

# Local Water Supply, Sanitation and Sewage

Country Report

Cyprus

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MEDA Water



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SOCIETÀ GESTIONE IMPIANTI IDRICI



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# 1. SUMMARY

<b>LOCAL WATER SUPPLY, SANITATION AND SEWAGE CYPRUS</b>
<b>SOCIAL CONTEXT</b>
<ul style="list-style-type: none"> <li>• Average Rainfall: 1987 – 2004: 470 mm / yr</li> <li>• Area: 9251 sq km</li> <li>• Total Population, 2003: around 770 000</li> <li>• Population Growth Rate 2003: 1.4%</li> <li>• Population Distribution: <ul style="list-style-type: none"> <li>• Urban: 69.3%</li> <li>• Rural: 30.7%</li> </ul> </li> <li>• Currency: 1 Cyprus Pound (CYP) = 1,70 EUR</li> </ul>
<b>INSTITUTIONAL SETTINGS</b>
<p><b>Policy Setting</b> : Ministry of Agriculture, Natural Resources and Environment  <b>Executive / Regulatory Level:</b> Water Development Department (WDD)<sup>1</sup>  <b>User Level:</b> Local Water Boards, Municipal Boards and Village Boards</p> <p>Water Supply and Sanitation, Sewerage services are managed by different water boards separately.</p> <p><b>Private Sector Involvement:</b>  The only Private Sector involvement in the water sector is the management of desalination plants in which private companies have given 10 years contracts. There is no further participation of domestic or foreign private companies.</p>
<b>WATER STRATEGY</b>
<p>From a strategy mainly for increasing water supply and reservoirs, to a combination between supply measures and demand management measures. Also important the use of non traditional water sources as desalination and treated wastewater. Desalination is considered crucial for securing continuous water supply.</p>
<b>WATER RESOURCES</b>
<ul style="list-style-type: none"> <li>• The sources for domestic water supply are: <ul style="list-style-type: none"> <li>- Desalination (45.5%)</li> <li>- Groundwater (28.8%)</li> <li>- Surface water (25.7%)</li> </ul> </li> <li>• Water Board of Lemesos<sup>2</sup> (2003) <ul style="list-style-type: none"> <li>Number of consumers: 62.970</li> <li>Water production / Bulkwater: 11.985.560 m<sup>3</sup> /year</li> <li>Consumption of water: 10.216.698 m<sup>3</sup> /year</li> <li>Unaccounted for water: 14.76 %</li> <li>Overall daily consumption per person: 193 litres</li> <li>Actual average daily consumption per person: 132 litres</li> </ul> </li> <li>• Water Board of Nicosia<sup>3</sup> (2004): <ul style="list-style-type: none"> <li>Number of consumers: Population 200.000 (83,129 Water Meters)</li> <li>Water production / Bulkwater: 18.141.070 m<sup>3</sup> (Domestic uses 13 MCM)</li> </ul> </li> </ul>

<sup>1</sup> Source: History - Water Development Department – Web page

<sup>2</sup> Source: Water Board of Lemesos - Data for Year 2003

<sup>3</sup> Source: "Seawater and Brackish Water Desalination in the Middle East, North Africa and Central Asia". Final Report Annex 6 Cyprus December 2004. The World Bank, Bank-Netherlands Water Partnership. DHV Water BV, the Netherlands. BRL ingénierie, France

<p>Consumption of water: 16,958,690 m<sup>3</sup> / year                  Unaccounted for water: approximately 24.4% (including administrative losses)                  Overall daily consumption per person: 200 litres                  Actual average daily consumption per person: 159 litres</p>
<p><b>WATER SUPPLY</b></p> <ul style="list-style-type: none"> <li>• Rate of population served by drinking water networks of total population: 100%                         <ul style="list-style-type: none"> <li>• Urban:100%</li> <li>• Rural: 100%</li> </ul> </li> <li>• Potable Water Consumed per capita:200 l/cap/day (estimated)</li> </ul> <p>Estimated population access to Improved Water sources through Household Connections:</p> <ul style="list-style-type: none"> <li>• Urban: 100%</li> <li>• Rural: 100%</li> </ul> <p>Service Continuity: During 2004, every household in every part of free Cyprus had continuous supply of drinking water on a 24-hour basis.<sup>4</sup></p>
<p><b>SANITATION &amp; SEWAGE</b></p> <ul style="list-style-type: none"> <li>• Rate of population connected to public sanitation 2002<sup>5</sup>:                         <ul style="list-style-type: none"> <li>• Urban: 49 %</li> <li>• Rural: 16%</li> </ul> </li> </ul> <p>Wastewater</p> <ul style="list-style-type: none"> <li>• Total Volume of Wastewater:</li> <li>• Total rate of Wastewater undergoing treatment:</li> <li>• Waste water undergoing treatment: capacity 20 hm<sup>3</sup>/ year, treated effluents is 11 hm<sup>3</sup>/ year.                         <ul style="list-style-type: none"> <li>• Physical / Tertiary:</li> <li>• Biological / Secondary:</li> <li>• Advanced:</li> </ul> </li> <li>• Rate of population served by waste water treatment plants:                         <ul style="list-style-type: none"> <li>• Urban:</li> <li>• Rural:</li> </ul> </li> </ul> <p>Estimated Rate of population with access to improved sanitation 2002<sup>6</sup>:</p> <ul style="list-style-type: none"> <li>- Urban: 100 %</li> <li>- Rural: 100%</li> </ul>
<p><b>INVESTMENTS IN WATER SECTOR</b></p> <ul style="list-style-type: none"> <li>• Total Investment in the water sector:</li> <li>• Investment in Water Supply %:</li> <li>• Investment in Sanitation and Wastewater Treatment %:</li> <li>• Private Part of Total Investment %:</li> <li>• Innovative solutions for financing investments:</li> </ul>

<sup>4</sup>Source: Annual report 2004 - Water Development Department – Web page

<sup>5</sup> Source: WHO / UNICEF Joint Monitoring Programme for Water Supply and Sanitation, Coverage Estimates, Sanitation, Updated in July 2004, Turkey

<sup>6</sup> Source: WHO / UNICEF Joint Monitoring Programme for Water Supply and Sanitation, Coverage Estimates, Sanitation, Updated in July 2004, Turkey

#### **WATER TARIFFS**

- Subsidized Water Supply: Bulkwater subsidized - The price for domestic water in 2001 was 0.335 Cy£ /m<sup>3</sup> (about 0.58 €).<sup>7</sup>

Tariff system:

- Progressive Block Tariff<sup>8</sup>
- Medium Tariff for 1 m<sup>3</sup> of domestic water:
- Metering:

Responsible institution for setting Tariffs:

Tariffs for Bulkwater is set by WDD and approved by the Council of Ministers in 1993. Setting progressive block tariffs, seasonal prices and over-consumption penalties for the purpose of promoting efficiency and conservation objectives in water use, lies within the jurisdiction of the local authorities and the Water Boards that are responsible for the distribution of water within the various urban and rural centres. Prices differs between the different municipalities.<sup>9</sup>

<sup>7</sup> Source: Guidelines for integrated Water Management, Regional experiences and management methods applicable to water stressed regions. Athens, 2005

<sup>8</sup> Seawater and Brackish Water Desalination in the Middle East, North Africa and Central Asia". Final Report Annex 6 Cyprus December 2004. The World Bank, Bank-Netherlands Water Partnership. DHV Water BV, the Netherlands. BRL ingénierie, France

<sup>9</sup> Source: Guidelines for integrated Water Management, Regional experiences and management methods applicable to water stressed regions. Athens, 2005

## 2. GENERAL CONTEXT

### 2.1. Geography

Cyprus is situated at the north eastern part of the Mediterranean basin. Cyprus is the third largest island in the Mediterranean with an area of 9 251 square kilometres. Cyprus is dominated in its topography by two mountain ranges, the Troodos range in the central part of the island and the Pentadaktylos range in the north of the island.<sup>10</sup>

### 2.2. Climate

Cyprus has a typical Mediterranean climate with mild winters, long hot, dry summers and short autumn and spring seasons. The mean annual temperature is 20.6°C. The average rainfall is 500 mm. The variation in rainfall is not only regional but annual and often two and even three-year consecutive droughts are observed.

Cyprus' environmental problems stem in part from its natural assets as a tourist centre. The influx of visitors every year combined with the limited water supply is putting pressure on the country's resources.<sup>11</sup>

### 2.3. Social Context

Awareness programmes aimed at domestic water supply have been in place since long and are considered to be quite successful. An interviewee is of the opinion that the biggest challenge lies in lowering the water use in the agricultural sector, since large gains can be made there.<sup>12</sup>

#### **Total population**<sup>13</sup>

In 2003 the population of Cyprus was approximately 770 000 persons

#### **Total Urban Population:**

69.3% Urban

#### **Total Rural Population:**

30.7% Rural

#### **Population Growth Rate**<sup>14</sup>

2003: 0.56% / year

#### **Currency:**

1 Cyprus Pound (CYP) = 1,70 EUR

<sup>10</sup> Source: Water Development Department - The Republic of Cyprus - Web Page

<sup>11</sup> Source: [http://europa.eu.int/comm/environment/news/efe/14/article\\_277\\_en.htm](http://europa.eu.int/comm/environment/news/efe/14/article_277_en.htm)

<sup>12</sup> Source "Seawater and Brackish Water Desalination in the Middle East, North Africa and Central Asia". Final Report Annex 6 Cyprus December 2004.

<sup>13</sup> Source Department of Statistics

<sup>14</sup> Source: <http://devdata.worldbank.org/external/CPProfile.asp?PTYPE=CP&CCODE=CYP>

### 3. INSTITUTIONAL SETTINGS

Level	Institution	Comment
<i>Policy Setting</i>	<b>Ministry of Agriculture, Natural Resources and Environment.</b>	<p>The policy control of water management in Cyprus is at present divided between three ministries.</p> <p>The Ministry of Agriculture, Natural Resources and Environment into which the Development Department, the Geological Survey Department and the Department of Agriculture and Environment Services are incorporated, is the main Ministry for water Policy.</p> <p>The ministry deals with the correlation between water supply and irrigation supply, but also advises on all aspects of water development.</p>
	<b>Ministry of the Interior</b>	This ministry has the legal responsibility for local government through its Districts Officers. It has an interest in the water supplies for new areas of building development and tourists areas and factories but also in irrigation schemes. It has the legal control over groundwater resources and issues all licences and permits.
	<b>Ministry of Finance</b>	This ministry is responsible for budgets and financial issues and the Minister is the chairman of the Planning Bureau. All expenditure is dealt with by the Accountant General and the Budgeting Officer whereas all main contracts by central tender board chaired by the Accountant General.
<i>Regulatory</i>	<b>Water Development Department (WDD)<sup>15</sup></b>	<p>The Water development Department is responsible for implementing the water policy of the Ministry of Agriculture, Natural Resources and Environment. The main objective of this policy<sup>16</sup> is rational development and use of water resources.<sup>16</sup></p> <p>As regards the provision of potable water, the WDD is responsible for the collection and storage of water in reservoirs, the treatment of the water and its conveyance to the cities and villages in Cyprus. It is also responsible for obtaining the water from the two desalination plants that are in operation in Dhekelia and Larnaca.<sup>17</sup></p> <p>The WDD makes sure that the water is delivered at the agreed quantities and that the water quality is in order. The water is then supplied to the population by the Water Boards, the Municipal Boards and the Village Boards.<sup>18</sup></p> <p>The WDD is also responsible for:</p> <ul style="list-style-type: none"> <li>• the collection, processing and classification of</li> </ul>

<sup>15</sup> Source: History - Water Development Department – Web page

<sup>16</sup> Annual Report 2004, Water Development Department, Republic of Cyprus, 2004

<sup>17</sup> Source: "Seawater and Brackish Water Desalination in the Middle East, North Africa and Central Asia". Final Report Annex 6 Cyprus December 2004

<sup>18</sup>Source: "Seawater and Brackish Water Desalination in the Middle East, North Africa and Central Asia". Final Report Annex 6 Cyprus December 2004

		<p>hydrological, hydro geological, geo-technical and other data necessary for the study, maintenance and safety of the water development works,</p> <ul style="list-style-type: none"> <li>• the study, design, construction, operation and maintenance of works, such as dams, ponds, irrigation, domestic water supply and sewerage schemes, water treatment works, sewage treatment and desalination plants</li> <li>• the protection of the water resources from pollution.</li> </ul>
<i>User Level</i>	<b>Water Boards, Municipal Boards and Village Boards</b> <sup>19</sup>	<p>Water Supply, Sanitation and Sewage are the responsibilities of the Municipalities. The services are managed separately by different boards under the municipalities.</p> <p>The domestic water is supplied to the population by the Water Boards, the Municipal Boards and the Village Boards (semi-governmental agencies belonging to the local authority).</p> <p>There are four Water Boards in Cyprus:</p> <ul style="list-style-type: none"> <li>• Nicosia</li> <li>• Limasol (Lemesos)</li> <li>• Larnaca</li> <li>• Famagusta. (Famagusta is for the moment inactive).</li> </ul> <p>The Water Boards basically runs without any subsidy. However, it should be noted that the bulk water that is bought from the Government (WDD) is subsidized.<sup>20</sup></p> <p>The objectives of the Water Boards are:</p> <ul style="list-style-type: none"> <li>• maintenance of the water distribution network,</li> <li>• the determination of water rates in order to finance the operating expenses and development projects of the Board, while remaining a non-profit making organisation.</li> <li>• planning and execution of development projects.</li> </ul> <p>In all other towns, municipalities and villages the water services are managed by local water communities, part of the municipal works organisation.</p>
<i>Other institutions</i>	<b>Drought Management Committee</b>	<p>Because of the climate change and the immediate impact on the reduction in the availability of the natural water resources, the Government of Cyprus has set up a Drought Management Committee with the responsibility of implementing measures of mitigating the adverse effects from drought and mainly to mitigate water scarcity problems. In parallel to this, realizing the need for additional water the Government decided to introduce seawater desalination for augmenting the water availability and increasing the reliability of water supply from the existing Government Water Projects. The Drought Committee is not a permanent committee but an Ad-Hoc and is energized when Drought Occurs.</p>

<sup>19</sup> Source: "Seawater and Brackish Water Desalination in the Middle East, North Africa and Central Asia". Final Report Annex 6 Cyprus December 2004

<sup>20</sup>Source: "Seawater and Brackish Water Desalination in the Middle East, North Africa and Central Asia". Final Report Annex 6 Cyprus December 2004

### **3.1. Water Development Department - Organisational Structure**

The Water Development Department was established in 1896 as a Section of the Public Works Department, with responsibility for domestic water supply and irrigation. In 1939 it was set up as an independent Government department called the Water Supply and Irrigation Department and in 1954 the name of the Department was changed to its present name of Water Development Department.

In 1960 the department came under the Ministry of Agriculture, Natural Resources and Environment and restructured in several divisions with responsibility for implementing the water policy of the newly established Republic.

#### **The Water Development Department Divisions**

- Water Resources
- Hydrology
- Planning
- Design
- Rural Projects Planning and Contracts
- Sewage and Reuse
- Construction
- Management
- Operation and Maintenance of Government Water Supply Systems,
- Operations and Maintenance of Irrigation Systems
- Telemetry
- Mechanical-Electrical Service Division

#### **3.1.1. Regional Offices**

The Department has also four Regional Offices, located in

- Nicosia
- Limassol (Lemesos)
- Paphos
- Famagusta – Larnaca

#### **3.1.2. Public / Private Utilities**

- **Water Board of Nicosia (WBN)**

The Water Board of Nicosia (WBN), is like the other water boards, a semi-governmental agency belonging to the local authority. WBN was established in 1953. It serves six municipalities, with 200,000 people, comprising approximately 80,000 connections. The network is divided into 21 districts which all have bulk meters in place, connected to a central SCADA monitoring system. It is only involved in water supply and has no responsibility for sewerage.

### **3.2. Private Sector Involvement**

The two plants in Dhekelia and Larnaca are run under a BOOT type of contract. The contracts run for 10 years. Once the contracts expire, it is very likely that the government will float management contracts for the operation of the plants. The initial operators (of the BOT contract) may be retained to carry out those management contracts.<sup>21</sup>

### **3.3. New Institutional Settings**

*The responsibility for water management has traditionally been divided between different ministries exercising overlapping jurisdictions. This sometimes resulted in the duplication of activities or the failure to take appropriate measures for effective water management. Efforts are now focusing on establishing*

<sup>21</sup> Source: "Seawater and Brackish Water Desalination in the Middle East, North Africa and Central Asia". Final Report Annex 6 Cyprus December 2004

*a new Directory for Integrated Water Management, which is proposed to manage the island's water resources within the framework of the national water policy in a holistic way.*<sup>22</sup>

*The Directory will deal with the provision of water for domestic purposes and agriculture, will control water extraction from surface and underground water systems, will supervise the safety of dams and reservoirs through the formulation of an appropriate legal framework, and will promote the conservation and management of water-related ecosystems. An advisory committee will be set up, comprised of key stakeholders in the water management sector, who will have an active role in the formulation and implementation of water related policies. The Directory for Integrated Water Management will be based on the existing Water Development Department within the Ministry of Agriculture, Natural Resources and Environment.*<sup>23</sup>

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<sup>22</sup> Source: - Water Management in Cyprus: Challenges and Opportunities - National Report - Ministry of Agriculture, Natural Resources and Environment, Water Development Department , Cyprus, Geneva, 13-14 December 2004

<sup>23</sup> Source: - Water Management in Cyprus: Challenges and Opportunities - National Report - Ministry of Agriculture, Natural Resources and Environment, Water Development Department , Cyprus, Geneva, 13-14 December 2004

## 4. LEGAL FRAMEWORK

The legal framework in Cyprus enacted during the colonial era still remains in force by virtue of the provisions of Article 188 of the Constitution although additions and modifications have been made to take account to changes, new developments and trends.

The laws related to water state following:<sup>24</sup>

- *All ground water and all surface water and wastewater resources are vested to the state.*
- *The Government has the power to construct waterworks and sell water at a price fixed by the Government and the Parliament.*
- *The water rights are protected and riparian rights are given to those who can prove that they own such rights.*
- *The Laws give the right to private individuals to sink or construct wells or drill boreholes, for ground water abstraction, after getting a permit from the District Officer.*
- *The Laws give the right to individuals to form Irrigation Divisions or Associations to construct irrigation works.*
- *The Laws give the right to villages and towns to form their own Commissions for constructing their own waterworks for domestic supply.*
- *The Laws give the right to town or villages to form their own sewage and drainage Boards for the collection, treatment and disposal of sewage effluents.*
- *The Laws, excepts in the cases of Irrigation Divisions, Association, Commission and Sewage Boards, do not mention the administrative authority which keeps the water resources inventory, or evaluates, or allocates and controls the use of water. This is a basic setback of the water legislation.*
- *Concerning environmental issues on water the Law no 69/91- "Water pollution control", provides for the reduction, control and abolition of water pollution for the best protection of the natural water resources and the health and well being of the population.*

Law	Comment
<i>Government Waterworks Law (Cap. 341)</i>	<p>This law empowers the government to plan, design, construct, operate and maintain, any waterworks, to sell water, to buy water rights, to assess water rights, to fix water tariffs and to collect water sale bills. The Law also give all ground and surface water to the Government.</p> <p>An amendment made in 1968 enables the creation, by the Government; of a Committee to administer water projects in accordance to Regulations approved by the Council of Ministers and ratified by the Parliament. The law gives the power to the Council of Ministers to define investments in waterworks, for the development of the water resources, their regulation, distribution, and management of all water resources that are controlled by the said waterworks.</p> <p>The law does not define one administrative authority for effective overall responsibility of the water resources and waterworks.</p>
<i>Wells Law (cap 351)</i>	Laws regulating permits for construction of wells or drilling of boreholes This law was partly improved by the Water Supply (Special Measures Law). It gives the Government power to declare and define special measure areas for groundwater protection against overexploitation.
<i>Water Supply (Municipal and Other Areas) Law (Cap 350)</i>	This Law provides for the creation of Water Boards for the towns of Cyprus under the chairmanship of the District Officer. Under the Law the Water Board, governed by a Board of Directors under the Chairmanship of the District Officer, has the power to build its own waterworks for water development and water distribution. However the practice has been to limit their activities within the distribution systems and leave the bulk supply of

<sup>24</sup> Source: Water Development Department - Legal Framework

	water to the Water Development Department.
<i>Water (Domestic Purposes) Village Supplies Law (Cap 349)</i>	This Law provides for the creation of village water Commissions for village water supply.
<i>Sewerage and Drainage Law (1/71)</i>	Sewerage and Drainage Law (1/71) <sup>25</sup> - This Law provides for the creation of Sewage Boards for the collection, treatment and disposal of sewage effluent and drainage water from areas defined by the Council of Ministers as "Sewerage and Drainage Law Areas". The Sewage Boards are responsible for the planning, design, construction, operation and maintenance of all works required.
<i>Other Water Laws</i>	<ul style="list-style-type: none"> <li>• Control of Water Pollution Law (69/91) <ul style="list-style-type: none"> <li>▪ Order 97/2000 For Dir. 75/440/EEC (surface water intended for the abstraction of drinking water)</li> <li>▪ Order 98/2000 For Dir. 79/869EEC and 81/555/EEC (methods of measurement &amp; frequencies of sampling/analysis)</li> <li>▪ Order 99/2000 For Dir. 76/160/EEC (bathing water)</li> </ul> </li> <li>• Control of Water Pollution (Application for a Licence relating to Waste Disposal) Regulations (288/92, 297/95)</li> <li>• The Control of Water Pollution (Prohibition of Discharge) Regulations (52/93)</li> <li>• The Control of Water Pollution (Measures for the Protection of Underground Waters) - Orders (45/96)</li> <li>• Municipal Corporations Law (111/85)</li> <li>• Water Supply (Special Measures) Law (32/64)</li> <li>• Water (Development and Distribution) Law (Cap 348)</li> <li>• Irrigation divisions (Villages) Law (Cap 342)</li> <li>• Public Health (Villages) Law (Cap. 259)</li> <li>• Nicosia Water Supply (Special Powers) Law</li> <li>• Standards and Quality Control Law (68/75, 24(I)/96)</li> </ul>

#### 4.1. Proposed laws under evaluation

In order to cope with actual discrepancies in the water legislation and water management a law is evaluated that provides for the creation of a Water Entity within the Government to undertake the management of the water resources of Cyprus.

- The intention is to form a Water Entity that is in charge with the following responsibilities:
- To prepare and submit proposals for the formulation of the water resources management policy.
- To undertake the implementation and execution of water development works and provide water for domestic and other uses.
- To control the abstraction of water from surface and groundwater reservoirs by issuing licenses to legal users and by taking the necessary measures for the strict implementation of the licenses.
- To plan and construct sewage water collection and water treatment plants and distribution systems for the re- use of the treated effluents.
- To provide technical assistance to other organizations on water development and water management.
- To sell and buy water within the water management policies of the government including desalinated water.
- To allocate the water available to the different users according to Government approved policy.

<sup>25</sup> Source: Country Profile Cyprus. The local government system in Cyprus

## 5. WATER STRATEGY<sup>26</sup>

Following the independence of Cyprus in 1960, the Government of Cyprus placed great importance on water management in order to secure an adequate supply of good quality water to the island's inhabitants. The main policy of the Government, implemented through the Water Development Department, was to increase water supply by constructing dams and conveyance infrastructure under the motto "No drop of water to the sea".

It is estimated that groundwater resources are overexploited by about 40% of the sustainable extraction level. The existing conditions have resulted in saline water intrusion and consequent quality deterioration in coastal aquifers and depletion of inland aquifers. Seawater intrusion in aquifers has also resulted in spoiling valuable underground water reservoirs. Furthermore, intensive agriculture and excessive use of fertilizers have resulted in nitrate pollution of many aquifers. Similar nitrate pollution problems appear in aquifers in inhabited areas because of direct sewage disposal in adsorption pits (Water Development Department and FAO, 2002).

Another problem that Cyprus is facing is the increased frequency and intensity of droughts during the last 30 years. Furthermore, the level of precipitation has decreased during the last century. (Water Development Department and FAO, 2002).

After the water crisis in the years between 1990-1991 and 1996- 2000 the Government was forced to impose restrictions on water supply both for domestic and irrigation purposes.<sup>27</sup> This led the Government of Cyprus to revise its general water policy, in an effort to promote effective water governance and to ensure that every person has access to safe drinking water.

New measures have included the:

- treatment of municipal waste
- use of tertiary treated water in agriculture and for groundwater recharge
- the introduction of desalination.
- Saving water through public education and awareness campaigns
- Revisions of existing legal and institutional framework in order to create an enabling environment for the implementation of integrated water management and the conservation of water-related ecosystems.

Better use of pricing and water conservation measures

At the same time, keen efforts have been undertaken towards saving water, through public education and awareness campaigns. In addition, several revisions have been made in the existing legal and institutional framework in order to create an enabling environment for the implementation of integrated water management and the conservation of water-related ecosystems.

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<sup>26</sup> Source: - Water Management in Cyprus: Challenges and Opportunities - National Report - Ministry of Agriculture, Natural Resources and Environment, Water Development Department , Cyprus, Geneva, 13-14 December 2004

<sup>27</sup> Source: Water Management in Cyprus: Challenges and Opportunities - National Report - Ministry of Agriculture, Natural Resources and Environment, Water Development Department , Cyprus, Geneva, 13-14 December 2004

## 6. WATER ASSESSMENT

### 6.1. Water Resources

The sources for domestic water supply are desalination (45.5%), groundwater (28.8%) and surface water (25.7%).

Per capita daily water use (including network losses) in year 2000 in the main towns and the aggregated villages:

**Table 7: Actual per capita daily water consumption during the year 2000**

<b>Town</b>	<b>Litres/capita/day including losses</b>
<b>Lefkosa</b>	150
<b>Lemesos</b>	215
<b>Larnaka</b>	162
<b>Pafos</b>	222
<b>Villages</b>	144

Note: Pafos has the higher losses in the distribution network, which are over 30%

Source: Savvides et al., 2001

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<sup>28</sup> Source: Reassessment of the Island's water resources and demand – Synthesis Report – Wulf Klohn – Ministry of agriculture, Natural Resources and Environment of Republic of Cyprus. Water development Department, June 2002

Water source	Estimated amount used million m <sup>3</sup> /year	%
Surface water	101.5	38%
Groundwater	127.4	48%
Springs	3.5	1%
Desalination units	33.5	13%
<b>TOTAL</b>	<b>265.9</b>	<b>100%</b>

Table: 34 Sources of Water Supply for all Sectors

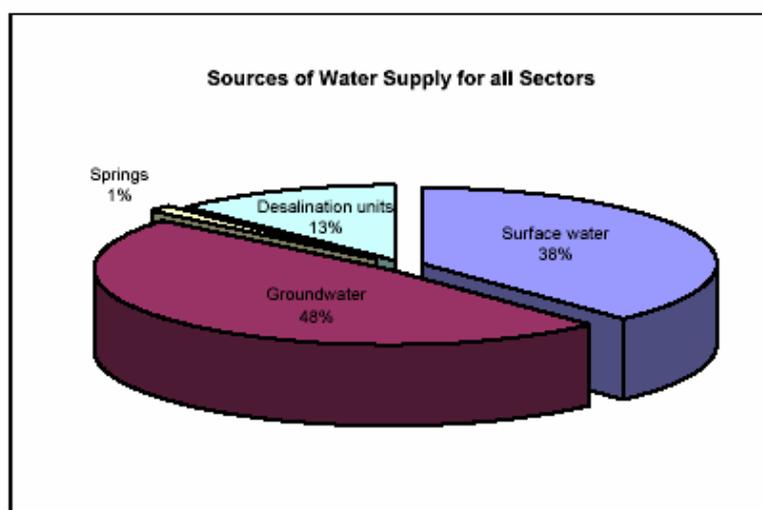


Figure: 20 Sources of Water Supply for all Sectors

### 6.1.1. Desalination

To increase the water resources and especially to relieve the domestic water supply from the vagaries of the weather, the Government signed contracts for the construction and operation of two desalination plants of the reverse osmosis type built in Dhekelia and Larnaca.<sup>29</sup> The new desalination plant near Larnaca Airport, the largest of Cyprus in this sector, coupled with the Dhekelia plant produce 33 million cubic metres of water a year.<sup>30</sup>

### 6.1.2. Water Demand

The two main water-consuming sectors in Cyprus are irrigated agriculture and domestic use. Agriculture accounts for about 70% of total water use, while the domestic sector accounts for 20% of water use. Other sectors include tourism (5% of water demand), industry (1%), and amenities (5%).<sup>31</sup>

Today the total water demand in Cyprus amounts to 265,9 million cubic meters annually. It is estimated that by 2020, water demand in Cyprus will increase to 313,7 cubic meters, mainly as a result of a rise in the use of domestic water and tourism development (Water Development Department and FAO, 2002).<sup>32</sup>

<sup>29</sup> Source: "Seawater and Brackish Water Desalination in the Middle East, North Africa and Central Asia". Final Report Annex 6 Cyprus December 2004

<sup>30</sup> Source: Annual report 2004 - Water Development Department – Web Page

<sup>31</sup> Source: Water Management in Cyprus: Challenges and Opportunities - National Report - Ministry of Agriculture, Natural Resources and Environment, Water Development Department, Cyprus, Geneva, 13-14 December 2004

<sup>32</sup> Source: Water Management in Cyprus: Challenges and Opportunities - National Report - Ministry of Agriculture, Natural Resources and Environment, Water Development Department, Cyprus, Geneva, 13-14 December 2004

Table 4: Projected water demand per year for the main sectors (2000 – 2020)

Sector of Demand / Year	2000	2005	2010	2020
<b>Agriculture</b>	182.4	182.4	182.4	182.4
<b>Domestic</b>				
Inhabitants	53.4	58.4	63.2	73.5
Tourism	14.1	18.0	22.9	30.8
<b>Industry</b>	3.5	5.0	6.0	7.0
<b>Environment</b>	12.5	14.0	16.0	20.0
<b>TOTAL (million m<sup>3</sup>)</b>	<b>265.9</b>	<b>277.8</b>	<b>290.5</b>	<b>313.7</b>

Source: Savvides et al., 2001

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## 6.2. Water Supply

### Service Continuity:

During 2004, every household in every part of free Cyprus had continuous supply of drinking water on a 24-hour basis.<sup>34</sup>

### Service Coverage:

Estimated coverage		
Year	Total	HC
1990	100%	100%
1995	100%	100%
2000	100%	100%
2002	100%	100%

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### 6.2.1. Water Uses:

Table 1. Present water use by sector in the Government controlled areas

No	Description of Use	Quantity in MCM	Percentage
1.	<b>Agriculture</b>	174,4	69
2.	<b>Domestic</b>	67,5	25
3.	<b>Animal Husbandry</b>	8,0	
4.	<b>Industry</b>	3,5	1
5.	<b>Environment</b>	12,5	5
6.	<b>Total</b>	265,9	100
	<b>Water use per capita per year in m3</b>	352,7	

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<sup>33</sup> Source: Reassessment of the Island's water resources and demand – Synthesis Report – Wulf Klohn Ministry of agriculture, Natural Resources and Environment of Republic of Cyprus. Water development Department – June 2002

<sup>34</sup> Source: Annual report 2004 - Water Development Department – Web page

<sup>35</sup> Source: WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation Coverage Estimates Access to Improved Drinking Water Sources- Cyprus – Updated in July 2004 - Cyprus

<sup>36</sup> Source: Cyprus - Water Resources Planning and Climate Change Adaptation. 2002. IUCN. Nicos X. TSIOURTIS

**Table 8: Domestic Water Demand for residents and tourists for the year 2000 (see also Figure 6)**

	Water demand (million m <sup>3</sup> )			% of total
	Resident	Tourist	Total	
Lefkosia & Suburbs	16.6	0.7	17.3	26%
Lemesos & Suburbs	12.8	3.6	16.4	24%
Larnaka & Suburbs	5.8	2.0	7.8	12%
Pafos & Suburbs	3.0	3.5	6.5	10%
Ammochostos	1.2	3.5	4.7	7%
All villages	11.3	0.8	12.1	18%
British Bases	1.8	-	1.8	3%
Turkish Sector / Lefkosia*	1.0	-	1.0	1%
<b>Total</b>	<b>53.4</b>	<b>14.1</b>	<b>67.5</b>	<b>100%</b>

\*) Note: The Water Board of Lefkosia provides about 1 million m<sup>3</sup> of water annually to the Turkish sector of Lefkosia.

Source: Savvides et al., 2001

### 6.2.2. Water Board of Nicosia<sup>37</sup> (WBN)

- The total volume of water distributed in Nicosia is around 15 MCM/year.
  - 13.8 MCM is for domestic use,
  - 0.5 MCM is for hotels, offices, etc.
  - 0.7 MCM is for industry in Nicosia.
- Since there is not much industry or tourism in Nicosia, the largest share of water supply is domestic water supply.
- WBN buys water in bulk from the Water Development Department and is responsible for the distribution thereof.
- The only adjustment to the water is slight chlorination in the WBN reservoirs. The reservoirs have a total capacity of 70,000 m<sup>3</sup>, the equivalent of two days' water supply. The entire water supply system is under gravity.
- Activities performed by WBN are repairs and maintenance of water networks and meter readings etc.
- Apart of the billing process only large works is outsourced.
- The total UfW is around 20%, including administrative losses, the target is to arrive at between 12 and 15% UfW.
- In order to reduce the un-accounted for water (UfW) there are ongoing leak reduction programmes.
- Water shortages has seriously harmed the distribution system, due to pressure being off and on, which lead to an increased number of leaks.
- The problem of water rationing, which troubled consumers for decades, was finally resolved in 2001 thanks to the implementation of desalination programmes and other measures adopted by the Government of Cyprus.
- All water consumption is metered; all meters are in accordance with the relevant EU regulations. Over 90 % of all meters are class C meters. Meters are replaced each 7-8 years. They cost are around CYL 10
- The tariff system that is in place is a progressive block tariff.

### 6.2.3. Water Board of Lemesos (Limassol)<sup>38</sup> (WBL)

#### Data for Year 2003

- Water production - 11.985.560 m<sup>3</sup>
- Consumption of water - 10.216.698 m<sup>3</sup>

<sup>37</sup> Source: "Seawater and Brackish Water Desalination in the Middle East, North Africa and Central Asia". Final Report Annex 6 Cyprus December 2004. The World Bank, Bank-Netherlands Water Partnership. DHV Water BV, the Netherlands. BRL ingénierie, France

<sup>38</sup> Source: Water Board of Lemesos (Limassol) Newspaper Statistics

- Unaccounted for water - 14.76 %
- Number of consumers - 62.970
- Overall daily consumption per person - 193 litres
- Length of network - 756.393
- Employees - 45
- Income - 3.841.980 Cy £
- Expenditure - 5.499.871 Cy £
- Asset Turnover - 42.68 %
- Capital Expenditure - 507.016 Cy£

- **UFW** <sup>39</sup>

In the domestic supply it is essential to reduce the losses by unaccounted for water, and to rehabilitate the distribution systems to minimize losses. It is also essential to vigorously campaign on people's awareness of the scarcity of water and its importance for sustainable development.

In order to reduce the un-accounted for water (UFW) there are ongoing leak reduction programmes. Water shortages has seriously harmed the distribution system, due to pressure being off and on, which lead to an increased number of leaks.

The problem of water rationing, which troubled consumers for decades, was finally resolved in 2001 thanks to the implementation of desalination programmes and other measures adopted by the Government of Cyprus.

### 6.3. Sanitation and Sewage

Recycled wastewater is an additional source of water that is applied in Cyprus. The first sewage treatment plant in operation produces 5 MCM of tertiary treated water and the new plants under construction and planning will produce 13 MCM by the year 2005 and 30 MCM by the year 2012.<sup>40</sup>

At the present about 3 million m<sup>3</sup> of treated sewage effluent is used for agriculture and irrigation. It is estimated that by 2012 an amount of approximately 30 million m<sup>3</sup> of treated sewage will be available for agriculture and irrigation.<sup>41</sup>

The water treatment plants of Khirokitia, Kornos and Limassol and Tersephanou were also constructed while Asprokremmos water treatment plant, which will deliver water to Paphos, is expected to commence operation early in the second half of 2003.<sup>42</sup>

<sup>39</sup> Source: Balance - Water Development Department – Web Page

<sup>40</sup> Source: "Seawater and Brackish Water Desalination in the Middle East, North Africa and Central Asia". Final Report Annex 6 Cyprus December 2004

<sup>41</sup> Source: Reassessment of the Island's water resources and demand – Synthesis Report – Wulf Klohn – Ministry of agriculture, Natural Resources and Environment of Republic of Cyprus. Water development Department, June 2002

<sup>42</sup> Source: Reassessment of the Island's water resources and demand – Synthesis Report – Wulf Klohn – Ministry of agriculture, Natural Resources and Environment of Republic of Cyprus. Water development Department, June 2002

## 7. TARIFFS

Cyprus has a strongly regulated water market. The Water Development Department is a natural monopolist for domestic water.

Water Development Department supply potable water to the three Water Boards of Nicosia, Larnaca and Limassol as well as to the 83 Municipalities, Development Boards and Village authorities in the four districts of Nicosia, Larnaca, Limassol and Famagusta. Water is also supplied to the Turkish occupied part of Nicosia and Famagusta.<sup>43</sup>

The cost of domestic water is fully charged to the customers. The price for domestic water in 2001 was 0.335 Cy£ /m<sup>3</sup> (about 0.58 €). (This tariffs was set by WDD and approved by the Council of Ministers in 1993.)

Setting progressive block tariffs, seasonal prices and over-consumption penalties for the purpose of promoting efficiency and conservation objectives in water use, lies within the jurisdiction of the local authorities and the Water Boards that are responsible for the distribution of water within the various urban and rural centres. Prices differs between the different the different municipalities.

- The water tariff structure imposed by the Water Boards is made of two parts: fixed charge and volumetric charge.
- Tariff rates are progressive; the volumetric charge increases as consumption increases.

The domestic water tariff is Cy£ 0.335 per m<sup>3</sup> is way below the cost of desalinated water (Cy£ 0.62 per m<sup>3</sup>). Many consumers are willing to pay about Cy£ 200 per m<sup>3</sup> for bottled water, although tap water is of good drinking quality.<sup>44</sup>

In view of the WFD Implementation Procedures, a pricing reform is underway by the Government Water Works.

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<sup>43</sup> Source: Water Pricing in Cyprus George Socratous, M.B.A., Ph.D Senior Water Engineer Water Development Department Ministry of Agriculture Natural Resources and Environment

<sup>44</sup> Source: Reassessment of the Island's water resources and demand – Synthesis Report – Wulf Klohn – Ministry of agriculture, Natural Resources and Environment of Republic of Cyprus. Water Development Department, June 2002

## 8. REFERENCES

Source	Links
Seawater and Brackish Water Desalination in the Middle East, North Africa and Central Asia Final Report Annex 6 Cyprus December 2004. The World Bank, Bank-Netherlands Water Partnership. DHV Water BV, the Netherlands. BRL ingénierie, France	<a href="http://wbIn0018.worldbank.org/water/bnwp.nsf/files/6cyprus.pdf/\$FILE/6cyprus.pdf">http://wbIn0018.worldbank.org/water/bnwp.nsf/files/6cyprus.pdf/\$FILE/6cyprus.pdf</a>
Water Development Department - The Republic of Cyprus	<a href="http://www.moa.gov.cy/moa/wdd/Wdd.nsf/resources_en/resources_en?OpenDocument">http://www.moa.gov.cy/moa/wdd/Wdd.nsf/resources_en/resources_en?OpenDocument</a>
Annual Report 2004 - Water Development Department - The Republic of Cyprus - Web Page	<a href="http://www.moa.gov.cy/moa/wdd/Wdd.nsf/All/A7FDFA2B6CC8C0FEC2256FC60026A632/\$file/Annual%20Report%202004.pdf?OpenElement">http://www.moa.gov.cy/moa/wdd/Wdd.nsf/All/A7FDFA2B6CC8C0FEC2256FC60026A632/\$file/Annual%20Report%202004.pdf?OpenElement</a>
Statistical Service of the Republic of Cyprus	<a href="http://www.mof.gov.cy/mof/cystat/statistics.nsf/index_en/index_en?OpenDocument">http://www.mof.gov.cy/mof/cystat/statistics.nsf/index_en/index_en?OpenDocument</a>
Reassessment of the Island's water resources and demand – Synthesis Report – Wulf Klohn – Ministry of agriculture, Natural Resources and Environment, Cyprus, Water development Department, June 2002	<a href="http://www.moa.gov.cy/moa/wdd/wdd.nsf/All/0E5A35979E87A16AC2256EBD003696DF/\$file/synthesis%20report.pdf">http://www.moa.gov.cy/moa/wdd/wdd.nsf/All/0E5A35979E87A16AC2256EBD003696DF/\$file/synthesis%20report.pdf</a>
Water Board of Lemesos (Limassol) Newspaper Statistics	<a href="http://www.wbl.com.cy/newpage/Statistics.htm">http://www.wbl.com.cy/newpage/Statistics.htm</a>
Ministry of Agriculture, Natural Resources and Environment, 2000	<a href="http://www.kypros.org/PIO/wdd/eng/scientific_articles/archieve2000/article001.htm">http://www.kypros.org/PIO/wdd/eng/scientific_articles/archieve2000/article001.htm</a>
Official Cyprus Government Pages Mirrored at KYPROS-NET	<a href="http://kypros.org/Government/">http://kypros.org/Government/</a>
WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation Coverage Estimates Access to Improved Drinking Water Sources -Cyprus – Updated in July 2004 -	<a href="http://www.childinfo.org/areas/water/pdfs/cyprus_wat_02.pdf">http://www.childinfo.org/areas/water/pdfs/cyprus_wat_02.pdf</a>
Water Management in Cyprus: Challenges and Opportunities - National Report - Ministry of Agriculture, Natural Resources and Environment, Water Development Department , Cyprus, Geneva, 13-14 December 2004	<a href="http://www.unece.org/env/water/meetings/ecosystem/Reports/Cyprus_en.pdf">http://www.unece.org/env/water/meetings/ecosystem/Reports/Cyprus_en.pdf</a>
Comparative Review of Water Sector Restructuring in the EU Accession States, Work Package 1, Final Report published by the EU-project Intermediaries. Will Medd, Cordula Fay, Simon Marvin	<a href="http://www.irsnet.de/intermediaries/ComparativeReport.pdf">www.irsnet.de/intermediaries/ComparativeReport.pdf</a>