

In this context, the documents of particular importance for water management are Convention on the Protection of Trans-boundary Watercourses and International Lakes, and Convention on Cooperation for the Protection and Sustainable use of the Danube River. In connection with these documents, Water Act and Water Management Financing Act have been amended accordingly. In addition to the two laws, over 40 by-laws from the field of water management have been passed. These by-laws regulate numerous issues such as preparing of water management plans, defining of water related structures, determining the areas of water management activities, issuing of water management documents (conditions, consents, and permits), determining of the water estate, issuing of concessions on water and water estate, organising water management and water management inspection.

Water management plans both at the national (Water Master Plan of Croatia) and at the local level (catchment area master plans or water management plans) are under preparation. These are long-term plans containing the data on distribution, resources and properties of water, water requirements, provision of adequate quantities of water, water protection from pollution, regulation of watercourses and flood protection. They also determine other measures and activities for establishing the integrated water regime in the given planning area. The plans are being developed based on the water management documentation kept by Croatian Waters, and on the annual plans of Croatian Waters. They include the use of revenues from the charges transferred to the account of Croatian Waters.

From the collected charges, construction of water use and water pollution prevention facilities is partially financed. These funds are used either in the form of loans, or as participation in the costs of construction, in which case Croatian Waters also obtains property rights. Since such funds are, in principal, insufficient, construction of such facilities is also planned at the local level, where the loans from foreign financial institutions (World Bank and others) are sought.

At present, priority is given to ensuring adequate water supply for population, while investments aimed to reduce water pollution are given less attention, mainly due to lack of available funds. The objective of water supply planning is to provide sufficient water quantities and adequate quality for all uses. Water Master Plan of Croatia and the water supply plan as a part there for, are elements of the wider physical planning and protection of aquatic environment, and thus of the environment as a whole.

2.1.1 Common Provision

Funding for the activities of municipal service companies is provided from various sources, but in the case of water supply and wastewater disposal and treatment, the funds are provided through the price of the service.

The price and the method of payment for the provision of water supply and sewerage services are determined by the service providers, i.e. municipal service companies, and there are no administrative or legal limitations regarding the level of the price. In practice, however, the price set by the municipal service companies is under control of the company’s founders - local government units.

The Municipal Service Act allows privatisation of water supply and wastewater sector, through its provisions that any legal entity or private person can get a concession for performing municipal services.

2.1.1.1 Service Area

The *territory* of Croatia is divided into 4 major water management areas which makes specific units: Sava water area, water area of the rivers Drava and Danube, water area of the Primorje and Istria and the water area of the Dalmatia area.

River Sava is used as a water resource for drinking for thousands of people living along the river or nearby, as well as rivers Drava and Danube.

It is estimated that 12% of the total water reserves in Croatia belongs to the underground waters but the significance of that source is very important which can be shown by the fact that more then 90% of all cities (settlements) use underground water for drinking purposes. Generally, the quality of underground waters is rather good, especially in comparasion with other European countries which means that this is a very important resource for Croatia.

The biggest consumers of *surface waters* for drinking purposes are Osijek (partly - Drava river), Vukovar (Danube) and Sisak (Kupa river).

Some 73% of the population of Croatia is supplied from public water supply systems. Out of the total wastewater - municipal and industrial - only 20% is treated before being discharged into watercourses. The water supply penetration through public networks increased from 53% in 1991 to 68% in 1995 and to 73% in 2000 and should reach 95% in 2015.

In spite of slow development during recent years, there is still a considerable back in sewerage services. Only half ot he country's households are connected to a sewerage network - 51%.

Wastewater production in cu.m. (total) are 287.803,000, and treated only 88,000,000 cu.m.

Percentage of treated wastewater with

- a mechanical treatment stage 85%
- a biological treatment stage 4%
- a mechanical-biological treatment stage 11%

Major problems facing water management and water demand in the Slavonia region of Sava catchment area is that only c/a 25% of the inhabitants are connected to the public supply system of drinking water and that the demand for water is high and water resources are limited. It means that more investigation for more water resources must be organized. In the middle and western part of Sava catchment area, especially in Zagreb and in its vicinity, there is heavy water demand. On average, c/a 75% of the demand is satisfied by the public water supply, even the ratio range between 40% to 90%. Problems related to the water supply must be solved in the combination of regional and central public water systems with the limited use of local water systems as transitory solution.

Major problems facing water supply in the catchment areas of Drava and Danube rivers are that only (on average) 53% of the population is supplied with public water supply system which means that the rest of population use water from its own wells as well as industry.

2.1.1.2 Conditions of Service

Companies with limited liabilities where local government units (one or several) are founders and owners of the company are still the predominant form of the organisation of service providers. Participation of private capital in these companies may not exceed 49% of the shares, and there are still no examples of fully privatised companies providing municipal services in the water sector.

In case when there is more than one founder of the company, their share in the company's property is determined based on:

- corresponding part of company property in a particular local government unit (municipality);
- share of services provided to a particular municipality;
- population.

Municipal activities are carried out as a public service.

Pursuant to Municipal Services Act and special regulations, local self-government units and legal and physical persons who carry out municipal activities are obligated to:

- ensure permanent and quality conducting of municipal activities,
- ensure the maintaining of municipal facilities and installations in a functional state,
- take measures to conserve and protect environment.

Pursuant, municipal activities are the following:

- drinking water supply,
- collection and wastewater treatment,

Drinking water supply includes the activities of abstraction, purification and delivery of drinking water.

Sewerage and wastewater treatment include collection and wastewater treatment, drainage of atmospheric water, and pumping, removal and disposal of faecal matter from septic tanks, sump pits and black pits.

Apart from the activities stated, the representative body of the local self-government unit can by decision determine the activities of local interest which are considered municipal activities pursuant to the provisions.

2.1.1.3 Reporting Requirements

The price of the municipal service is paid to the service provider on the basis of monthly bills and of the act proposed by the company performing the service and approved by the company founder.

The water user charge is determined by the decree of Croatian Waters based on level of tarrif approved by the Government of the Republic of Croatia, and on the Regulations on calculation and payment of the water user charge, determined annually (or for the shorter periods of time) by the State Water Directorate. Croatian Waters determines the user charge for all the entities abstracting or drawing water directly from its natural sources. Companies supplying water to the consumers through public water supply systems collect the charge (part of the monthly water bills), and transfer the revenues to the account of Croatian Waters.

The water protection (pollution) charge is determined by a decree of Croatian Waters vode, based on level of tarrif approved by the Government of the Republic of Croatia, for the period of one year or less. In the case of direct discharge, Croatian Waters collects water protection charge, based on the measurements of pollution levels. Water supply companies collect the water protection charge from the users that discharge wastewater through the public sewage systems, and transfer it to the account of Croatian Waters.

The concession charge is determined by the concession contract. In the cases when the decision on awarding the concession is made by Parliament, Government or the State Water Directorate, the contracting authority is State Water Directorate. If the decision on awarding concession is made by county authorities, the contracting authority is Croatian Waters. The agreed amount of the concession charge is paid in favour of the Government budget, if the concession contract is signed by the State Water Directorate, and in favour of the county budget if the concession contract is signed by Croatian Waters.

2.1.1.4 Ownership of Infrastructure

Public ownership of the water supply and wastewater treatment facilities prevails in Croatia. Since local government units are the majority owners of all the existing service providers, Municipal Assemblies have the key role in the management of infrastructure. In the case of new investments, Croatian Waters may acquire property rights, provided that it participates in financing the given development.

2.1.2 Self Service

For the purpose of conducting of activities Municipal Services Act, local self-government units can establish self-services.

Self-services do not have characteristics of a legal person.

Self-services can also conduct municipal activities for other local self-government units in the area of the same or other counties, on the basis of a written contract.

In case the contracts of entrusting the conducting of municipal activities are made by the administration of local self-government units.

Self-services are independent in conducting of municipal activities pursuant, regulations based on foundation forms.

A local self-government unit establishes self-services by the decision of its representative body in the manner and following the procedure stipulated, and regulations.

The decision to establish self-services contains, in particular, the provisions related to:

- municipal activities to be conducted by the self-services,
- the area in which municipal activities shall be conducted,
- internal structure, business organization and management of the self-services,
- funds necessary to start the operation of the self-services, and the manner of their obtaining or securing,
- business acts of the self-services,
- reporting about business efficiency,
- limitations related to acquiring, burdening and alienation of real estate and other forms of special property of the local self-government unit, in which the business of the self-services is conducted,
- manner of supervision of the self-services' business by the local self-government unit,
- appointing and relieving of the manager of the self-services,
- termination of the self-services.

Internal structure of the self-services is regulated by the decision on the establishment of the self-services, and elaborated in more detail in the business statute of the self-services

The self-services are managed by the manager.

The manager is appointed and relieved by the administration of the local self-government unit.

The manager organizes and manages the business of the self-services, is accountable to the administration of the local self-government unit for material and financial business of the self-services, and lawfulness of the business of the self-services.

Based on the authorization by the administration of the local self-government unit, the manager enters into contracts with other physical or legal persons.

The Water Act, the Water Management Financing Act and the Municipal Services Act define the payers of municipal services, water user charge and water protection charge.

Table 2 Charges Paid for Water Use and Wastewater Discharge

1. Price of municipal service	Paid by the end users.
2. Water use charge	Paid by legal entities and persons that abstract or pump water from watercourses, lakes, storage reservoirs ground aquifers and other natural sources.
3. Water protection charge	Paid by legal entities and persons that discharge wastewater or other substances that pollute water.
4. Concessions on water and water-related estate	Paid by concession holder for: • water abstraction for public water supply; • use of water power for electricity generation of electric energy; • water abstraction for technological purposes in industrial and similar activities; • pumping of mineral and thermal waters - water abstraction for irrigation; • fish farming in enclosed water bodies.

2.1.2.1 Limitations on Self Service

The sanctions related to non-payment of the water user charge, water protection charge or concession charge are defined by the Water Management Financing Act, including fines ranging from HRK 10,000 to HRK 500,000 (EURO 1,300 to EURO 65,000) in the following cases:

- if the water supply company fails to account and remit in due time the funds of the water user charge,
- if the company using water power for electricity generation fails to account and to remit in due time the water user charge,
- if the liable company fails to account and to remit water protection charge.

In the above cases, the law envisages fines for the responsible person in the company, ranging from HRK 1,000 to 10,000 (130 EURO to 1,300 EURO).

2.2 Management Units

The conducting of municipal activities can be jointly organized by several local self-government units in a manner stipulated.

The local self-government unit incapable of independently providing the conducting of municipal activities can by the decision of its representative body entrust the conducting of such activities to another local self-government unit in the area of the same or other county, on the basis of a written contract.

If the municipal infrastructure system covers the area of more local self-government units within one or more counties, and forms a unitary, indivisible functional unit, the local self-government units are obligated to organize joint conducting of municipal activities by means of jointly-owned companies.

If the local self-government unit has not organized a permanent, quality conducting of certain municipal activities, or maintaining of individual facilities and installations of municipal infrastructure in the functional state pursuant to provisions, the county in whose area the local self-government unit is located shall organize the conducting of certain or all municipal activities, i.e. the maintenance of facilities and installations of municipal infrastructure in the functional state, at the cost of the local self-government unit.

Any disputes that may arise from the implementation are resolved by arbitration, which consists of representatives of the ministry responsible for municipal services, the county and the local self-government unit.

In accordance with the Municipal Services Act (NN 36(95) which defines the municipal activities, these services include among others water supply and wastewater treatment and disposal. municipal services may be performed by:

1. a company founded by one or several local government units
2. a public institution founded by a local government unit
3. a service - plant, established by one or several local government units
4. a legal entity or a person, subject to concession agreement

Regulations influencing the price of water and the application of economic instruments in water sector are, as follows:

Municipal Services Act (NN 36/95).

Decree on municipal service price determined by the Assembly of the municipal company, and other decisions of the company regarding development of municipal infrastructure and loan obligations.

- Water Management Financing Act (NN 107/95, 19/96 and 88/98) .
- Ordinance on the level of water user charge (NN 62/00).
- Regulations on calculation and payment of water use charge (NN 94/98).
- Ordinance on the level of water protection charge (NN 58/00).
- Regulations on calculation and payment of the water protection charge (NN 62/00).
- Decree on conditions and procedures for awarding of concessions on water and public water-related estate (NN 99/96).

2.2.1 Administrative Units

The management bodies of the municipal companies are the Assembly, Supervising Committee and the management. The company founder, which is at the same time majority owner (city council or city authorities), passes regulations governing the activity of the company.

Based on the required financial resources and the way of financing the municipal infrastructure, the municipal services company has the right to decide what will be the level of the investment costs to be covered by the end users through the water price.

In theory, there are no limitations on the level of the prices municipal companies charge for their services. However, since the company's founders i.e. local government units decide the pricing policy, strong economic and social concerns are often incorporated in it. Although the information indicating regional variations in the collection efficiency exists, there is no data on the impact of municipal service prices on the rate of the payment of water bills in Croatia.

2.2.2 Operating Units

The price and the method of payment for the provision of water supply and sewage services are determined by the service providers, i.e. municipal service companies, and there are no administrative or legal limitations regarding the level of the price. In practice, however, the price set by the municipal service companies is under control of the company's founders - local government units.

2.2.3 Ownership of Facilities

Full privatisation of municipal service companies in Croatia is a desired direction, although the awareness that there are positive and negative sides of the process exists. Participants pointed out that

the positive effects of privatisation of municipal services would not be an automatic result, but would require numerous preconditions, such as:

- adhering to the rules of competition;
- market prices of water, i.e. elimination of the mechanisms that keep the water prices low in order to safeguard the living standard of the users, practice that is currently achieved through the right of the company's founder to control the prices;
- clear contractual relations on the quality of services between the user and the provider of the services (private partner);
- the contract with the private partner must include a time limit in order to provide the possibility of competition in case the provider of the service does not fulfil contractual obligations;
- in case of bankruptcy of the private partner, the service user must be able to protect assets given to the private partner for use;
- the control over the private partner's cost and the possibility of their reduction must be permanent and efficient.

Only professional application of the above-mentioned conditions and of the international experience of more developed societies (including privatisation of municipal companies in transition countries) may give the desired results.

2.3 Service Users

2.3.1 Classification of Users

In accordance with the Municipal Services Act defines the principles, manner of conducting and financing of municipal services and other issues aimed at the efficient carrying out of municipal activities.

Pursuant to this Act, municipal services include the conducting of municipal activities, in particular the providing of municipal services of interest to physical and legal persons, and financing of the construction and maintenance of facilities and installations of the municipal infrastructure as a complete system in the areas of municipalities, towns and the City of Zagreb (hereinafter: local self-government units) as well as in the counties, provided that it is so stipulated.

The funds for conducting of the following municipal activities are secured from the price of the municipal service, as follows:

1. drinking water supply,
2. collection and wastewater treatment, excluding atmospheric water,

The price amount and method of payment of the municipal service are determined by the service provider.

The price of the municipal service for provided municipal service is paid to the service provider.

The payer of the price for provided municipal service is the owner of the real estate, or the user when the owner has transferred it by contract to the user.

If the reasons occur to introduce direct supervision of prices of municipal services, pursuant to a special Act, the measure of direct supervision of prices is introduced by the competent body of the local self-government unit in whose area the seat of the service provider is located.

The construction of facilities and installations of municipal infrastructure for:

1. drinking water supply,
2. sewerage and wastewater treatment

is financed from:

1. municipal contributions,
2. budgets of the local self-government unit,
3. grants, and
4. other sources determined by special regulations.

The decision which determines the amount of the municipal tax is made by the administrative department of the local self-government unit competent for municipal services.

The decision contains, in particular:

1. the amount of funds which the owner of the building site is obligated to pay at one time, or in installments,
2. deadline for the construction of the municipal facility or installations,
3. fine and a reimbursement of paid funds, if the local self-government unit does not fulfill its obligation.

The decision which does not contain the obligatory elements prescribed is null and void.

The decision is made after the determination of the amount of municipal taxes, at the latest by the issuing of the building permit.

The municipal tax is paid per [M1] m^2 gross of the developed surface of the building which can be built on the building lot.

A municipal tax payer who demolishes or restores the existing facility already connected to the municipal infrastructure is obligated to participate in construction financing of facilities and installations of municipal infrastructure proportionally to the increase in the surface of the building in comparison to the previous structure.

The owner of the building is obligated to connect his building to the municipal infrastructure under the conditions prescribed by the decision of the representative body of the local self-government unit.

The owner of the building site pays the costs of the connection of the building site to the facilities and installations of municipal infrastructure directly to the connection provider.

The representative body of the local self-government unit can by decision determine the areas in which the owner of the building can be exempt from the obligation to connect to municipal infrastructure, if the person has in a satisfactory manner individually fulfilled his needs.

The buildings built without a building permit cannot be connected to municipal infrastructure.

2.3.2 Classification of Waters

In the Republic of Croatia, water is classified according to the quality into categories from I to V, on the basis of criteria defined in the Ordinance on Water Classification (NN 77/98). Category I refers to drinking quality waters, and surface waters suitable for trout farming. Bathing and waters suitable for recreation and growing of lower quality fish fall into the second category, Water suitable for the use in industry and agriculture are classified as category III, while waters that can be used only after the purification and in the areas with severe water shortages are classified as category IV. Finally, category V refers to waters that cannot be used for any purposes.

2.4 Regulatory Units

The water sector has linkages with other Ministries, and State Directorates in such matters as organization and scope, public health, improvements in municipal services and general policy on protection of the environment etc.

The Government of Croatia (GOC), through its House of Representatives, has established a National Water Council for the purpose of discussing essential issues of water management, coordination of

various needs and interests, and proposing measures for the development and improvement of the water system in the Republic of Croatia.

The National Water Council consists of the Chairman and ten members appointed for the period of four years by the House of Representatives of the Parliament of the Republic of Croatia. The Chairman and members are nominated from among the representatives in Parliament, eminent scientists and professionals in the field of water management and related fields.

The administrative supervision of the Water Act and its regulations is carried out by the State Water Directorate, which also carries out inspection over the implementation of the provisions of the Water Act and its Regulations, in collaboration with county offices.

"Croatian Waters" is the government agency for water management. The task of Croatian Waters is to ensure permanent and unimpeded carrying out of public services and other tasks in water management in the scope defined by plans and in accordance with the available funds provided for the purpose under corresponding legislation.

The government bodies are organised in accordance with the Act on Organisation and Scope of Ministries and other Government Administration Bodies (NN 48/99 and 15/00). The Act defines their scope of work and competencies. The Ministries, State Directorates, and other bodies having direct influence on water sector policies through regulations proposed to the government of the Republic of Croatia are, as follows:

2.4.1 The State Water Directorate

The State Water Directorate is in charge of all the activities related to water management. The State Water Directorate monitors and co-ordinates development of the water management system, while allowing for the needs of the overall economic development. It is also in charge of the measures for regulation of watercourses and other water bodies, protection from floods and ice, erosion and torrents, irrigation and drainage. Other competencies of the State Water Directorate include management and use of water-related estate, protection of water and sea from pollution, provision of adequate water supplies for population and industry, use of water power, planning and co-ordination of development and construction of public water supply and sewage systems, and inspection in the field of water pollution control. The State Water Directorate proposes to the Government of the Republic of Croatia the level of water use charge and water protection charge (tariff), which are the constituent parts of the total price of water delivered.

(1) Organization

As a Directorate, the SWD is headed by a Director and does not have a seat in the Cabinet of Ministers, but may participate if requested to do so.

SWD has four divisions and its prime responsibility is directing the long-term development of water resources, management of water resources, and supervision over implementation of the provisions of the Water Act (NN 107/95).

The SWD carries out administrative supervision over Croatian Waters regarding its performance of administrative tasks entrusted to it under the Water Act, carries out inspection over the implementation of the provisions of the Water Act, and its organization is structured accordingly.

(2) Jurisdiction

The Water Act defines the responsible bodies and the sharing of responsibilities and water inspection. The SWD develops laws and regulations and ensures the administrative supervision of the implementation of the legislation on water.

In particular, it exercises control over water quality standards and pollution levels, and is the principal International Alert Centre for early warning in the case of accidents on Trans National waters.

SWD controls Croatian Waters and arbitrates on any problems between it and the county offices in charge of water management.

SWD through its State Water Inspectorate is responsible for inspection of national waters (12 inspectors) and acts together with county water management inspectors (40 inspectors located at county offices) who are responsible for local waters. The State Inspectorate is responsible for the monitoring of water quality.

The State Water Inspectorate is also responsible for international commitments, the preparation and implementation of the National Plan for the Defense Against Floods, and other sub-plans under the National Water Management Master Plan of Croatia (yet to be issued).

2.4.2 The Ministry of Public Works

The Ministry of Public Works is in charge of the activities related to the application of instruments and measures of the economic policy in construction, housing and housing policy, and implementation of special programs for improvement of the situation in municipal services.

2.4.3 The Ministry of Environment and Physical Development

The Ministry of Environment and Physical Development carries out administrative and other tasks related to the general policy of environmental protection, providing of conditions for sustainable development, protection of air, water, sea, flora and fauna in integrated interaction.

2.4.4 Counties

In addition to the above-mentioned Ministries, at the local level, there are 21 counties and the metropolitan administration of the City of Zagreb, which influence the price of water by their respective decisions.

2.4.5 Croatia Waters

"Croatian Waters" is a Government agency for water management. The task of Croatian Waters is to ensure permanent and unimpeded carrying out of public services and other tasks in water management in the scope defined by plans and in accordance with the available funds provided for the purpose under corresponding legislation. Within its legal powers, Croatian Waters passes administrative and other acts and makes decisions on issues important to water management. These include preparing of basic plans for water management, maintenance of water-related structures, protection from detrimental effects of water, water use, water pollution control, managing of public water estate, professional supervision and engineering in construction of water-related structures, and collection of funds for financing of such works and activities.

(1) Organization

The governing body of Croatian Waters is the Management Council. The Management Council has seven members, appointed (and dismissed) by the government. The members are nominated primarily from among public officials and professionals in the field of water management, economy and public finance.

The leader of operations of Croatian Waters is the General Manager. He is appointed (and dismissed) by the government (GOC) upon proposal by the Director of the State Water Directorate, for a period of five years.

The internal organization of Croatian Waters for the purpose of operative management has established five Water Management Departments as follows:

1. Sava Basin, with the seat in Zagreb
2. City of Zagreb, with the seat in Zagreb
3. Drava Basin, with the seat in Osijek
4. Littoral and Istrial Basin, with the seat in Rijeka
5. Dalmation Basin, with the seat in Split

Water management branch offices of catchment areas are formed within the departments.

The internal organization of Croatian Waters is defined by a separate general document passed by the management council with the consent of the Director of SWD. The internal organization is determined in accordance with the principles of internal organization defined by the Statute. There is an Act on Organization and Scope of Ministries and other Government Administration Bodies (NN 48/99 and 15/00).

Operational management of the water system is carried out by four Water Management Departments for each of the main basin catchment areas, and one special department for the City of Zagreb catchment area. Each department has sections dealing with the basic components of water management (water use, water protection, and protection from water). The main four water management departments also control the branch offices for the 31 individual river catchment areas.

Water management activities as defined by the Water Act are carried out by a number of separate sectors responsible for:

- Preparing studies and development plans
- Pollution control
- Ensuring of water resources
- Protection from the harmful effects of water
- Operation of public authority in the water sector

The main office of Croatian Waters is located in Zagreb, and includes the water management departments of the Sava river basin and the City of Zagreb basin (other basin departments are located elsewhere).

Croatian Waters has a staff of about 700, with approximately 60% being the holders of University Degrees.

(2) Jurisdiction

Croatian Water has responsibility for State and local water management. Its principle duties are to manage Croatia's waters according to the adopted water management plans and schemes, issue administrative and other orders and make decisions on matters of importance. In terms of water management, it has jurisdiction over the following:

- Preparation of water management plans, water management schemes of catchment areas and other plans for water management
- Regulation of watercourses and other water bodies and protection from the adverse effects of water - monitoring of the situation and control of watercourses and other water bodies, organization of protection from floods and ice, protection from erosion and torrents, organization of construction, technical and economic maintenance of watercourses and water works
- Water protection-monitoring and determination of water quality, organizing of implementation of the National Water Protection Master Plan, coordination of water protection plans of the local

administrative units and other plans for investment in water protection, and control over their implementation, measures for prevention and elimination of water pollution

- Supervision over implementation of terms and conditions of water management acts and concession agreements (water management supervision)
- Tasks related to implementation of plans for water management

2.4.6 Local Governments

(1) Organization

Most but not all of the companies providing water supply and sewerage system services are joint stock companies owned by the municipalities they serve. In some places the services are operated by municipal departments.

In general terms, the organization of these private (municipal) companies is similar, with an Assembly, a Supervising Committee and a Manager (or Director). The organization beyond this level depends on the total municipal services provided (some companies provide solid waste disposal, cemetery maintenance etc.), the size of the population and industries served, and the level of facilities to be operated and maintained. Hence, all companies have different departments and sections to suit their particular needs.

Regulations governing the activities of the company are passed by the company founder and majority stockholder who are usually a city council, town council or municipality.

The Assembly is the highest authority of the company like Board through which the founder makes decisions on the following matters:

- Tariff setting
- Contents of the contract with the company
- Election (and dismissal) of the members of the supervising committee
- Appointment (and dismissal) of the manager
- Appointment of members of the arbitration committee
- Acceptance of new members into the company
- Awarding of concessions for municipal activities following the previous decision of the city, town or municipal council - (the founder of the company) for water source
- Adopting regulation on financing of development of municipal activities
- Development program of water supply and wastewater disposal

The Supervising Committee supervises the operation of the company and acts on behalf of the company towards the management. The Supervising Committee in particular:

- Supervises the use of company funds, the operation of the company, the implementation of contracts and decisions of the Assembly
- Discusses the reports on Operations and Finance
- Submits to the Assembly the reports on supervision etc.

(2) Jurisdiction

With regard to water quality management, Municipal and Town Councils, and the City of Zagreb, are responsible for the drawing up and issuing of the following regulations under the Water Act:

- Sanitary protection zones around sources of water used for public supply

- Use of the public water estate for rest and recreation
- The method of wastewater disposal, the obligation to connect to the public sewerage system, the conditions and manner of wastewater disposal in areas where such systems do not exist, particular measures for the disposal and elimination of hazardous and other substances, and the obligation to maintain the public sewerage system
- Maintenance of the amelioration drainage system

The municipal companies have jurisdiction over the operation and maintenance of the water supply, wastewater treatment and disposal.

2.5 Environmental Regulation

Pursuant to the Croatia's foreign policy objectives, the process of European integration has been recognized as one of the top priorities. In order to decrease differences between Croatia and the EU member states in the field of environmental monitoring and reporting, it will be necessary to adopt the EU/European Environmental Agency (EEA) standards and guidelines in the process of association. Without a doubt, the harmonization of indicator sets and environmental reporting with the EU accepted norms and standards is one of the most important steps in achieving the sound environmental management. The implementation of these standards will make the data comparable and ready for exchange on both, the national and international level. This in turn, will allow the EU and the international community in general, to provide a better assistance to Croatia both in terms of consultancy and technology transfer.

In Croatia today, the collection of environmental data is carried out on different levels and it is most financed from the State budget. Various governmental bodies, research and academic institutions as well as other organizations/companies have competence to gather information and meta-data of a vital enviromental importance.

According to the provisions of the Law on Environmental Protection of the Ministry of Environmental Protection and Physical Planning has the obligation to prepare the State of the Environment Report every four years. The preparation of the State of the Environment Report heavily relies on the data available while its quality depends on the quality of the data used.

The Ministry of Environmental Protection, and Physical Planning, is responsible for water bodies inside protected areas, and deals with environmental protection information. It is responsible for the maintenance of the Environmental Pollution/Emission Cadastre created in 1997, which includes emissions into waters. The Ministry of Health looks at the health impact of water (drinking water) and water uses.

2.6 Economic Regulation

The basic economic regulators influencing the price of water, and corresponding legislation are the following.

Table 3 Basic Economic Regulations Influencing the Price of Water

1. Price of municipal service	Source of revenue for municipal service determined by the Municipal Services Act (includes the service, repayment of loans for construction of facilities and municipal infrastructure). It is determined by the provider of the municipal service, with the consent of the founder of the municipal company.
2. Water use tariff	Source of revenue for financing of water management defined by the Water Management Financing Act (NN 107/95). The charge (tariff) is determined by the Government of the Republic of Croatia
3. Water protection tariff	Source of revenue for financing of water management defined by the Water Management Financing Act (NN 107/95). The charge level (tariff) is determined by the Government of the Republic of Croatia.
4. Concessions on water and water estate	Concession provides the right of use of water and water-related estate, i.e. the right to perform economic and other activities on water and water-related estate.

Other important laws that may directly influence the price of water are:

- Islands Act (NN 34/99)
- Investment Promotion Act (NN 73/00)

The above laws provide certain alleviations in financing of infrastructure works, which results in lower loan repayment instalments and directly affects the price of water.

In accordance with the Islands Act, the Program of Sustainable Development is prepared. On the basis of this Program, it is possible to obtain loans at more favourable terms than those at the market. In addition, the Government prepares national development programs for the islands, which among other things include water supply and disposal of island wastewater.

The Investments Promotion Act provides the possibility of using tax and customs privileges for newly established companies carrying out specific activities (such as new companies holding the concession rights for municipal service activities, for example).

Also, in the areas of particular national concern, in accordance with the program of reconstruction of such areas, it is possible to implement more favourable investments in infrastructure, which may influence the final price of water in such areas.

2.6.1 The Water Protection Charge

The Water Protection Charge is fully defined in the Water Management Finance Act (NN 107/95, as amended by NN 19/96 and NN 88/98), and summarized below:

Payments for water protection are made for contamination and pollution of water resources. The funds collected by these payments are used for financing of protection of water resources, as follows:

- Preparation of Water Protection Plans and their implementation
- Recording and establishing the quality of water resources and undertakingmeasures for their protection
- Building of water protection facilities

In addition, the funds are used for proportional participation in financing the expert, administrative and other activities in water system management, considered as public service.

Payments for water protection are made by legal and physical persons discharging wastewater or other substances contaminating water or deteriorating their quality and usability. The water protection payments are accounted by legal persons performing water supply activities as per the quantity of distributed water, and these payments are made by the owners and users of apartments and business premises with a connection to the water supply system, except by those discharging contaminated industrial wastewater. These legal persons keep the collected payments on an internal transfer account and remit them to Croatian Waters as determined by the State Water Directorate. The legal persons collecting payments for transfer to Croatian Waters are entitled to a fee in the amount not exceeding 5% of the payment collected in accordance with a contract entered into with Croatian Waters.

The payments for water protection are made as per the quantity of discharged wastewater and by the degree of impact on deterioration of quality and usability of the water (quantity of discharged dangerous substances, impact on the deterioration of quality, etc.).

The amount of payment for water protection is determined by the government of Republic of Croatia. The unit charge in principle cannot be less than the price of wastewater purification (except for the payments made by the users purifying the water with their own purifiers), but in practice this principle is rarely applied.

The water protection payments from the persons discharging contaminated (polluted) industrial wastewater and from the users of apartments and business premises without a connection to the water supply system are accounted by and made to Croatian Waters.

Water Protection charge payments made to Croatian Waters in year 2000 were as follows:

Table 4 Payments of Water Protection Charge in Croatia

Source	Billed HRK	Collected HRK	Balance HRK
W & S Companies	161,442,448	139,252,758	22,189,690
Industrial & Other Users	95,282,849	46,311,536	48,971,313
Total	**256,725,297**	**185,564,294**	**71,161,003**

As can be seen from the foregoing, the collection efficiency for payments through the W & S Companies was 86%, that of the industrial and other users paying directly to Croatian Waters was only 49 %, giving an overall collection efficiency of 72%.

Contributions of W & S Companies amounted to about 60% of the total billed and 75% of the amount collected. Although the balances are, in theory, collectable and subject to penalties for late payment, the Croatian Waters recorded the amount outstanding at the end of year 2000 to be HRK 448,083,966.

However, the figures given are running totals and do not necessarily reflect the true collection efficiency, although the figures may be considered indicative since the debt to Croatian Waters is increasing on year.

Figures for the Sava Basin, excluding Zagreb for year 2000 were as follows:

Table 5 Payments of Water Protection Charge in the Sava River Basin

Source	Billed HRK	Collected HRK	Balance HRK
W & S Companies	20,886,471	18,872,089	2,014,382
Industrial & Other Users	25,443,999	12,832,465	12,611,533
Total	**46,330,470**	**31,704,554**	**14,625,915**

2.6.2 Central Financing of Infrastructure Development

The users of sewerage collector mains, wastewater treatment plants, submarine collectors with corresponding facilities, retention basins, collector overflows, pumping stations, etc. may use

preferential loans (with a lower interest rate than commercial loans) from Croatian Waters provided for water pollution control and included in the annual Water Management Plan, under the conditions that that they provide their own contribution of minimum:

(i) 25% in areas of particular national concern
(ii) 30% on Adriatic Islands
(iii) 35% in towns and municipalities where the development of public sewerage is less than 30%
(iv) 50% in other towns and municipalities

The burden of the local cost contribution is shared between the local government and the company providing water and sewerage services, in accordance with the affordability of the parties. The amount of contribution from the town and municipal companies must be considered separately for each individual case in accordance with the ability of each municipal authority to obtain a long-term loan. Since the companies are wholly owned by the local authorities, there is no distinction between local government and the municipal company when considering the percentage of the local budget contribution to project financing.

3 PRODUCT QUANTITY AND QUALITY

Table 6 Water Use in Croatia

Average annual water use in Croatia from 1990-1999	635 million m^3
- public water supply	278 million m^3
- industrial purposes - company executed abstraction	75 million m^3
- cooling water	205 million m^3
- other	77 million m^3
Population connected to public water supply	3,286 million m^3
Specific water consumption from public water supply systems	232l/per capita/day
Total leakages in water supply systems	46%
Percentage of groundwater in water quantities abstracted for water supply	86 %
Percentage of surface waters in water quantities abstracted for water supply	14 %
Population supplied from public water supply systems	
- in 1990	62 %
- in 1992 (decrease due to war-related destruction)	51 %
- in 2000	75 %
Amelioration areas	
- with favourable natural conditions for amelioration	620,000 ha
- with constructed amelioration systems	13,290 ha
Surface of freshwater fisheries in the Sava, Drava and Danube catchment areas	13.110 ha
Available, technically usable hydropower potential of the Republic of Croatia	12.00 TWh/year
- used hydropower potential in 17 conventional hydropower plants	5.5 TWh/year
- economically and ecologically profitable portion of unused hydropower potential	3.50 TWh/year
- hydropower potential without economical or ecological profitability	3.00 TWh/year

Table 7 Protection of Water and Sea from Pollution and Contamination

Total number of locations for monitoring the quality of sufrace waters, groundwater and the sea	704
- surface waters	239
- groundwater	183
- sediment	8

- coastal waters	68
- special programs	206

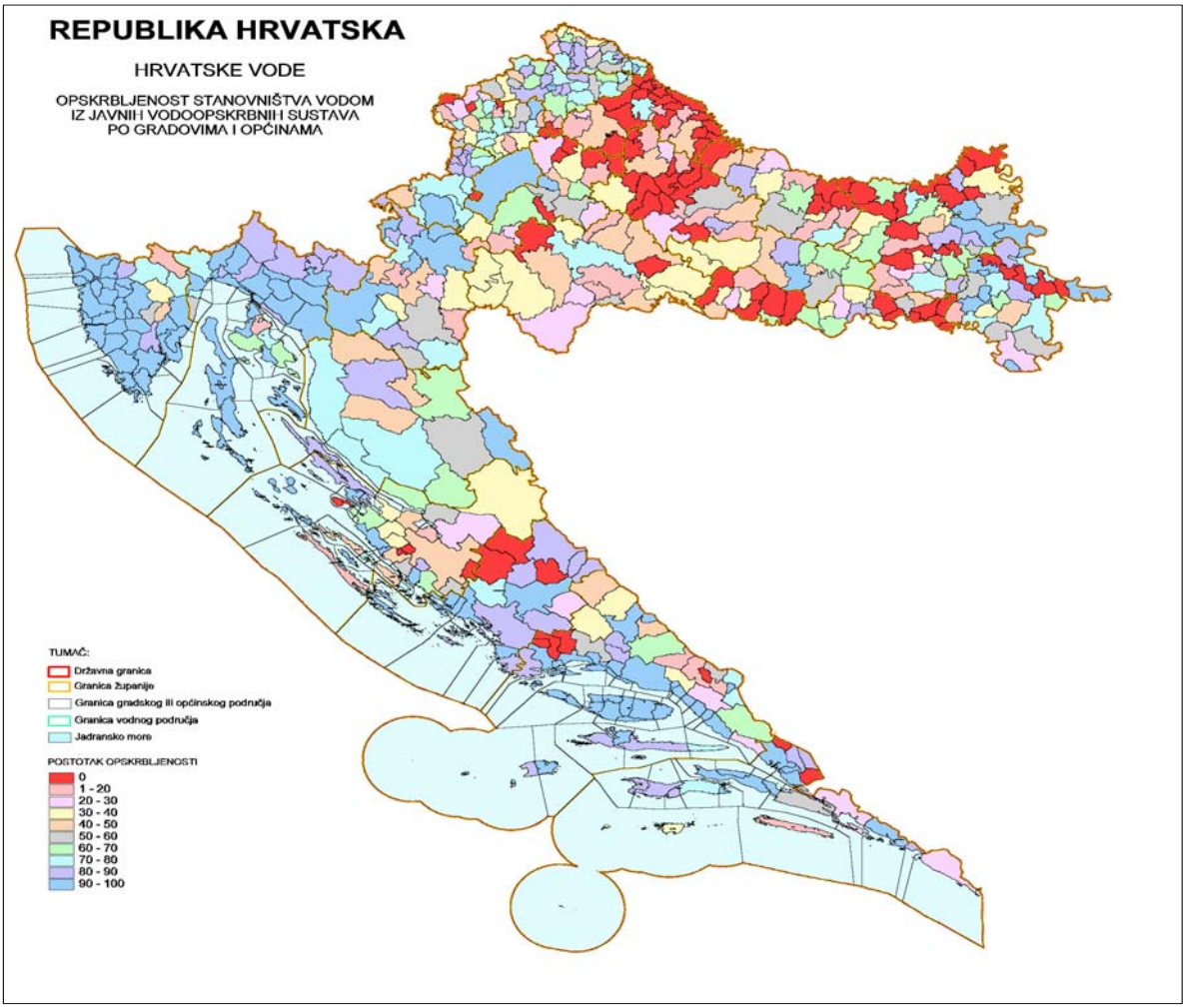
Surface waters and sea water quality trends

Due to the reduced industrial production since 1999 a trend of quality improvement of surface waters has become evident. Water quality of large watercourses complies with the majority of key parameters prescribed for the category, with the exception of segments downstream of largest sources of pollution. Small local watercourses in their upstream segments are mostly satisfactory with regards to prescribed category, which is not the case with lowland watercourse sections.

In karst regions water quality in spring areas is satisfactory for prescribed category, except in unfavourable hydrologic conditions. Sea water quality is mostly satisfactory for prescribed water categories I and II, except for areas along wastewater discharges of large polluters. Measured average values of BOD_5 are mostly satisfactory for water quality categories II and III.

Table 8 Monitoring and Level of Wastewater Treatment

Total number of locations for monitoring wastewater and point source pollution	1730
- municipal wastewater	201
- industrial wastewater	1529
Constructed municipal wastewater treatmet plants (2.230.820 PE)	67
- mechanical treatment	17
- mechanical - biological treatment	27
- mechanical treatment with long submarine outfall	22
- constructed wetlands	1
Households connected to public sewerage systems	40-50%
- percentage of mechanically treated wastewater	10.5%
- percentage of mechanically-biologically treated wastewater	3.8 %
Some importat ecosystems in water basins	
- Plitvice Lakes National Park	
- Krka River National Park	
- Lonjsko Polje and Mokro Polje	
- Kopački Rit	
- Lower Neretva River	
- Crna Mlaka Fish Ponds	


REPUBLIKA HRVATSKA
HRVATSKE VODE
OPSKRBLJENOST STANOVNIŠTVA VODOM
IZ JAVNIH VODOOPSKRBNIH SUSTAVA
PO GRADOVIMA I OPĆINAMA
TUMAČ:
Državna granica
Granica županije
Granica gradskog ili općinskog područja
Granica vodnog područja
Jadransko more
POSTOTAK OPSKRBLJENOSTI
0
1 - 20
20 - 30
30 - 40
40 - 50
50 - 60
60 - 70
70 - 80
80 - 90
90 - 100

4 ECONOMIC DATA

4.1 Prices at Various Points in the Production

Water use charges are calculated based on the tariffs (No) set by the Government of the Republic of Croatia, quantity of water used, and a series of correction factors that reflect the intended use of water.

Charges (No) per 1 m^3 of water (depending on category) are given below:

- Category I HRK 0.80, EURO 0.10
- Category II HRK 0.72, EURO 0.09
- Category III HRK 0.56, EURO 0.07
- Category IV and V HRK 0.32, EURO 0.04
- Mineral and thermal waters HRK 1.60, EURO 0.21

Since it's introduction in 1990 until recently, basic tariff of water use charges was linked to Deutsche Mark, so the currency change (from former Yugoslav dinars into Croatian kunas) and inflation did not affect the relative amount of the tariff. Water Management Financing Act from 1995 confirmed previous regulations on the basic charge tariffs, so they in fact did not change during the past 10 years. With the low inflation rates in the recent years (since the tariff is no longer linked to German currency), and due to generally low purchasing power and weak economy, there were no attempts to raise the level of the tariff.

4.2 Water Price Structure - Tariffs

Based on the above data, the following table illustrates structure of water prices paid by consumers connected to the public water supply and sewerage system in several Croatian cities.

Table 9 Water Price Structure in Selected Cities in Croatia (2000)

Water price component	1	2	3	4	5	6	7
municipal service for water supply	2.41	1.15	1.10	2.04	2.90	1.81	1.17
VAT 22%	0.53	0.26	0.24	0.45	0.63	0.40	0.26
municipal service for sewerage	0.61	0.50	0.33	0.68	0.30	0.61	0.46
VAT 22%	0.13	0.11	0.07	0.15	0.07	0.13	0.10
development of infrastructure	0.57	0.42	0.94	3.44	-	0.16	1.70
water user charge	0.80	0.80	0.80	0.80	0.80	0.80	0.80
water protection charge	0.90	0.90	0.90	0.90	0.90	0.90	0.90
water use concession charge	0.08	0.08	0.08	0.08	0.08	0.08	0.08
TOTAL per 1 cu.m. HRK	**6.03**	**4.22**	**4.46**	**8.54**	**5.68**	**4.89**	**5.47**
TOTAL per 1 cu.m. EURO	**0.78**	**0.55**	**0.58**	**1.11**	**0.74**	**0.64**	**0.71**

Cities: 1 Rijeka, 2 Zagreb, 3 Varaždin, 4. Osijek, 5 Gospić, 6 Đakovo, 7 Split.

(1 EURO =7.7 HRK)

Source: Survey of the State Water Directorate

4.3 Water Protection Charge

The basic tariff (T) for 1 m^3 of discharged wastewater is 0.90 HRK (0.12 EURO). The amount of water protection charge for discharged water is calculated according to the following formulae:

a) For wastewater discharged into public sewerage system (communal and/or industrial wastewater), or into natural recipient:

$$N = T \times V \times k_1 \times k_2 \quad (1)$$

b) For discharged wastewater, which was used in the cooling process, into natural recipient:

$$N = T_{\Delta t} \times V_t \times \Delta t \quad (2)$$

c) For wastewater discharged into natural recipient when communal and industrial wastewater is mixed with wastewater used in the cooling process:

$$N = (T \times V \times k_1 \times k_2) + (T_{\Delta t} \times V_t \times \Delta_t) \quad (3)$$

The factors in equations (1), (2) and (3) mean:

N = amount of charge

T = charge level or tariff per cu.m. of discharged wastewater, set by the Ordinance of the Government of Republic of Croatia (0,9 HRK, EURO 0.12)

$T_{\Delta t}$= charge level or tariff per cu.m. of wastewater used for cooling, as determined by the Ordinance of the Government of Croatia (0,0009 HRK, EURO 0.00012)

V = annual quantity of discharged wastewater in cu.m.

V_t = annual quantity of discharged wastewater used for cooling, in cu.m.

k_1 = coefficient reflecting the level of deterioration of water quality and suitability for use, calculated according to the formula:

$$k_1 = \left(\frac{B}{B_d} \times R + \sum_{i=1}^{n} \frac{OT_i}{OT_{di}}\right)^{0,5}$$

Where:

B = annual arithmetic mean of all measured values of five-day biochemical oxygen demand in mg O_2 /l in discharged wastewater

B_d = permissible value of five-day biochemical oxygen demand in mg O_2/l, determined by the water management permit

R = factor of biodegradability of released wastewater, calculated according to the formula COD_{cr}/ (2.5 x B), which is introduced only if higher than 1, and when wastewater is discharged into the public sewerage system. Exceptionally, it may be introduced in the case when wastewater is discharged into the natural recipient, and in accounting of the charge B = 250.

COD_{cr} = the annual arithmetic mean of all measured values of chemical oxygen demand in released wastewater, in mg O_2/l,

OT_i = annual arithmetic mean of all measured concentrations of i-th dangerous substance in mg/l in discharged wastewater

OT_{di} = permissible concentration of i-th dangerous substance in discharged wastewater, determined by the water management permit

k_2 = coefficient applied only when wastewater is discharged through the wastewater treatment plants into the natural recipient, which is:

0.70 - For wastewaters discharged through a wastewater treatment plant with the first stage of treatment, or through plants with a corresponding level of treatment with a submarine outfall

0.30 - For wastewaters discharged through a second stage treatment plant with sludge processing and disposal, or through a first stage treatment plant with submarine outfall and disposal of sludge

0.20 - For wastewaters discharged through a third stage treatment plant, with sludge treatment and disposal

Δt = Difference of arithmetic means of measured values of wastewater temperature at discharge and measured values of temperature at the intake, during one year.

Coefficient k_1 is a cost-recovery instrument, and its value is proportional to the actual level of pollution of the discharged wastewater. K_1 is equal to 1 for communal wastewater and other effluents that are not subject to wastewater permits. The coefficient is calculated based on the actual (measured) values of water pollutants against their values given in the effluent permit[1].

Coefficient k_2 on the other hand is an incentive instrument, aimed to stimulate polluters to discharge wastewater thorough the plants with full-scale treatment - mechanical, biological and chemical. However, incentive function of the coefficient may be fulfilled only if the basic water protection tariff (currently 0,9 HRK/m^3) is set on a realistic level and if it represents the actual costs of necessary water treatment.

By being the subject to the same regulations as water use charge, the relative amount of the water protection charge has not changed during the last decade.

Following formulas are used in calculating water user charges:

For water delivered through water supply system, for technological purposes with user's own abstraction, and for abstraction of water for cooling processes

$$N = N_o \times V_1$$

Where:

N = the amount of charge

N_o = tariff depending on water category

V_1= quantity of water in cu.m. used in the accounting period

a) For water abstraction or pumping by the user's plant, when water is used for fish-farming

$$N = 0.05 \times N_o \times V_2$$

Where:

N = amount of charge

N_o = tariff depending on water category

V_2 = quantity of water used expressed as the volume of fishpond, in cu.m.

b) For irrigation:

$$N = N_1 \times V_3 \times k$$

Where:

N = amount of charge

[1] The permissible concentrations of dangerous substances are defined in the effluent permit, which is issued by either county authorities or Hrvatske vode, with the consent of State Water Directorate.

N_1 = tariff determined, in this case, by the municipal assembly

V_3 = quantity of water used in the accounting period

k = correction coefficient determined by the county assembly;

Correction factor k is designed in such a way as to reflect the level of development of the irrigation system. Its rationale is to stimulate the application of more efficient irrigation systems, and thus the more efficient use of water. However, due to bad conditions in the agricultural sector, and low collection efficiency, a number of municipal assemblies decided not to implement this charge.

c) For water used for electricity generation

$$N = N_2 \times E$$

Where:

N = amount of charge

N_2 = level of charge per 1 KW h (7.5% of the price of KWh at plant gate)

E = quantity of electric energy produced in the accounting period

d) For water which is used as plant driving power

$$N = N_2 \times S$$

Where:

N = amount of charge

N_2 = level of charge per 1 KWh

S = total plant power in KW

4.4 Concession charge

The annual charge paid for concession is:

1. for water abstraction for public water supply - 10 percent of the water user charge, which is 0.08 HRK (EURO 0.01) per cu.m. of water;
2. for water abstraction for selling on the market - 2.5 percent of revenues from water sale;
3. for pumping of mineral and thermal waters, 10 percent of charge for use of such waters which is 0.16 HRK (EURO 0.02) per cu.m;
4. for pumping of mineral waters for the market, 2.5 percent of revenues from the sales;
5. for irrigation, 10 percent of the water user charge;
6. for the use of water power for generating of electric energy, the annual charge is 1 percent of actual average price of energy at plant gate;
7. for the use of water power for plant driving, 1 percent of revenues from the activity for which the plant is used;
8. for fish-farming, 15 percent of estimated value of total fish catch in one year.

Concession charges described above were set in 1996, and have not changed since.

5 INFRASTRUCTURE

Data referring to water consumption in Croatia exists within official data of Croatian Waters. These data are collected for the purpose of calculating the water management charges (water protection, water use and concession charges). The second source of the data related to the water consumption is official statistical data of the National Statistical institute.

Prior to 1998, municipalities were not obliged to report data on total abstracted water, so water supply statistics were kept in a different way. Since two years ago, municipalities report data related to abstracted water (volume of water metered on the actual place of the water intake, or volume of water which enters water supply system), but the data collection is still not entirely smooth and efficient.

According to the present calculations, leakages from the public water supply system were estimated at 46% in 1998, and at 43% in 1999. The figures represent difference between abstracted and delivered water, and are mainly attributed to the old age of the water supply pipelines and equipment. Another factor influencing high leakages is a considerable number of illegal connections to the water supply network. War damages of the water supply facilities, poor maintenance and low-quality materials also play a role in the water losses accounting to nearly half of the abstracted water.

When all the categories of water supply are taken into account (PWS, industry's own abstraction, cooling water and others), leakages are estimated at 25%.

The percentage of population with the access to PWS was 62% in 1991. Over the last 10 years, Percentage of population with the access to PWS rose steadily and reached 73% in 2000. However the level of water supply is still not satisfactory. The reasons for this can be found in water supply constraints such as inadequate capacity of water sources, and incomplete or non-satisfactory development of water supply system. Damages caused by the war additionally worsened the existing problems in water supply.

When the data on the water delivered through the PWS is compared with the share of population with access to PWS, two opposite trends are observed: decrease in the consumption of water delivered through PWS (311 mill m^3 in 1991, 276 mill m^3 in 1999), and an increase in the percentage of population with the access to PWS (62% in 1991, 73% now). The main explanation for this is drastically reduced water consumption of the industrial sector, due to reduced level of industrial operations in the country. At the same time, a slight trend in the reduction of per capita domestic water consumption is observed. Both of these two factors are offsetting the effects of the increased share of population connected to PWS, and resulting in decreased total water consumption during the last 10 years.

Equipment for metering of the water delivered to households exist in 59 out of 130 Croatian municipalities that have registered service companies dealing with water supply and wastewater (data from 1998).

Water consumption is mainly metered by block of flats, or by single-family houses. The bill paid by block of flats is divided by number of persons in the block, and does not reflect the actual water use of the individual household. In the case of the single-family houses the bill is paid by the house and in the some cases can reflect the actual water use of the individual household.

In the last few years, municipalities in larger cities allow installation of meters in each flat. There is no particular official standpoint related to this issue, and if there are specific requests for installation of individual metering equipment, there are usually approved. Generally speaking, individual metering equipment in the big apartment building is still rare. The metering system is volumetric.

Some of the municipalities where there is no metering equipment, for example, determine minimal volume of water per inhabitant, which is used for further calculations (for example 5 m^3/inh/month).

The following table presents the share of population with access to sewerage and public wastewater treatment facilities. It also gives share of population (in different regions) with access to primary and secondary wastewater treatment for 1996 and 1999.

Table 10 Share of Population with Access to Sewerage and Public Wastewater Treatment Facilities

River basin	Number of inhabitants (rough figures)	Year	Connected to public sewer network		Connected to primary treatment plants		Connected to secondary treatment plants	
			No. inh.	%	No. inh.	%	No. inh.	%
Sava	2,340,000	1996.	1,169,700	50.0	20,700	0.9	80,300	3.4
		1999.	1,239,900	53.0	20,700	0.9	80,300	3.4
Drava and Danube	910,000	1996.	425,000	46.7	25,000	2.7	49,300	5.4
		1999.	427,000	46.9	25,000	2.7	65,300	7.2
Littoral and Istrian	599,000	1996.	320,000	53.4	230,000	38.4	13,500	2.3
		1999.	344,900	57.6	252,000	42.1	22,000	3.7
Dalmatian	937,000	1996.	380,000	40.6	180,000	19.2	9,500	1.0
		1999.	468,500	50.0	205,600	21.9	12,000	1.3
Total Croatia	**4,786,000**	**1996.**	**2,294,700**	**47.9**	**455,700**	**9.5**	**152,600**	**3.2**
		1999.	**2,480,300**	**51.8**	**503,300**	**10.5**	**179,600**	**3.8**

Source: Croatian Waters

The typical sewage system is combined. Only a few smaller cities and residential districts of bigger towns have separate systems. Industrial wastewater is often discharged into the sewerage system, in many cases without adequate pre-treatment. In terms of treatment facilities, Croatia is under-equipped. The bulk of the wastewater undergoes primary treatment only. Since construction of wastewater treatment plants was made priority a few years ago, many municipal facilities have been or are being built.

As shown in Table 10, the share of population connected to public sewerage and wastewater treatment plants is considerably higher in Littoral and Istrian river basin, than in any other region of Croatia. This is due to the fact that boundaries of this river basin coincide with the most developed part of Croatia, which has long developed a systematic approach in dealing with wastewater. At the same time, the price of water paid in the counties of this river basin is significantly higher than the average price of Croatia, i.e. more funds are available for the investment in wastewater treatment plants/sewage system.

Due to the already mentioned weaknesses in keeping water statistics in Croatia, and relatively low penetration of metering equipment, data on per capita (or household) water consumption is not readily available. This report therefore looks into couple of different methods for calculating average water consumption

As already explained, water consumption has a decreasing trend due to the large decrease of water consumption by the industrial sector. Based on the above calculation method, this in fact means that the total quantity of consumed/abstracted water fell from 232 m^3 per person per year in 1985, to 170 m^3 in 1995. The downward trend continued in the second half of the 90's, with the following average consumption figures: 1996 - 167 m^3 per person; 1997 - 165 m^3 per person; 1998 - 166 m^3 per person.

Another method takes into account domestic water consumption, and divides the quantity of invoiced water with the number of users. The average consumption calculated in this way is 60 m^3 per user per year, where user is not a single person, but the holder of the water bill.

6 MANAGEMENT UNITS

6.1 Types of Management Units

The Municipal Services Act (NN No. 36/95), which defines the municipal activities, includes, among others, water supply and wastewater disposal services. Municipal services may be carried out by either or among the following entities:

1) A company founded by one or several local administration units
2) A public institution founded by a local administrative unit
3) A service plant, established by one or several local administration units
4) A legal entity or a person subject to concession agreement

Presently, private companies provide most of the municipal services (wastewater disposal). There are about 130 such companies located in the larger urban areas. Privatization of municipal service companies has been carried out under the Municipal Services Act.

When municipal companies are formed, they are usually established as limited liability companies (d.o.o.), with local administration unit(s) as founders and owners.

Local Administration Units must hold at least 51% of the shares, with the remaining shares available for other private entities. No one from the private sector has yet bought into these companies since their financial situations are unattractive to investors.

The municipal companies are the owners of the assets, and if others buy in, their ownership would be in proportion to their shareholdings.

It is essential to ensure that the water and sewerage companies have the institutional as well as the financial capacity for the operation and maintenance of the enhanced sewerage systems.

The formation of private municipal companies has lead to many municipal services,in addition to water supply and sewerage, being transferred to the new limited liability companies (d.o.o.) There are some comapnies that provide water, and sewerage services only. The remaining companies are communal service companies that provide a range of other services from gas supply and solid waste disposal to open air markets and cementery maintenance.

In the interest of economy, there is logic to the sharing of financial and management services, and to group together environmental and other services, which can share both labor and transport. However, as the sewerage network expands and the treatment plants come on stream, there will be need for a dedicated management team and labor force for the water supply and sewerage services.

It is recommended that the whole policy regarding the services to be provided by a municipal company be re-assessed nationally, particularly where large sewerage (and water supply) projects are planned.

6.2 Management Unit Services Areas

Due to the increasing standard of living and the reflashing of tourism we see and expect a further increasing water demand. The water supply penetration through public networks increased from 53% in 1991 to 68% in 1995 and to 73% in 1999 and should reach 95% in 2015. The network length in 1998 was 24,596 km.

Table 11 Basic Data of Water Supply (2000)

Indicator	Unit	Value
Population supplied with piped water	Thousand	3,125
Population supply penetration 1999 (% of total population)	%	73
Specific water demand	L / capita, day	205
Total water consumption household	Mil m^3 / y	190.317
Total water consumption industry	Mil m^3/ y	139.006
Length of water supply networks	km	24,596
Water losses	%	43

It is recommended that the municipal companies that provide a variety of services, form a separate water supply and sewerage department to cope with the proposed expansion to the sewerage system and the construction of treatment plants. Water and sewerage form and integral system and their operation, maintenance and development must be compatible.

Such a department should have one (1) manager for the technical and financial operations of both the water supply and sewerage sections, sharing the services of plant and vehicles, the laboratory, etc. The sewerage section should have units for drainage, the sewerage network, and the treatment plant.

There must be a Management/Finance/Administration structure to support the technical services of the water supply and sewerage units within the new combined department. Whereas it is desirable for the department to have its own finance and administration section, this may not always be possible, particularly in the smaller companies.

However, it is essential that any finance department providing services to a number of departments has a separate cost center for water supply and sewerage accounts, a sound billing system and be able to provide essential statistical information.

6.3 Population Served

It is important to point out that the war (1991-1995) had a tremendous impact on the population distribution and the number of inhabitants (forced migrations, refugees, displaced persons, ethnic cleansing, etc). Population movements particularly affected Eastern part of the country, but the demographic situation changed for the whole country as well. For example, mid-year population estimate of the Statistical Information 2001 gives a figure of 4,437,000 inhabitants.

Share of agricultural population in 1991 was 8.,56% (409,647 inhabitants), while there is no precise data on the ratio of rural/urban population. A 1997 estimate stated that rural population in Croatia accounted for 20-30 % of the country's population.

Data referring to water consumption in Croatia exists within official data of Croatian Waters. These data are collected for the purpose of calculating the water management charges (water protection, water use and concession charges). The second source of the data related to the water consumption is official statistical data of the National Statistical institute.

Although the data on water consumption is fairly well kept, some estimates are still necessary. These estimates are included in Table 12, presenting total water supply in Croatia for the year 1985, and the period 1990-1999.

Table 12 Total Water Supply in Croatia (in mill m^3)

Type of consumption	Years										
	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Public water supply system	368	338	311	319	315	276	272	296	292	289	276
Industry (not connected to public supply system)	129	111	87	79	69	97	86	56	54	55	52
Cooling water	310	251	127	203	205	210	215	210	210	212	211
Other	80	79	75	77	77	78	78	77	77	78	77
Total	**887**	**779**	**600**	**678**	**666**	**661**	**651**	**639**	**633**	**634**	**616**

Source: Gradjevinski godisnjak; dr.sc. Dragutin Geres + Croatian Waters data

Figures given for *public water supply (PWS) system* refer to delivered (i.e. invoiced) water, both for domestic consumption and industry. Leakages (estimated as a difference between abstracted and delivered water) are not included.

Industry (not connected to public supply system) gives data on the water consumption of the industrial sector through own abstraction of groundwater and surface water). Once again, leakages are not included.

Volume of the *cooling water* is derived form the data used for calculation of water management charges.

Finally, category *others* gives an estimated volume of water used for domestic or industrial purposes that does not fall under any of the previous categories.

As presented in the next table, domestic consumption accounted for 56 (59)% of the PWS in 1998 and 1999 respectively. The share of the domestic consumption has risen significantly in comparison with the early '90s, when it accounted for some 40% of the PWS.

Table 13 Domestic Water Consumption in the Total Public Water Supply (mill m^3)

	1998	**1999**
Total public water supply	289	276
Domestic consumption	162	162
Share of domestic consumption in PWS (in %)	56.06	58.7

Source: Gradjevinski godisnjak, Croatian Waters, dr.sc. Dragutin Geres

Prior to 1998, municipalities were not obliged to report data on total abstracted water, so water supply statistics were kept in a different way. Since two years ago, municipalities report data related to abstracted water (volume of water metered on the actual place of the water intake, or volume of water which enters water supply system), but the data collection is still not entirely smooth and efficient.

Due to the already mentioned weaknesses in keeping water statistics in Croatia, and relatively low penetration of metering equipment, data on per capita (or household) water consumption is not readily available. This report therefore looks into couple of different methods for calculating average water consumption

Household water price consists from the following items: basic price of water - price of municipal service, water use charge, water protection charge, concession charge, and tax. Both basic price of water and water management charges (water use, water protection and concession charges) are based on volume rates.

VAT rate of 22% is only applied to the basic price of water (price of municipal services).

Structure of the average price for household for $1m^3$ of delivered water is presented in the following table:

Table 14 Average Price for Household for $1m^3$ of Delivered Water (incl. Sewerage)

Price component	Charge
Municipal service for water supply	A
VAT 22%	22% A
Development of infrastructure	B
Municipal service for sewerage	C
VAT 22%	22% C
Water user tariff	D
Water protection tariff	E
Water use concession charge	F
TOTAL per 1 cu.m.	**A+22%A+B+C+22%C+D+E+F**

The above scheme applies to consumers connected to the public water supply and sewerage system.

Decreasing or increasing block schedule does not exist at the moment, and is not planned in the near future.

The exact data on the relation between the average water expanses paid by Croatian households and their income and other expenditures does not exist. Nevertheless, some comparison of water prices and household income can be made, based on the figures presented in this report so far, and official statistic.

If the annual consumption of $60m^3$ per user and the price of water are taken into account, an average domestic user in Croatia paid 293 HRK (or 38 EURO) water bill in the year 2000. According to the National Statistics Institute, the average net monthly salary for the same year was 3,055 HRK (397 EURO).

Data on the annual water consumption for industrial use is given below.

Table 15 Industrial Water Consumption in the Total Water Supply (mill m^3)

	1998	1999
Total water supply	634	616
Industry*	181	162
Share of industry (%)	28.55	26.3

Source: Construction Yearbook, Croatian Waters, dr.sc. Dragutin Geres

Figures refer both to the industrial water supplied through the public supply system, and own abstraction

6.4 Special Obligations

The State Water Directorate, Croatian Waters, and the Counties have the responsibility for the organization of physical and financial planning with respect to the detailed plans within their areas of jurisdiction. The operation and maintenance of water and sewerage facilities, and the setting of tariffs rest with the municipal companies under the jurisdiction of the local governments.

In order to avail themselves of the loans provided by Croatian Waters, the municipal companies should have both the institutional and financial capacity to operate and maintain the facilities. Further, they should have the financial resources to contribute to the project finance and service the loans from Croatian Waters.

For the success of the project, there is a need to amend the regulations in order to ensure that Loan Agreements between SWD/Croatian Waters and the Local governments/W&S Companies will contains conditions to ensure due performance of sewerage development contracts by the municipal companies.

6.5 Financial Conditions

The water supply and sewerage companies (W&S companies) collect water pollution charges from customers and remit the amount collected to (Croatian Waters) Croatian Waters is required to return 50% of this amount to the W&S companies for the construction of pollution control facilities (sewer networks and treatment plant). This is given in the form of an interest free loan over 50 years. Generally, the Local Government (LG) and the W&S company must match this amount with funds from their own budget. If the loan is not repaid, Croatian Waters becomes the owner of that proportion of the assets financed.

Since the National Water Master Plan is still under preparation, and the counties have not yet completed their Water Pollution Control Plans, there is no national financing strategy at present.

7 NATIONAL AND LOCAL REGULATION

7.1 National and Local Planning and Permitting

Water Management Master Plan

Medium and long term planning of sewerage facilities is difficult without a corresponding master plan fot he development of water supply systems. The Water Management Master Plan of Croatia is scheduled for completion by the end of 2004., and it should provide the basis for planning of all water related facilities. It is recommended that the Water Management Master Plan be completed as soon as possible.

County Water Polution Control Plan

The National Pollution Control Plan has been completed, and it introduces measures to ensure that Croatia's natural water bodies are protected from polution by both municipal and industrial wastewaters. The plan sets time horizons for the building of facilities and plant for wastewater treatment. However, the plan only sets the framework for general policy.

County plans for the construction of wastewater treatment plants are incomplete and it is recommended that the State Water Directorate and Croatian Waters take action to assist the counties with this task, on a basin-by-basin framework. This should include a strategy for the drawing upo of master plans with implementation schedules and financing mechanisms.

7.1.1 Data Collection

Each municipality periodically monitors sewage effluent and each industry periodically monitors industrial wastewater according to the government regulations, including frequency and parameters of analysis. Licensed laboratories perform the laboratory analyses and the results are submitted to Croatian Waters.

7.1.2 Activity Permitting

The permissible limits of major parameters of industrial wastewater discharged into natural receiving waters and public sewerage systems one prescribed in NN No 40/99 as amended by NN No 6/01

7.2 Economic Regulations or Limitations

Water Management Financing Act

This Act defines the source of funds and purposes for which they may be used and funds from each source may only be used for specific purposes. For example, the water protection tariff may only be used for the protection of water resources (including construction of sewerage system), and the water use tariff, on exploitation of water resources (including construction of water supply system).

Water Management Fund

The Water Management Fund forms part of the consolidated central government budget, and the financial plan is drawn up annualy by Croatian Waters (Croatian Waters) in consultation with the municipal companies providing water and sewerage services. The financial plan for the year 2000 shows the following major features:

Table 16 Income of the Water Management Fund (2000)

Income		Amount (10^3 HRK)	Rate (%)
1. Income From Fees	Water Use Tariff	210,000	14.5
	Water Protection Tariff	235,000	16.3
	Extraction of Sand & Gravel	3,000	0.2
	River Basin Fee	310,000	21.5
	Power Generation Charges	40,000	2.8
	Sub-total	798,000	55.3
2. Income from Government Budget		390,794	27.1
3. Income from Towns & Municipalities		27,000	1.9
4. Min. of Public Works Reconstruction & Development		33,500	2.3
5. Income from Power Generation		15,000	1.0
6. Sale of Croatian Privatization Fund Stock		85,000	5.9
7. Other Income		94,910	6.6
Total Income		**1,444,204**	**100.00**

Source: Croatian Waters

Table 17 Expenditures of the Water Management Fund (2000)

Expenditure		Amount (10^3 HRK)	Rate (%)
1. Running Costs	Operating Expenditure	203,000	13.5
	Carrying out of Obligations	545,650	36.2
	Sub-total	748,650	49.6
2. Capital Expenditures & Transfers	Investment for Tangible/Intangible Assets	25,000	1.7
	Investment for Pollution Control Facilities - National Waters	77,600	5.1
	Investment for Water Supply Reconstruction & Development	357,694	23.7
	Investment for Water & Sea Pollution Control Facilities	238,265	15.8
	Investment for Water Management Design	61,000	50.4
	Sub-total	759,559	50.4
Total Expenditure		**1,508,209**	**100.00**

Source: Croatian Waters

Source of funds for government is the 22% VAT paid on the amount billed for water supply and sewerage services. This government source would not be enhaned by an increase in collection efficency. However, the municipal companies would benefit as they currently pay the tax on uncollected bills.

Source of funds for Croatian Waters is the Water Protection Tariff, which would be increased by improved collection efficiency. In addition, the level of the water pollution tariff should not be lower than the cost of wastewater treatment in accordance with the Water Management Financing Act. This tariff should be determined annually and enforced within the limitations of affordability.

Source of funds for the municipal companies is the chare, which should be set to cover the cost of operation, maintenance and development. Realistic charges should be set, again within the limitations of affordability. The sources of funds to the companies could be increased immediately by improved collection efficiencies, which would increase revenue for water supply as well as sewerage and also, increase the amount of water use tariff payable to Croatian Waters.

In order to improve collection, it is necessary for all municipalities to have by-laws to enforce disconnection for none payment. It also appears to be necessary to simplify the legal process to reduce time and costs for any neccessary court action.

To ensure the financial viability of projects, it is recommended that Croatian Waters should review its policy on the percentage of loans made available to municipal companies for development projects to minimize the loan charges to the municipal companies.

In addition, loan agreements between Croatian Waters and the municipal companies should include provisions for the attainment of collection efficiency targets for the setting of tariff levels necessary to meet financial obligations, and for the achievement of the appropriate wastewater effluent quality, etc.

The owners of the companies are the LG authorities, which decide policy and approve the charges proosed by the company. Hence, the companies are responsible to the LG and not Croatian Waters,with development being in line with LG aims and objectives.

Profit and Loss accounts usually show that income and expenditure is balanced, except when loan-financing charges are included which usually leads to a loss situation. O&M is generally limited to the amount of finance available rather than to a rational plan.

7.3 Environmental Regulations and Restrictions

National Water Protection Plan

The National Water Protection Plan issued in January 1999 (NN No. 8/99) includes definitions, plans, measures and others; namely, (i) Necessary research and monitoring of water quality; (ii) Categorization of water; (iii) Measures for water conservation; (iv) Measures for contamination emergencies of water; (iv) Plan to build sewerage facilities and sewage treatment plant; (b) Source and manner of financing the plan; and (vi) A list of legal and natural persons charged with carrying out the plan.

(a) Water Quality Monitoring

Water quality monitoring programs for national waters (national monitoring program) are drawn up and carried out by Croatian Waters. National waters are as listed in NN No. 8/99 and local waters are all other waters. A county water protection plan lays down the program for monitoring the quality of local water. The results of the monitoring are delivered to Croatian Waters and published together with the report on monitoring of the national water.

(b) Categorization of Water

The Plan contains the categorization of national waters, while categorization of local waters are contained in the county water protection plan.

The receiving waters for effluent are categorized in the Decree on Water Classification (NN No. 77/98) whose prescribed conditions have to be met. Water is clasified into five (5) types according to its quality that corresponds to the established conditions of its general ecological function and to the conditions of water use. The categorization of national waters has been completed, and that for local waters will be contained in the county water protection plans when issued.

(c) Limit Values of Wastewater Effluent Quality

For the protection of water quality and the environment, limit values of hazardous and other substances in the effluents of industrial wastewater and sewage tratment plant are prescribed by the Decrees issued by the State Water Directorate (NN No. 40/99, as amended by NN No. 6/01 for industrial wastewater and NN No. 40/99 for effluent from sewage treatment plant).

(d) Measures for Contamination Emergencies

The Plan contains measures for cases of exstraordinary water contamination and contamination emergencies. For Threat Level 1 (minor quantities of dangerous substance) and Level 2 (major quantities of dangerous substance), measures laid down in the county water protection plan are applied. In the case of Threat Level 3 (quantities of dangerous substances with possible cross-border consequence), the provisions of the National Water Protection Plan are applied.

(e) Sewerage Development Plan

The Plan sets up the implementation program in three (3) stages for the construction of public sewerage system and wastewater treatment plant; namely, short-term program up to 2005, medium term program up to 2010 and long term program up to 2025.

(f) International Agreements

Trans-boundary water issues are very important to Croatia. The National Water Protection plan includes water quality monitoring programs for cross-border watercourses, and these are subjet to treaties between the Republic of Croatia and neighboring states in connection with water industry relationships.

The national monitoring program on the Trans-National Monitoring Network (TNMN) for the Danube Drainage Basin is the program of the Permanent Commission f the Danube Protection Convention.

8 SOURCE USERS

The water of water supply system and the wastewater of sewerage system includes domestic, institutional and industrial (including commercial) wastewater, and groundwater infiltration. The wastewater of large industries is estimated individually. The wastewater of the remaining small industries is dealt as part of the municipal wastewater, as well as domestic and institutional wastewater.

(1) Design Unit Municipal Wastewater Quantity

(a) Unit Municipal Water Consumption

The existing domestic water consumption (household use only) ranges from 80 l/capita/day (lcd) to 170 lcd, mostly less than 150 lcd. It is nearly constant irrespective of the population size of town. However, domestic water consumption in the urban centers is larger than the above average value. Hence, the existing domestic water consumption in the objective sewerage development areas is assumed to be 170 lcd.

On the other hand, the unit municipal water consumption (including domestic, institutional and small industry uses) increases according to the population size of town. The unit municipal water consuption is classified into 190 lcd for towns with less than 10,000 inhabitants and 230 lcd for towns with 10,000 population or more.

The future unit municipal water consumption will increase according to the improvement of living standards. The annual growth rate is assumed at 2%.

(b) Unit Municipal Wastewater

Most of the consumed municipal water returns to the sewerage system. The unit municipal wastewater is estimated from the unit municipal water consumption on the assumption that the return rate is 80%.

(c) Municipal Wastewater Fluctuation

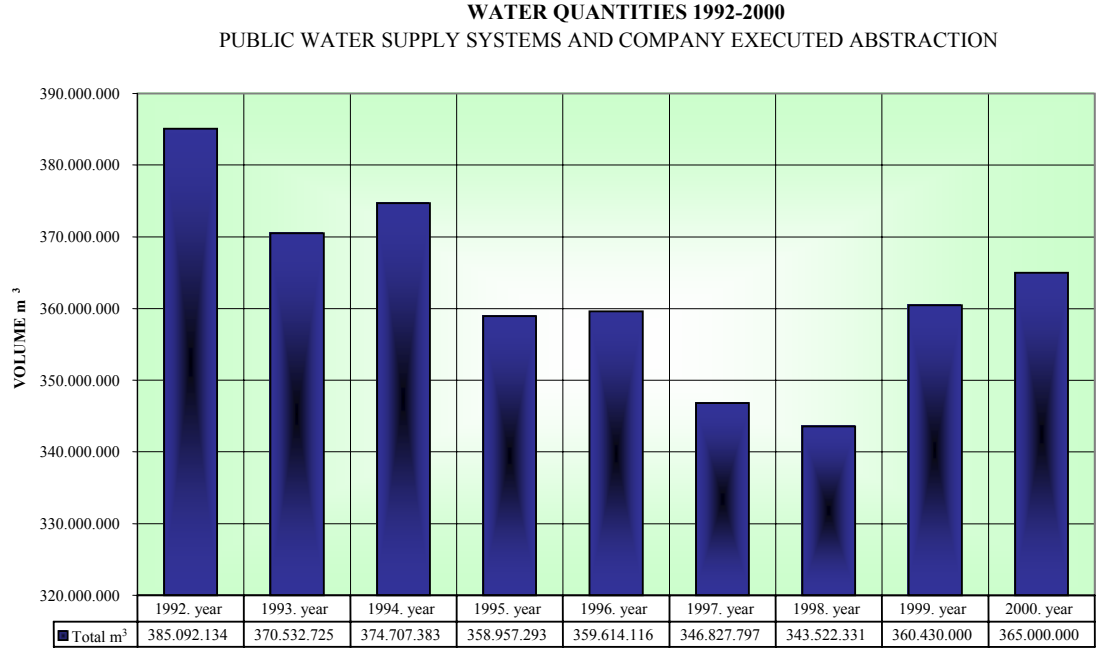
The wastewater flow seasonally fluctuates throughout the year. Therefore, the capacity of treatment plant is usually designed to meet the daily maximum wastewater flow in the month when the largest water consumption occurs. The daily maximum ratio (ratio of the daily maximum in the largest consumption month to the daily average) in the towns is in the range of 1.10 and 1.30. The daily maximum ratio is assumed at 1.30 for safety. The wastewater flow also hourly varies. Therefore, the capacity of sewer and pump is designed to meet the maximum hourly wastewater flow.

(d) Groundwater Infiltration

Groundwater infiltration is usually expressed as a ratio of the infiltrated groundwater to the municipal wastewater quantity.

Table 18 Public Water Supply

	Unit of measure	1998.	1999.	2000.
Volume of water used	'000 m^3	356,664	323,701	314,089
Length of watermains	km	7,312	7,335	7,335
Length of distribution network	km	24,596	24,689	24,792
Water connections	number	874,703	877,668	878,499



Source: Croatian Waters

Table 19 Public Sewage System

	Unit of measure	1998.	1999.	2000.
Wastewater - total	'000 m^3	287,803	258,608	257,901
Purified wastewater	'000 m^3	87,796	88,785	86,579
Unpurified wastewater	'000 m^3	200,007	169,823	171,322
Total length of sewage network	km	5,093	5,236	5,368
Length of main sewer	km	1,121	1,201	1,069
Sewage connections	number	294,210	303,532	318,658

Source: Statistical Yearbook of Republic of Croatia

Systematic control of water quality in all well fields, inflow area and water supply structures guarantee quality portable water supply in compilance with appplicable regulations in the future.

9 POLICY ISSUES

9.1 Policies

The economic and political processes in the country were also reflected on municipal water management, in particular in the field of water pollution control. Stopping on reduction of operation of some industrial plants resulted in reduced pollution in temporary improvement of surface water quality. At present the main problem in water pollution control is the insufficient number of treatment plants for municipal wastewater from public sewerage systems. Such problems are at present the priority in solving of water pollution control issues in the Republic of Croatia, and for this purpose it is necessary to provide large financial means to cover the requirements from its own sources but before that it will be to look for funds through International loans, will be necessary to prepare *tariff reforms* and *effluent charge reforms* which we use in case study with spread sheet modul.

The strategy of water and water protection from pollution is defined by document State Water Protection Plan (NN8/99). The Plan contains:

- required research and analysis to water quality;
- water categorisation (planned water quality in a given area - sensitivity of the area);
- water protection measures;
- emergency measures for cases of sudden and accidental pollution;
- plan of construction of wastewater treatment plants larger than 50,000 population equivalent (PE);
- sources of financing;
- list of persons and entities in charge of enforcement of the Plan, their rights and responsibilities.

At the county level, water protection plans are also prepared. The county plans have the same contents, and are adjusted with the state plan, elaborating in detail parts of procedures in cases of emergency or accidental pollution, as well as provision of financial resources for construction of water protection facilities. While State Water Protection Plan is a strategic document, county plan is an implementation document for the territory of the particular County.

The funds for water protection and, consequently, for the implementation of the above plans, come exclusively from the water pollution charges which are, with respect to the problems of water pollution in Croatia, insufficient.

For the purpose of water protection against pollution, the law provides that the charge (tariff) for water protection should not be lower than the costs of wastewater treatment. However, a recent assessment carried out by Croatian Waters experts indicated that the presently paid tariff is four times lower than the actual costs of wastewater treatment. Yet the existing level of basic tariff (and resultant water protection charge) is maintained, mainly due to the general status of the national economy.

The underrated and unrealistic level of water protection charge is also the cause of the prevailing attitudes towards the wastewater treatment. Given the fact that levied charges are several times lower then full economic and environmental costs of water pollution, everybody is motivated to maintain the status quo, rather then to invest into new wastewater treatment plants. In addition, small number of existing wastewater treatment plants considerably increases the water price for those connected to them. The other users who have not built any treatment plants enjoy considerably lower price of water, and it is more convenient for them to pay the unrealistically low charge.

9.2 Policy Evaluation

Starting from the above, it will be necessary to review all legislation related to water management, adjust it to EU requirements and define the possible deadlines for fulfilment of commitments towards

EU, because the Republic of Croatia is oriented towards joining the EU. At present, the major problem in meeting these objectives is lack of funds. Also, it will be necessary, through international workshops, to educate young professionals for working in accordance with EU requirements, and to adjust water management to new approaches, in particular with regard to the environment and sustainable economic development.

In the EU, economic principles and the use of economic instruments have been gradually but clearly embedded into environmental policies. The Treaty now integrates the Polluter Pays Principle as a foundation of all European environmental policies. The Fifth Environmental Action Programme of the European Commission ending in 2000 has the broadening of the range of policy instruments as one of its top priorities. However, progress in the actual appliciation of economis instruments remains limited so far.

The Commission has advocated an increased role for pricing in enhancing the sustainability of water resources in the context of the proposed Directive establishing a framework for Community action in the field of water policy (or Water Framework Directive).

(1) Efficient water pricing acts as an incentive to reduce pollution and improve the efficiency of water use. Thus, it reduces the pressure on water resources and the environment, and it ensures available resources are efficiently allocated between water uses.

(2) As a result, water supply and treatment infrastructure can be more adequately sized. This means providing water services and protecting the environment more cost-effectively.

(3) It mobilises financial resources to ensure the financial sustainability of water infrastructure and service suppliers, and to pay for environmental protection.

It is argued that the lack of importance given to economic and environmental issues in designing existing water pricing policies, as opposed to more general social or development objectives, has led to current situations of inefficent use, over-exploitation and degradation of surface and groundwater resources.

Over the last few years, Croatia has put a lot of effort into enacting laws and regulations in the area of water management a special for these strategis:

Strategy name	Srategy Description	Comments/Concerns
Economic regulation	1. Price of municipal service Source of revenue for municipal service determined by the Municipal Services Act (includes the service, repayment of loans for construction of facilities and municipal infrastructure). It is determined by the provider of the municipal service, with the consent of the founder of the municipal company. 2. Water use tariff Source of revenue for financing of water management defined by the Water Management Financing Act (NN 107/95). The charge (tariff) is determined by the Government of the Republic of Croatia 3. Water protection tariff Source of revenue for financing of water management defined by the Water Management Financing Act (NN 107/95). The charge level (tariff) is determined by the Government of the Republic of Croatia. 4. Concessions on water and water estate Concession provides the right of use of water and water-related estate, i.e. the right to perform economic and other activities on water and water-related estate.	The economic analisys should be undertaken to aid decision-making in selecting programmes of measures for achieving the environmental objectives as well as to ensure transparency and informed decisions on the recovery of costs. Economics has to provide enough information to make assesment and justification of objective derogation, because of sustainable socio-economic activities and restrictions. In the case of Croatia, such derogations could be of special importance, due to less developed water uses and watere services, that need to be improved.
Environmental regulation	The strategy of water and water protection from pollution is defined by document State Water Protection Plan (NN8/99) which contains: - required research and analysis to water quality - water categorisation (planned water quality in a given area – sensitivity of the area) - water protection measures - emergency measures for cases of sudden and accidental pollution - plan of construction of wastewater treatment plants larger than 50,000 population equivalent (PE) - sources of financing - list of persons and entities in charge of enforcement of the Plan, their rights and responsibilities	Reduction of water consumption by increase in use efficency and reduction in quantity of wastewater leads to the protection of water rscources.

Strategy name	Srategy Description	Comments/Concerns
Policy regulation	The Ministries and State Directorates having direct influence on water sector policies through regulations proposed to the government of the Republic of Croatia are: The State Water Directorate In charge of all the activities related to water management Monitors and co-ordinates development of the water management system, while allowing for the needs of the overall economic development In charge of the measures for regulation of watercourses and other water bodies, protection from floods and ice, erosion and torrents, irrigation and drainage Other competencies include management and use of water-related estate, protection of water and sea from pollution, provision of adequate water supplies for population and industry, use of water power, planning and co-ordination of development and construction of public water supply and sewage systems, and inspection in the field of water pollution control Proposes to the Government of the Republic of Croatia the level of water use charge and water protection charge (tariff), which are the constituent parts of the total price of water delivered The Ministry of Environment and Physical Development The Ministry carries out administrative and other tasks related to the general policy of environmental protection, providing of conditions for sustainable development, protection of air, water, sea, flora and fauna in integrated interaction Agency for water management "Hrvatske vode" is a Government agency for water management The task of Hrvatske vode is to ensure permanent and unimpeded carrying out of public services and other tasks in water management in the scope defined by plans and in accordance with the available funds provided for the purpose under corresponding legislation	The integratedwater resources management ensures sustainable management of the water demand and development of water resources.

Strategy name	Srategy Description	Comments/Concerns
	Within its legal powers, Hrvatske vode passes administrative and other acts and makes decisions on issues important to water management: preparing of basic plans for water management, maintenance of water-related structures, protection from detrimental effects of water, water use, water pollution control, managing of public water estate, professional supervision and engineering in construction of water-related structures collection of funds for financing of such works and activities The seat of Hrvatske vode is in Zagreb - there are five water management departments: in Zagreb, for the Sava river basin, in Osijek for the Drava and Danube river basin, in Rijeka for the Istrian and Littoral basin, in Split for the Dalmatian basin and a further department in Zagreb for the catchment area of the City of Zagreb	

According to the strategy acts and the ensuing regulations, every municipality is responsible for provide tariff and charges effluents reforms with next evaluations:

Strategy name	Advantages		Disadvantages	
	Advantages	Evaluation	Disadvantages	Evaluation
Economic regulation	• large revenues • new investment • determined purpose	SUFFICIENT	• economic analsys • unpaid tariff • large water consume	
Environmental regulation	• data (quality, quantity) • save resource • transbounders effect	PROPORTIONATE	• lack of monitoring • lack of project documentation • pollution	
Policy regulation	• water management • the integrated water resource managament • planing	PRACTICAL	• political decisions • EU water framework • determine priority	

Recommendation:

There are enough resources all over the country, but there are lot of problems with water losses and old water network.

Due to this, big investments are needed and increase of tariffs and charges is necessary in the next years. However, they will not cover all investments so other founds will have to be included.

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