

WATER AND SANITATION COUNTRY PROFILE

REPUBLIC OF MACEDONIA

Decision -Making

Programmes and Projects

- A. Integrated Water Resources Development and Management
- B. Water Resources Assessment
- C. Protection of Water Resources
- D. Drinking Water Supply and Sanitation
- E. Water and Sustainable Urban Development
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Decision Making: Coordinating Bodies: According to the Law on the Organization and Operation of the State Administrative Bodies and the Law on Waters the overall competence and responsibility for water resources development and management is vested in the Ministry of Agriculture, Forestry and Water Economy (MAFWE). Relevant administrative bodies within the MAFWE are the Water Management Administration and the Administration for Hydro-meteorological Affairs.

According to the Law on the Organization and Operation of the State Administrative Bodies and Law on Environment and Nature Protection and Promotion, the competence for monitoring the conditions of the environment and protection of the water against pollution is vested in the Ministry of Environment and Physical Planning (MEPP). A relevant administrative body within the MEEP is the Inspectorate for Environment.

The competence for health protection, water pollution, protection of the population against water pollution as well as affairs of food products (drinking water) is vested in the Ministry of Health (MOH).

The Ministry of Transport and Communication conducts affairs related to internal navigation and municipal water supply and wastewater collection and treatment. The Ministry of Economy (MOE) conducts affairs as concern the water use for hydro-power generation and tourism.

The Ministry of Local Self-Government conducts affairs of the development of hydraulic infrastructure in under-developed regions.

According to the new Law on Self-government the competence on water supply, sanitation and wastewater treatment of the municipalities is vested in the relevant municipality. Also the measures for protection and pollution control fall under the responsibility of the municipalities.

The Ministry of Foreign Affairs conducts activities concerning establishment, development and coordination of relations of the country in international affairs.

Legislation and Regulations: The important legislation of the Republic of Macedonia in the field of water related subjects was recently established in line with the transformation process of the country. A number of respective regulations still in force date back or are taken over unchanged from the years of former Yugoslavia. Apart from the legislation dealing directly with water management there are important links with environmental or other sector or horizontal legislation, which affect the institutions and procedures in the field of water management. The sources of the present legal framework dealing directly or indirectly with water management or having reference to water related matters include:

- Law on Waters (enacted 01/1998)
- Law on Environment and Nature Protection and Promotion
- Law on Execution of Hydro-Meteorological Works (03/1992)
- Law on Protection of Ohrid, Prespa and Dojran Lake (12/1977)
- Law on Inland Navigation (04/2000)
- Law on Fishery (05/1993)
- Law on Unification of the Methods for Determination, Recording and Data Collection for the Reserves of Minerals and Groundwater and its Water Balance (04/1977)
- Law on Agricultural Land (06/1998, amended 03/1999)
- Law on the Organization and Operation of the State Administrative Bodies (07/2002)
- Law on Communal Activities (1998)

- Law on Public Hygiene Maintaining and on Communal Solid and Technological Waste Gathering and Transport (1998)
- Law on Local Self-Government (01/2002)
- Law on Special Nature Resource Protection (draft 04/2002)
- Law on Water Supply, Drainage, Treatment and Discharge of Urban Wastewater (Draft 03/2000)
- Law on Water Communities (Draft 05/2002)
- Law on Water Management Organizations (Draft under discussion)

The following subsidiary ordinances under the "books of regulations" are in force at this time (abbreviated titles):

- Quality and Health Safety of Drinking Water (1984)
- Sampling and Laboratory Analyses of Drinking Water (1987)
- Hygienic Safety of Drinking Water (1987)
- Amendment on Quality and Health Safety of Drinking Water (1991)
- Classification of Waters (1999)
- Categorization of Water Courses and Lakes (1999)
- Books on Water (water use register)
- Fees for Use of Water by Producers of Electric Power (01/2000)
- Diary for the Exploitation of Sand, Gravel and Stone (1999)
- License for the Water Inspector (1999)
- Recording of Water Level, Storage-Volume and Discharge from Dam-Reservoirs (1999)
- Recording on Water Management Structures and Facilities (1999)
- Monitoring of Sediments in Dam-Reservoirs (1999)
- Minimum Requirement for Technical Monitoring of Dams (2002)

Apart from national laws also some international conventions or agreements are sources of the water legislation. There exist agreements on transboundary waters with Greece, Albania and Bulgaria on downstream water courses and commonly shared lakes which originate from former Yugoslavia. There is no agreement with Yugoslavia as to a tributary flowing into Macedonian territory.

Strategies, Policies and Plans: The general strategy is incorporated in the NEAP (National Environmental Action Plan, 1997) financed by the World Bank. Now, Republic of Macedonia is in the phase of preparing the second generation of NEAP, financed by the EU. General directions are also indicated by the NEHAP (National Environmental Health Plan, 1999) supported by the World Health Organization.

An Environmental Monitoring Strategy and Data Management Strategy will be important outputs of Project „Strengthening the Capacity of the Ministry of Environment and Physical Planning“. At the same time, the new Law on water is under parliamentary procedure for adopting.

Programmes and Projects: The European Community has provided funds under its PHARE 1999 programme for the implementation of the Project „Strengthening the Capacity of the Ministry of Environment and Physical Planning“, which mainly focuses on the improvement of the environmental legal framework and on the environmental information communication strategy and awareness raising.

Component 1 concerns the approximation of Macedonian legislation to the EU environmental acquis communitarian. Covered, are major areas of environmental protection and natural

resources management, such as horizontal legislation, water resources management, waste and hazardous waste management and nature conservation.

- Water resources management, including aspects of resources management and control of waste water pollution; the result of the work will be a comprehensive draft water resources management act which will be implemented (later, after this Project) through specific regulations

Component 2 addresses a complex mix of awareness and communications issues of national and local importance in the Republic of Macedonia. The first part of component 2 deals with Environmental Awareness Raising and Communication. The second part involves Environmental Monitoring and Data Management.

Lake Ohrid Conservation Project, cross border Project with Albania, 1999-2003, supported by GEF (the implementing agency is the World Bank). The Project costs amount to 4,170,000 US\$, in which the Albanian and the Government of the Republic of Macedonia partakes with a share of 270,000 US\$. The components are: Institutional Strengthening, Lake Ohrid Monitoring Programme, Watershed Management, Public Awareness and Participation.

Vardar River Monitoring Project, (Phare) 1997/98-2002, 1,760,000 €(including 10% national contributions), cross border project (with Greece). The deliverables are foundations, power supply, telephone lines etc. for the monitoring stations, 2 automatic monitoring stations and 3 laboratories, with all equipment.

GTZ is funding a Project Water Resources Management for the Monitoring of major rivers. The Project was commenced in 1993, and will be completed by the end of 2002.

Status: The territory of the Republic of Macedonia comprises four catchments areas: Vardar, Crn Drim, Strumica and South Morava with three large natural lakes (Dojran, Prespa and Ohrid) and numerous mountain lakes in it. Eighteen large artificial lakes have been constructed in Macedonia, as well as 100 smaller ones (called water accumulations) with a total net water accumulation of over 500 million m³.

According to Article 85 of the Law on Waters the categorization and classification of the waters is done in line with international standards. The corresponding "Book of Regulations" (ordinance) classifies the waters from "purity" to "pollution" in five classes and defines the permitted use criteria of the respective water class. The categorization enumerates the country's waters by river basins, lakes and groundwater and defines which quality class applies in which water course district. This complies with the approach of the EU legislation to classification of water, but it reflects merely the status-quo for the purpose to qualify certain waters for certain uses. The missing link is the obligation and the instruments to regulate the protection of the waters and how to achieve a better status than categorized.

Total quantities of water on the territory of the Republic of Macedonia, according to the Law on Waters, enjoy the status of national wealth (water resource). Water is a good for general use and can not be privately owned. Advantage before other types of needs and users is attached to drinking water, use for curative purposes and for the needs of national defense. Central water supply in the Republic is provided for the entire urban population of about 1.160.000 inhabitants and about 160.000 rural inhabitants connected to urban water supply systems - in total, around 1.320.000 inhabitants (64% of the total population of around 2.050.000 inhabitants in the Republic). Around 520.000 rural inhabitants (58% of the total rural population of 890.000 inhabitants) are supplied with water from central water supply systems from their own water intakes, and around 210.000 rural inhabitants (23% of the total of 890.000) are supplied from local water supply facilities. Out of the total number of inhabitants in the Republic, around 60% are supplied from carstic water sources, around 20% from surface water resources and around 20% from well ground waters.

Water supply for the population in the Republic of Macedonia in terms of pure and health safe drinking water has so far noted a development tendency of positive direction, i.e. the percentage of people supplied with safe drinking water has been increasing. According to the established indicators for the Republic of Macedonia, the percentage of population supplied with safe drinking water, has increased from 64% in 1971 to 91% in 2000. Indicators for urban areas have noted increase, from 92% in 1991 to 96% of the population in 2000, supplied with safe drinking water. Indicators for rural areas indicate rapid increase of the population supplied with safe drinking water, from 60% in 1991 to 76% in 2000.

The monitoring of drinking water originating from public water supply facilities, from health point of view, is performed by the Republic Institute for Health Protection in cooperation with Institutes for Health Protection in the Republic of Macedonia, conducting laboratory analyses for which institutes lack appropriate equipment and methodology. Following hygiene-epidemiological indications, it carries out the required sanitary-hygiene inspections and laboratory tests in cooperation with the State Sanitary and Health Inspectorate with the Ministry of Health.

The status of water resources in the Republic of Macedonia, with regard to ground water resources, indicates that they are relatively clean in the upper water flows (in mountainous areas) and within the limits specified in the regulations for water categorization; the quality of water in middle and lower water flows depends on the status of treatment of wastewater from settlements, industry, agriculture, tourism, etc., and at many points it is of poorer quality than specified in the regulations for water categorization.

Climate and meteorological and hydrological conditions are the causes for shortage of water in intaken springs in certain seasons of the year in some regions of the Republic, posing a serious hygiene-epidemiological problems in the subject populated areas. In addition, there have been events of floods leading to water turbidity in water accumulations, such as the one in Kumanovo in 2000.

The quality and health safety of water originating from carstic springs and from water accumulations (more than 80% of water used for water supply for settlements), excluding pollutants of natural origin - turbidity, nitrogenous matters, possible iron, etc., belongs mainly to I or II class, according to the Decree on Water Classification. Bacteriological pollution is mainly by saprophyte bacteria, originating from soil or surface water resources. Watersheds of these water springs (wide protection zone) are mainly in high mountainous areas, where there are no industrial polluters, nor notable population; the possible bacteriological pollution originates mainly from extensive live stock breeding in summer periods and from life processes in the surface layer of the soil; tourist activities in those zones are of insignificant scale and does not pose a serious sanitary-hygiene problem yet. The contents of nitrates in these water resources is low, at an average of around 1 mg/l.

Natural composition of water concerning total mineralization, contents of iron, manganese and other micro elements varies in wider ranges. Almost all carstic and surface water resources and significant portion of well water resources, are highly deficient in fluorine of relevance for the prophylaxis of tooth caries. Some of the intake well waters note the problem of an increased presence of iron and manganese (Veles, Stip, Kocani, and in some rural settlements). Nitrates in those water resources are in the range of 1 - 5 mg/l; only in some of the wells supplying seasonally water for Prilep (in summer months, when the water inflow from the carstic springs of Studencica decreases), and in some of the wells supplying water for the town of Radovis, the contents of nitrates is above 10 mg/l, but does not exceed 15 mg/l; both well areas are located in a region where land is intensively used for agricultural purposes. Toxic parameters like lead, arsenic, chromium, cadmium, etc., have not been detected in concentrations exceeding applicable regulations or recommendations of the World Health Organization and EU. In 2003, higher contents of aluminium was recorded in the drinking water from the city water supply system in Sveti Nikole and water was prohibited for

drinking in April 2003. Indicators of pollution from organic origin, as nitrate compounds (ammonia, nitrites and nitrates), consumption of $KMnO_4$, except in few water supply facilities in some villages (in the area of Strumica), do not pose major sanitary-hygiene problem. Radiological pollution and pollution with organic-chlorine and organic phosphorous pesticides, according to the data from the analyses done so far, does not pose a sanitary-hygiene problem in the Republic.

In case of water supply systems using carstic springs or ground water from wells, as well as those processing surface water, microbiological and biological composition of drinking water in central urban water supply systems is in compliance with the applicable regulations. Responsibility for the health safety of this water is with the professional communal organizations, under regular control of the Institute for Health Protection, in cooperation with the State Sanitary and Health Inspectorate. Central water supply facilities using their own water intake in rural settlements are under responsibility of local communities, where professional status of water facilities management is not adequately regulated. Supervision over these facilities is insufficient, compared to urban water supply facilities. The percentage of bacteriological unsafe findings is significant, according to the recommendations of the WHO and EU, i.e. more than 5% of examined samples. The most unfavorable state has been detected with individual water supply facilities, where conducted analyses showed that the percentage of bacteriological unsafe findings is highest compared to other types of facilities.

In the past, the main water borne diseases were intestinal infective diseases, the most frequent among which were diarrhea, intestinal typhus and paratiphuses, infective hepatitis of A type (water borne diseases); in regular checks-up of school aged children, carriers of intestinal parasites (roundworm) have been also found. In our area, and in relation with water, there have been diseases communicated through contact with the water containing infective elements, such as leptospirosis (water-related diseases), as well as diseases where water is a medium for development of vectors for certain diseases, such as malaria (water-associated diseases). These diseases appear in epidemic, endemic and hyper-endemic forms. Non-infective diseases appearing in endemic form due to the improper physical and chemical composition of water, with an exception of tooth caries which has been widely spread in the country and individual endemic areas of fluorosis, have not been recorded in terms of other geochemical and endemopathic spots or acute and chronic intoxications. In the past, there were areas with endemic tireopathy, which were remedied through application of iodined salt. Nitrates, posing serious health problem in many parts of Europe, have not been recorded as a health problem in our country, except in small number of individual water supply facilities in certain plain villages.

In the course of the last 25 years, from 1978 to 2003, several hydro epidemics have been recorded, both in local and urban water supply domains. Causes for epidemics include severe disorders of safety of water intakes or distribution networks, or in sanitary protection zones of water intakes. Microbiological causes recorded include shigellosis and other causes of diarrhea, intestinal typhus, paratiphuses, infective hepatitis of A type, etc. Epidemics of highest morbidity were: in the village of Velebrdo, in 1978 - intestinal typhus, Debar in 1978 infective hepatitis of A type, Kratovo in 1980 infective hepatitis of A type, Stip in 1988 dysentery (shigellosis), Veles in 1990 infective hepatitis of A type, Stip in 1991 dysentery (shigellosis and other causes for diarrhea), Probistip in 1993 infective hepatitis of A type, village of Zrnovci in 1994 enterocolitis.

With regard to ground water resources, which have been insufficiently systematically examined, potentially polluted areas due to chemical and oil industries include ground water resources downstream the industrial zone in the city of Skopje, and downstream the refinery in Bujkovci; both areas are located downstream of the urban zone of the city of Skopje, on the left and right banks of Vardar River.

The state with threehalomethanes and other halogenated hydrocarbons is regularly examined in the Republic Institute for Health Protection. Waters from carstic carstic springs and ground water resources, intaken through wells, have low potential for their creation at application of chlorinization for disinfection. Waters in water accumulations contain slightly higher quantities of organic matter from natural origin, as a precourse of these compounds; possible problems can be expected from smaller accumulations. The analyses done so far have found chloroform in quantities between 40-70 mg/l in chlorinated water in Berovo and Sv. Nikole (where water has been banned for drinking since April 2003), while other threehalomethares (bromoform, dibromchlorinemethane, dichlorinebrommethane) are bellow the detection limit of the equipment (gas chromatographer).

Indicators for hygienic manner of wastewater disposition, from households into urban environment, have also noted signific ant increase from 44% in 1971 to 85% in 2000. These indicators show that not all households in urban settlements that are connected to safe drinking water supply systems have sanitary and hygienic appropriate disposal of wastewater. Indicators of households wastewater disposal in rural settlements indicate low values and insignificant increase in the past three decades. Namely, 1.6% of the rural population in 1971 in the Republic of Macedonia had hygienic disposal of wastewater, while in 2000, a percentage of 12% had appropriate wastewater disposal. There has been an increase in the percentage and minimal improvement in wastewater sanitation in rural areas.

Activities are in progress, carried out by the Ministry of Health together with experts from public health organizations, aimed at adopting new laws and secondary legislation concerning drinking water safety. They will implement the recommendations of the World Health Organization and European Directives for water (Framework Directive 63/2000 and Directive on Drinking Water Quality 98/83) for human health protection and promotion. The Regulation on health safety of drinking water is in its final stage of drafting and new Law on Food and Food Related Products Safety is under development ("Official Gazette of RM" No. 54/2002).

The Draft Law on Water, which is in Parliamentary procedure for adoption, is a product of inter-sectoral cooperation between competent ministries and their experts, and it will implement the recommendations of WHO and EU in the doma in of health protection of water users, as well as environment and nature improvement.

Problems and Challenges: Major problems with the water in the Republic of Macedonia are:

- Increasing water demands for land development, drinking water supply and industry
- Erosion and sedimentation
- Discharge and treatment of wastewaters
- Long periods of dry weather with insufficient rainfalls.

One of the most important goals of Republic of Macedonia is preparation for integration in EU. Such of challenge erase number of problems that comes of the differences in the policy, so preparation in the legislation of water management, environmental protection and regional development should be according EU requirements.

In the context of the obligations of social mechanisms responsible for spatial planning, environmental health protection and protection of biological diversity of water resources in the Republic, the challenge to enforce the provisions of existing laws remains (especially the Law on Health Protection), as well as laws in parliamentary procedure of adoption (Law on Water, Law on Environment and Law on Nature Conservation). Translated into reality, this would mean provision of required funds for construction and operation of systems for treatment of communal and industrial wastewater.

The short and mid term vision of development in water management sector will be within the new digitized Water Master Plan. With it will be solved the most important question about balancing of the water, sustainable use, development of the agriculture and the rural development.

Anticipation of increasing of water demands will bring needs to reduce the losses in the water supply networks and transfer of the water from the Western parts to the Eastern parts.

Irrigation is main condition for Republic of Macedonia to use comparative advantages in agriculture production. In the Program for public investment, prepared from Government of Republic of Macedonia, and water management as whole and irrigation as a segment of water management are treated as priorities in directing of the investments.

In the context of using the natural waters it should be mentioned that public awareness of water and environmental protection must grow, until it reach the level of public concern.

Presently in Republic of Macedonia there are large problems relating to the ownership and utilization of the land. Processes in transformation of state-owned agricultural combines to private farm management by means of concession and privatization, which will obtain rational and sustainable utilization of the land and water and will increase efficiency. The reform in agricultural sector cannot be successfully done, without improvement (qualitative and quantitative) of non-agricultural segments of rural economy.

The following steps are considered important to facilitate the implementation of the main developments:

- Preparation and implementation of the legislation for water management;
- Reconstruction and recovery of the existing systems for water supply with a goal to reduce the losses to 10-15 %;
- Extending of the existing water supply systems: local and regional;
- Construction of new water supplies systems;
- Reconstruction and rehabilitation of the existing irrigation schemes;
- In the period up to year 2025, construction new irrigation schemes on the area of 227.000 ha;
- Construction of sewerage systems and waste treatment plants from the major cities and rural settlements;
- Construction of waste treatment plants for the industry;
- Control of the solid waste with construction of disposal plants;
- Protection of the wells with marking of the protection zones;
- Ending the process of transformation of state-owned agricultural combines and companies;
- Giving the uncultivated arable land on private farm management by means of concessions, leases and other forms;
- To meet domestic demands for agricultural products;
- Increasing the export of agricultural product;
- To provide the agricultural producers with more favorable and stable economical and social status;
- Increasing the level of infrastructures in rural settlements and diminishing the differences in relation with urban settlements;
- Qualitative and quantitative improvement of the level of public standard and tertiary activities, increasing of level of the services in nearest centers;
- Priority development of the activities acceptable from ecological point of view and activities in which priority is non-polluted environment (tourism, green food etc.);
- Improvement of the level of communication of the rural with urban settlements.

Capacity-building, Education, Training and Awareness-raising The public is informed on the activities carried out in the framework of the Projects for the First national communication via radio, TV and press, and journalists have shown great interest, asking for more information by themselves.

Article 10 of the Law on the Organization and Operation of the State Administrative Bodies provides the involvement of the citizens as to the preparation of laws, organizing the public etc. Article 22 of the Law on Waters requires the publication of the draft version of the "water management base" and an expert discussion on it. The final proposal is too prepared "on the basis of the opinions resulting from the expert discussion".

In general there is a strong appreciation of nature among the people of Macedonia and good awareness of environmental issues in areas where there is ready access to a good level of general education. However, for most of the general public a general lack of understanding of the actual levels of environmental pollution and degradation and its causes can be stated. Most people are not aware that their individual behavior has an impact on the environment and how they could contribute to improve environmental sustainability.

Information: The MEPP, through its EIC is the main governmental authority responsible for collection and dissemination of official environmental information and data, on the basis of existing legal regulations in the Republic of Macedonia. For the complete management of all environmental data, the MEPP depends on information provided by other relevant governmental bodies and institutions.

Research and Technologies: The quality of surface waters is monitored on the basis of the existing national legislation "Law on Waters; Decree on Waters Classification" ("Official Gazette of RM" No: 18/99); Decree on Categorization of Watercourses, Lakes, Accumulations and Ground Waters" ("Official Gazette of RM" No: 18/99) Decision on Maximum Permissible Concentrations of Hazardous Substances into the Trans-republican Watercourses, Trans-boundary Waters and Marine Waters of Yugoslavia" ("Official Gazette of SFRY" No: 8-78).

Water level and temperature are monitored at hydrological stations for surface waters. Water samples for suspended deposit are taken from 20 stations and control measurements of water quantity are carried out periodically.

- 50 hydrological stations are equipped with automatic water level recorders
- 20 hydrological stations are electronically forwarding continuous water level data to the HMI used for forecasting and international data exchange.

The hydrological measuring network will be expanded with the following new equipment: 26 water level recorders of type "SEBA", 7 complete sets of current meters, 5 automated hydrologic stations and personal computers.

The HMI's ecological division is monitoring chemical and physical water parameters at currently 66 measuring points in the country, of which 20 will be equipped with new semi-automatic stations (2 provided by the EU and 18 by Switzerland). HMI is periodically controlling domestic and industrial waste waters. Surface water pollution is regularly monitored for chemical and toxicological parameters, periodically radiological and biological analysis is carried out.

Water samples are analyzed on the following parameters: organoleptic features, dissolved oxygen, BOD₅, COD, pH, conductivity, mineralization, hardness, sulfides, sulfates, chlorides, carbonates, bicarbonates, phosphates, nitrates, nitrites, cyanides, phenols, ammonium, sodium, potassium, magnesium, iron, manganese, lead, cadmium, copper, total chromium, nickel, cobalt, silver, free chlorine and total B-radioactivity.

Physical-chemical, chemical-toxicological, radiological, microbiological and aerobiological analyses of samples are carried out in the state laboratory, Groundwater quality is controlled periodically only within the territory of Skopje.

Financing No information is available

Cooperation: Many international organizations are operating in Macedonia providing technical assistance in various fields and finance of infrastructure. For the water sector the World Bank (mainly by GEF finance), the German bilateral cooperation through GTZ and KfW, the Regional Environmental Centre (financed by several donors) with its new large REReP Programme are strong players. The largest donor in general is the European Union through its CARDS program, where Europe aid within its CARDS strategy 2002-2006 has identified environment and natural resources as one of its priorities for cooperation. The EIC maintains the connection with the Environmental Information System of the European Union and the European Environmental Agency – EIONET/ TELEMATIC, and the global information exchange network of the UNEP, INFOTERRA, the main objectives of which are information, monitoring and assessment of the state of the water quality and quantity.

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Annex

Population in the Republic of Macedonia with access to the public water supply system (PWSS) - Table 1 (urban areas) and (Table 2) (rural areas)

Table 1: Distribution by public water supply serving in urban areas in 2000 y

1.2 REPUBLIC OF MACEDONIA		
1	SKOPJE	440,570
2	OHRID	41,213
3	STRUGA	35,509
4	DEBAR	17,588
5	STRUMICA	34,420
6	VALANDOVO	4,432
7	VELES	48,364
8	SV.NIKOLE	11,000
9	KAVADARCI	38,157
10	NEGOTINO	12,100
11	GEVGELIJA	14,998
12	PRILEP	64,897
13	KRUSEVO	5,507
14	MAK.BROD	3,358
15	KUMANOVO	65,036
16	KR.PALANKA	11,350
17	KRATOVO	6,647
18	KOCANI	28,000
19	VINICA	10,630
20	BEROVO	8,930
21	DELCEVO	11,763
22	TETOVO	50,344
23	GOSTIVAR	42,000
24	BITOLA	83,053
25	RESEN	9,736
26	DEM.HISAR	2,627
27	KICEVO	27,414
28	STIP	42,000
29	RADOVIS	16,000
30	PROBISTIP	11,000
	TOTAL	1,200,000

Table 2: Distribution by public water supply serving in rural areas in 2000 y

Republic of Macedonia	2	Number of Rural settlements	Total population
Rural settlements connected to PWSS		162	250,000

Table 3: Distribution of drinking water quality from PWSS for physical-chemical and microbiological parameters in the Republic of Macedonia by years

REPUBLIC OF MACEDONIA		Physical-chemical parameters			Microbiological parameters		
j) YEAR	% from total population	Number of samples	Improper samples	%	Number of samples	Improper samples	%

2000	69	10.512	709	6.7	10.512	213	2
1999	66	11.531	596	5.2	11.531	231	2.7
1998							
1997	65.3	22.182	415	1.87	23.207	157	0.67

Table 4: Water supply systems which used deep and shallow underground water

Settlement	Capacity (l/sec)	2.1.2	Ha r d n e s s	Chemical characteristics	Microbiological uncertainty
a) <i>Bogdanci</i>	50	13.9		Cr=76.4;Mg=21.4	temporary
Valandovo	40	12		Cr,Mg	temporary
Gevgelija	140	15		Mg=31.5;Ca=73.7, Cr,Mg	temporary raw water
Delcevo	42	2.8		Fe=0.266	temporary raw water
D.Hisar	6	9.3		Ca=55.1; Mg=12.9	temporary raw water
Kocani	260	14.9		Mn=0.099;Mg=15.1;Ca=69.1	temporary raw water
Kr.Palanka	60	4.73		Ca=11.7;Mg=12.9	rare
Miravci	12.5	6.78		dry remainder:236.0	correct
Ohrid	30	14.5		Mg=1.46;Ca=64.1	correct
Probistip	50	10.1		Ca=48.0; Mg=13.1	temporary raw water
Radovis	65	15.4		temporary presence of nitrates	temporary raw water
Star Dojran	16	17.2		Mg=30.2;Ca=71.1	correct
Stip	300	13.7		Temporary presence of lead and nitrates in raw water	temporary raw water
Skopje	1450	17.5		Mg=24.2;Ca=98.4	correct

Table 5: Water supply systems which used karst underground water

Settlement	Capacity (l/sec)	2.1.3	Ha r d n e s s	Chemical characteristics	Microbiological uncertainty
Skopje*	4500	17.5		Ca=99.3; Mg=15.3	safe
Prilep*	200	6.6		Ca=32.5; Mg=6.5	temporary

Ohrid*	100	8.2	Ca=44.1; Mg=9.2	Microbiological conditional safe
Tetovo	280	6.3	Ca=36.4; Mg=5.2	Microbiological conditional safe
Gostivar	250	7	Ca=31.2; Mg=7.4	temporary sediment
Kavadarci*	350	6.1	Ca=38.2; Mg=2.8	rare pollution
Negotino*	80	6.1	Ca=38.2 Mg=2.8	rare pollution
Krusevo*	25	6.1	Ca=32.5; Mg=6.5	rare pollution
Kicevo	545	6.6	Ca=34.3; Mg=5.7	rare pollution
Struga	200	9.3	Ca=42.0; Mg=13.2	Microbiological conditional safe
Valandovo*	181	12	Ca=49.6; Mg=20.5	Microbiological conditional safe
Resen*	40	9.8	Ca=28.5; Mg=12.0	Microbiological conditional safe
S. Dojran*	30	13.1	Ca=49.2; Mg=16.5	Microbiological conditional safe
Debar	200	7.9	Ca=49.5; Mg=3.68	temporary

Table 6: Water supply systems which used surface water

Settlement	Capacity (l/sec)	2.1.4 Ha	Chemical characteristics	Microbiological uncertainty
Bitola	480	1.8	Ca=11.6; Mg=1.5 ; Fe=0.01	safe
Kumanovo	300	6.9	Ca=33.2; Mg=8.1	safe
Veles*	230	12.8	Ca=49.8 Mg=19.5	rare secondary pollution
Strumica	400	5	Ca=22.4 Mg=7.5 ; Fe=0.08	safe
Vinica	120	8.8	Ca=37.4 Mg=12.0 ; Fe=0.01	safe
Sv.Nikole	75	10.6	Ca=57.3	rare secondary pollution

			Mg=16.8; Fe=0.01	
Berovo	100	3.1	Ca=12.6 Mg=2.1 ; Fe=0.1	safe
Kratovo	60	3.6	Ca=13.2 Mg=4.1 ; Fe=0.01	rare secondary pollution
Kavadarci*	200	6.1	Ca=38.2; Mg=2.8	rare secondary pollution

Table 7: Distribution of analyzed bathing water samples by years in the natural lakes in the Republic of Macedonia

	2000				1999				1997			
	Physical-chemical		Microbiological		Physical-chemical		Microbiological		Physical-chemical		Microbiological	
	Number of samples	% Improper	Number of samples	% Improper	Number of samples	% Improper	Number of samples	% Improper	Number of samples	% Improper	Number of samples	% Improper
Ohrid Lake	111	5.4	111	5.4	130	4	130	0	123	0.8	123	4
Prespa Lake	65	32	65	23	68	12	68	20	77	6	77	23
Dojran Lake	42	100	42	0	42	100	42	0	30	100	30	0

Table 8: National population connected to waste water treatment plants

2.2 Republic of Macedonia		Units	1998	1999	2000
National resident population		1000's	1.990.000	2.025.000	2.050.000
% of national resident population connected to:		% of pop.			
Total public sewage treatment, of which: (27), (a)					
1)					
- Mechanical treatment only (29)		% of pop.	5.00%	5.00%	5.00%
- Biological treatment (30)		% of pop.	4.50%	4.50%	4.50%
- Advanced treatment technology (31)		% of pop.			
Other sewage treatment (28), (b) 2)		% of pop.	0.50%	0.50%	0.50%
Total public sewerage with treatment (c) 1) +		% of pop.	5.00%	5.00%	5.00%
2)					
Public sewerage without treatment (26) 3)		% of pop.	95.00%	95.00%	95.00%
Total public sewerage 1) + 2) +3)		% of pop.	46.00%	49.00%	49.00%
Non public sewerage or independent sewerage (26A)		% of pop.			0.50%
of which with independent treatment (28A)		% of pop.			0.10%

