

DEVELOPMENT OF WATER RESOURVES IN CYPRUS

A HISTORICAL REVIEW



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Cover page photograph:

Stone aqueduct in Larnaka

Back page photograph:

Rock structured bridge in Simou village

ADDRESS BY THE MINISTER

Water is one of the most precious goods on our planet and constitutes a fundamental heritage for every generation. Water is necessary for the development of all sectors of the economy. We have, therefore, an obligation towards improving its quality, its management on a national level and its proper use. In arid and semi-arid areas of our planet, as is the case in Cyprus, the supply of water is a continuous problem. The island's water-shortage problem is clearly manifested through this short historical review in the present edition.

The Ministry of Agriculture, Natural Resources and Environment in order to face the water shortage has resorted to the use of non-conventional means, such as seawater desalination, the utilization of various marginal waters in residential areas, the recovery and reuse of treated water effluent etc. Today, the management of water resources in our country depends not only on the more effective use of the available conventional resources, but also on the use of non-conventional resources, which was not done before.

We have an obligation to protect the water from pollution as well as from waste and to ensure that its management is rational, especially now, with our accession to the European Union. Cyprus must become fully harmonized with the *acquis communautaire*. It is imperative that all management bodies as well as the consumers themselves are continuously informed about the wise and proper use of water and that water awareness is promoted.

I wish to express my gratitude and my congratulations to the director and the personnel of the Water Development Department, who in any way contributed to the preparation of this issue.

Timis Efthimiou
**Minister of Agriculture,
Natural Resources and Environment**

December, 2003

PREFACE

This edition contributes to the presentation in general terms of the water development of our country. The reader is given the picture of our water problem and the efforts that were and are still made to face the water shortage. Since the Neolithic era (8500 B.C.) the residents of Cyprus used to build their settlements close to springs and rivers in order to have easy and continuous access to water, this indispensable good for our life. Since then and up to this day, a lot of water works have been carried out in order to have continuous supply of water, not only to households, but also for the development of all sectors of economy.

The progress made to this day, especially after Cyprus Independence in 1960, as well as future planning are demonstrated through this short historical review of water development in Cyprus. The problem of water supply was even more aggravated due to the Turkish invasion in 1974 and the continuing occupation of a significant part of our island.

Today the water demand in our country for the various uses is higher than the available water resources. The problem has been intensified during the last decade, due to the observed prolonged low rainfall. The Water Development Department is making continuous efforts towards the reduction of water demand through the application of water saving measures, and also towards the solution of the water problem in general through the construction of new water projects.

Christodoulos Artemis
Director
Water Development Department

December, 2003

Introduction

From the various water works, which were found in archaeological excavations of ancient settlements, it appears that the climatological conditions of Cyprus have not substantially changed from the ancient times to this day. The island has always suffered from droughts and water shortages. Therefore, its inhabitants were forced to face seriously the problem of water shortage, by trying to find proper ways for its collection, storage and conveyance to satisfy their potable water supplies and irrigation needs.

During the Stone Age, the settlements in Cyprus were built in places where there was surface or underground water available.

During the Neolithic Era (8500-3900 B.C.) settlements were found in areas with springs, which gushed out throughout the year or near rivers. Reference is made for example to the Khirokitia settlement, which used to obtain water from the Maroni river. Settlements found in the Karpassia area were built close to areas where signs of springs were found.



*Plan of the Neolithic Settlement of Khirokitia and the Maroni river
(Photographs: Department of Antiquities Archive)*

During the first and middle Copper Age (2500-1600 B.C.) the ancient settlements were built on high fortified places, probably because of the fear of raids. In these settlements special structures and installations, mostly eastern and stone conveyors, were there for the collection and storage of rainwater. In addition to the fortified position, all these



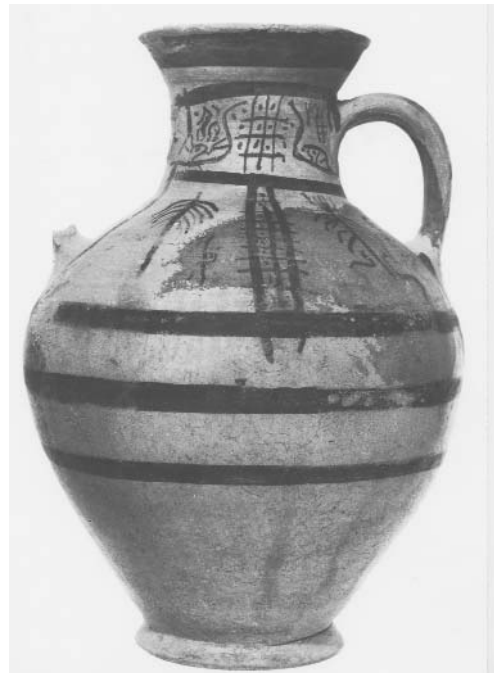
*Conveyors for the collection of rainwater in Alassa
(Photo: Department of Antiquities Archive)*

settlements had springs, rivers or wells close to them from where they could deliver water. Later on, when the danger of raids was eliminated, the towns were being built on the plains where there was water or in places where groundwater could be found. In those towns, which faced lack of water, the system of collection and storage of rainwater was very much developed on an organised basis. A characteristic example of this is the town of



*Urn of the 9th B.C. century
(Photo: Department of Antiquities Archive)*

Engomi near Salamina. Engomi seems to have been a large and densely populated town. It was also considered a good port, since the mouth of Pedieos river, which seems to have been navigable, was close to it. The demands for potable water and irrigation water in Engomi were quite big. The groundwater, which was drawn from the wells that were dug by the residents round the area, covered only part of their needs. The serious problem of lack of water was tackled in the following way: in the whole town there was an organised network of collection of rainwater from each house. The water was collected in earthen conveyors and was kept in cisterns in the yard of each house.



*Urn of the 5th B.C. century
(Photo: Department of Antiquities Archive)*

During the Classic, Hellenistic and Roman eras (480 B.C.-49 A.D.) the development of water resources and the proper water use began to take place on a more detailed and organised basis due to the fact that Cyprus has always been suffering from droughts and lack of water. During this era, Cyprus was densely populated and the authorities of its towns had always to face the problem of lack of water. Those towns, which were built on areas where there were springs or rivers, used their water and delivered it into towns with proper conveyance systems and aqueducts

The main town of Cyprus during this time was Salamina. Although there was no spring close to it, the town was obtaining drinking water from the Kythrea spring, with a proper conveyor of about 40 km long. Ruins of this conveyor are saved up to this day. It seems that the knowledge of practical and applied Engineering at that time was very advanced,



*Stone aqueduct at Agios Serghios for the conveyance of water from Kyrenia to Salamina
(Photo: Department of Antiquities Archive)*

judging from the excellent aqueducts that were found at Salamina. Outside the town, there was a big central aqueduct from which water was distributed to smaller or secondary aqueducts. From these aqueducts the water was conveyed with a proper system of underground earthen conveyors to the various parts of the town.

The system of distributing hot and cold water in the town's baths is also technically perfect.

Other towns, which did not have springs or rivers nearby, utilized groundwater. At this time, the underground chain of wells (commonly called "Laounia") was constructed, which provided water to the towns for drinking and irrigation purposes.

It is quite remarkable how these people used to construct those complicated water supply and irrigation works with the then available knowledge and means.



*The floor of Salamina's baths
(Photo: Department of Antiquities Archive)*



*The underheaters of Salamina's baths
(Photo: Department of Antiquities Archive)*

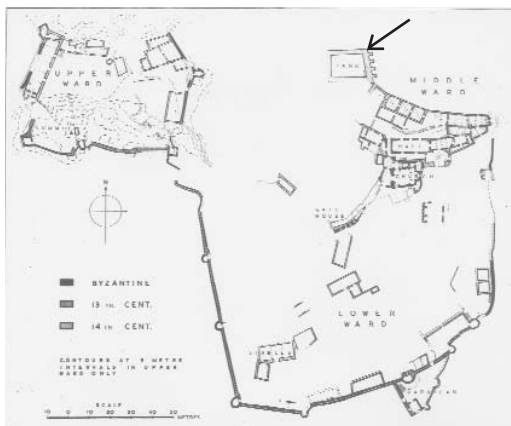


*A cistern at Vouni palace
(Photo: Department of Antiquities Archive)*

During the first Christian and Byzantine period (330–1191 A.D.) no development of the water resources was observed. The towns were using the existing Hellenistic and Roman structures with some repairs for potable water supplies. It is also obvious that the wars which made the island suffer during this period were much more serious than the problems of lack of water. Thus, not only no attention was paid to tackling this problem, but also no maintenance of the old water works was performed either. The destructions that these structures suffered due to time and the wars

were not repaired and as a result Cyprus went on suffering from water shortage.

Based on historical evidence, it seems that at the time of Saint Helena, around 306 A.D., Cyprus was very seriously affected from droughts, which lasted for 17 years. During this period, the island was almost deserted. After the end of the droughts, it is said, that some more people were transported to Cyprus mainly from the island of Tylos.



*Plan of Saint Hilarion castle where the place of storing water is shown
(Photo: Department of Antiquities Archive)*



*Cistern at Stavrovouni monastery
(Photo: WDD Archive)*

During the period of Frankish and Venetian domination (1192-1489 A.D. and 1489-1571 A.D. respectively) the towns of Cyprus were surrounded by walls and well fortified. The conquerors of the island solved the problem of lack of potable water supplies with a systematic channelling and underground storage of rainwater. In order to eliminate loss of water during the delivery, earthen conveyors and masonry underground channels were used.



*Entrance of stone built laoumi
(Photo: WDD Archive)*



*Alakati for drawing water
(Photo: Ministry of Agriculture, Natural Resources and Environment Archive)*

Moreover, for water supply purposes, but mainly for irrigation, they exploited, modified and increased the systems of chain of wells, the so-called "Laoumia". When water did not reach the surface they used the "alakati", a turning wheel, which was turned around by an animal. This



*Underground stone built channel of the laoumi
(Photo: WDD Archive)*

way, they were drawing water to the surface and irrigated their private farms, the "Timaria".



*Alakati for drawing water
(Photo: PIO Archive)*

During the Turkish domination (1571-1878 A.D.), the Turks found organised towns and advanced agriculture. They misappropriated the already existing properties that they found and they never felt that they needed to be creative. On the contrary, they destroyed any of those works, which were of no use to them, or they left them without maintenance and they were eventually ruined with the passing of time. The only constructive work they carried out on a private basis was the increase of the



*Entrance of a "laoumi"
(Photo: WDD Archive)*



*A view of a single well from a chain of wells for the water supply of the town of Larnaca
(Photo: WDD Archive)*



*Underground masonry conveyors that conveyed water from the "laoumia" to the stone aqueducts for the water supply of the town of Larnaca
(Photo: WDD Archive)*

laoumia on certain "timaria", which were then turned into "tsiflikia". No studies or future projections were taken into consideration for the different works they carried out.

Just before the British occupation in 1878, Professor Gaudry of the Paris University visited Cyprus and became the first to make a description of the geology of Cyprus.



*Masonry aqueduct for the water supply of the town of Larnaca
(Photo: WDD Archive)*

During the British colonial period (1878-1960 A.D.) the British handled the problem of lack of water on a systematic basis. The first problem that they tried to solve was that of town water supply. At a later stage, they dealt with seeking water for irrigation purposes. During the first year of the British colonial period, the Royal Cross of Engineers of the British Army dealt with the repair of existing irrigation works. In 1880, England sent the geologist R. Russel to study the water resources and the problem of water supply in Cyprus. In his study "Report on Existing Water Supply of the Island of Cyprus and on the Probabilities of Procuring Additional Water Supply from Artesian wells", Russel claimed that the Mesaoria area constituted a good artesian watershed and proposed deep boreholes to be drilled to find artesian water. Russel's proposals started being applied with the drilling of deep boreholes. . However, this plan was interrupted due to the high cost and lack of technical means.



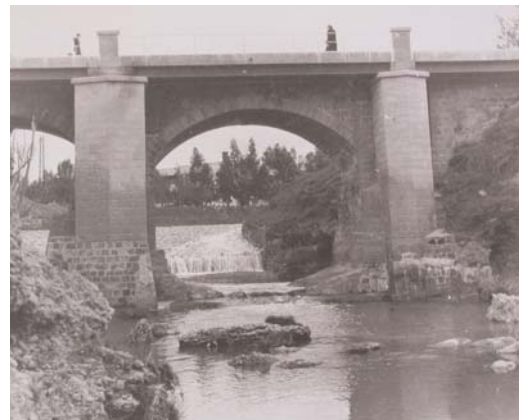
Borehole
(Photo: PIO Archive)

In 1896 the Department of Public Works was established, which undertook, inter alia, the construction of water works, whereas in 1898 hydraulic engineer Medlicott arrived in Cyprus

in order to study the construction of various irrigation works. In his study, Medlicott reached the conclusion that the best irrigation works should be constructed in Mesaoria. His plan envisaged the construction of reservoirs at Kouklia, Akheritou and Sygkrassi for storing the flow of the Pedieos and Yialias rivers. The works were intended for the irrigation of cereals and cotton in Mesaoria. Moreover, Medlicott suggested a series of works to reserve part of the flow of Merika and Akaki rivers, which are tributaries of Serrakhis river, as well as some other tributaries of Serrakhis and Ovgos rivers from the western to the eastern Mesaoria, with the simultaneous



Kouklia reservoir (1900)
(Photo: WDD Archive)



Pedieos river
(Photo: Levention Municipal Museum Archive)

construction of a chain of reservoirs for storing the water. The first of these reservoirs would be constructed at Yerolakkos village and the others at some distance from Famagusta.

Although the first phase of the project had started being executed, it seems that its first stages of implementation failed and the project was eventually abandoned.

In 1905 the British geologist C. Reid came to Cyprus in order to study the possibilities of groundwater development in the island. After some investigations, Reid rejected Russel's theory of artesian conditions in Mesaoria and proposed the drilling of boreholes in the Kokkinohoria and Morphou areas. On the basis of Reid's proposals some boreholes were drilled at a depth of 1000 feet.

Reid also proposed the construction of tunnels in the Pendadaktylos range for the exploitation of the limestone aquifer. In 1908, after relevant

studies, the construction of a tunnel began at Pileri locality, near Kythrea. The works went on, with some intermediate interruptions, until 1934, when the work was abandoned.

In 1921, colonel W.N. Ellis was sent to Cyprus in order to study the expansion of the irrigation works. Ellis expressed the view that Cyprus topography does not allow the construction of cheap dams for storing surface water.

Therefore, he proposed as the best way for the expansion of the irrigation area, the drilling of boreholes on a private basis, by offering loans to the farmers for this purpose. On the basis of Ellis proposals, the colonial government assigned to A. Beeby Thompson and Partners the drilling of boreholes on the Mesaoria and Kokkinohoria area and they had very positive results.



Fountain at Kaimakli (1930)
(Photo: Leventon Municipal Museum Archive)

At the beginning of 1939 a separate Department was established which undertook the responsibility of the water development works, the Water Supply and Irrigation Department, which in 1995 was renamed to Water Development Department. During the 1940/s and 1950/s, the Department's activities were limited to carrying out small irrigation works of local significance in all districts of Cyprus, with the use of surface water, small diversion dams, small water reservoirs and distribution channels, mainly made of concrete.

Until the declaration of the Republic of Cyprus in 1960, thousands of boreholes were drilled in all parts of Cyprus, which resulted into a serious depletion, due to overpumping of the groundwater reserves, in the main waterbearing areas, such as Famagusta, Morphou and Akrotiri.



Public spring (1945)
(Photo: Leventon Municipal Museum Archive)



Delivery of water in a carriage (1945)
(Photo: Leventon Municipal Museum Archive)



Spring at school (1940)
(Photo: Leventon Municipal Museum Archive)



A well at Tsada (1952-55)
(Photo: Leventon Municipal Museum Archive)



Public spring (1945)
(Photo: Leventon Municipal Museum Archive)



Delivery of water (1952-55)
(Photo: Leventon Municipal Museum Archive)

QUOTES OF VARIOUS VISITORS ABOUT THE WATER RESOURCES OF CYPRUS

Doctor Hume (1801)

"We went to Limassol in order to procure wood and water, the latter being obtained from a well with the method of a persian rotating wheel of bad fabrication, which is turned around by a donkey. The well was located at an isolated locality, west of the town, under the shadow of a variety of trees, including Palma Christi or castor oil bush (kourtounia) and Morus Alba (sycamore)."

Ali Bay (1806)

"The monastery of Saint Thekla is nicely located on the slope of the same mountain... The monastery is in good shape and below a spring is flowing with excellent water."

"The existence of this place (Kythrea) depends on a spring in the north, which is divided into two channels and flows plenty of water at the edge of a valley, which is located between two hills of pure clay, which are quite bare and never were so fertile as they are now. Some houses are scattered in the valley, as well as some mills that provide Nicosia with flour. The soil is not that good, the lack of water in the island necessitates the utilization of all possible means of irrigation and as far as the valley is concerned, it is well cultivated up to where the water can reach."

The name Regaena's Palace, as I have mentioned, was transmitted and sustained out of a lasting tradition... Kythera and Idalion are the two nearest places that water can be found in such abundance, so that the mighty lady of the palace could irrigate her gardens."

"There is no spring on the rock, but I suspect that in earlier times there was one. Probably that of the monastery of Saint Ioannis Chrysostomos is an old spring, whose flow was diverted from its original route."

"On the next day, Friday 25 April, I visited the holy garden of Aphrodite... From various points at the slope nice, clean water is flowing and one can see that previously there were more outflows."

[The water] is easily distributed in the sloping ground of the garden. The rock formation exhibits various depressions, providing diversity to the landscape and allowing the garden to be divided into various parts, each one being able to have cavernous depressions or its chambers chiselled in the rock slope."

"Generally, Cyprus is lacking water. The mountains near Paphos and Episkopi provide plenty of water, but in the other parts of the island there are only some streams and torrents that have little or no water at all during summer. With a little effort, I think that enough water for the needs of the island could be drawn from the Paphos mountain... and judging from the ruins of the aqueducts that are found everywhere, even at the driest areas, I suspect that in ancient times there existed a general irrigation system."

John M. Kinneir (1814)

"And (next) morning, I went on a tour to the ruins of Salamina or rather Constantia, since the first one was entirely sunk due to a sea flood. These ruins consist of the foundations of ancient walls, at a perimeter of three to four miles, with old cisterns for the collection of rain water, broken pillars and foundations of buildings, that are scattered along the coast and close to the mouth of Pithias (Pedaea), the ancient Pedieos (Pedaeus)."

"The typical winds blow from northeast and southwest. The latter (southwest winds) are usually coupled with heavy rainfalls."

"Between the upper and the lower town there is a knoll, on which a building seems to have been built, and right at the foot of this hill, the seafront of the port is located, whose entrance is now blocked with sand and gravels.

Therefore (there) the water remains stagnant during summer. Remains of the moat, as well as of the aqueduct, can also be detected. This is due to the fact that Larnaca does not have good quality water and even today it obtains it from outside the town through an aqueduct which was constructed by a Turkish emir about half a century ago (20)."

PROVERBS ABOUT WATER

Όποιος χαραμίζει την γην τζαι το νερό, χαραμίζει το μάλιν του τζαι των παιδικιών του κυρία

With this proverb the importance of saving the natural resources is stressed, along with the protection of the natural environment, which is related to and affects our future and the future of our children.

Στην αστοσιά φελά τζαι το χαλάζι

The problem of water shortage is pointed out, when even hail is welcome, in spite of the risk of destruction.

Όσπου έσει το βυζίν της μάνας, νιαλινίσκει το μωρόν. Αμα λείψει πεχανίσκει

This is put parabolically to stress the importance of water and moisture for the trees. Farmers consider water as the milk of the earth.

Επαντρεύτην η πείνα την δίψα

The significance of the consequences of drought is stressed here with emphasis, the outcome of which is hunger of the population.

Κότσινα νέφη, μαύρη πείνα

It refers to cases of drought, the outcome of which is hunger and poverty, since there is not enough food.

Αμα πει ο Οκτώβρης, ανάγκην του Μάρτη εν έσει

The importance of rainfalls in October is expressed, and that as long as the soil is full of water as early as October, the moisture is retained for a long period and the crop is secured.

Το νερό του Οκτώβρη τζαι του Μάρτη αμ μεν έσεις τόπο να το βάλεις, βαλ' το μες το πιθάρι

This proverb underlines the importance of utilizing the rain during October and March and of the surpluses, which should be stored. Within this spirit lies the collection of water with the construction of dams and reservoirs.

Το νερό του Οκτώβρη αν ιμπορείς βαρ' το μες την πότσαν

It is used to stress how beneficial the rainfalls of October are and the need for its best utilization.

Αν έσεις νερόν φύλαε το για την αυλή σου που διψά

It is used to promote water conscience, saving, collection and proper utilization of water, which farmers deservedly characterize as the milk of earth.

Το νερόν εν το γάλα της γης τζαι χαράς' τον που το έσει

It is said to stress the importance and the value of the water, which gives joy and happiness to its owners. A reality that is especially realized today with the great drought that strikes our island.

The newly established Republic of Cyprus, immediately after Independence, realized the problem of water shortage and promptly dealt with it. The slogan NOT A DROP OF WATER TO THE SEA defined the Government's water policy and all the governments to follow.



*Visit of the first President of the Republic of Cyprus Archbishop Makarios III' to the offices of the Water Development Department
(Photo: WDD Archive)*



*Measuring waterflow (at Kythrea spring)
(Photo: WDD Archive)*



*Measuring water flow
(Photo: WDD Archive)*

The main characteristic of the period from 1960 until the Turkish invasion, was the close cooperation between the Ministry of Agriculture and Natural Resources, through the Water Development Department, and international organizations for carrying out studies related to the planning of the development and the construction of works and the formation of short-term and long-term action plans. During this period, the techno-economic studies for a lot of works were prepared and many dams were constructed, such as those of Pomos, Agia Marina, Argaka, Lefkara, Yermasoyia, Polemidia and Mavrokolymbos. At the same time, the needs for potable water supplies of the villages were satisfied through some water being distributed at each household.



*Water Development Department's Workshop
(Photo: PIO Archive)*



*Placing of pipeline at Nicosia
(Photo: PIO Archive)*



*Construction of the foundations of the Trimiklini dam
(Photo: PIO Archive)*



*Construction of a concrete reservoir in Nicosia
(Photo: PIO Archive)*



*Construction of irrigation canals
(Photo: Ministry of Agriculture, Nat. Res. & Env. Archive)*



*Construction of a reservoir in Famagusta
(Photo: PIO Archive)*



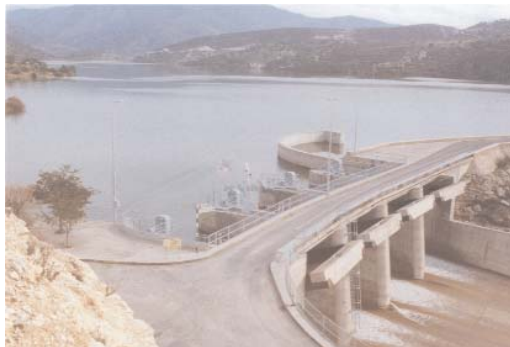
*Levelling by the Topography Branch of the Water Development Department at Kokkinotrimithia
(Photo: PIO Archive)*



*Argaka dam (1964)
(Photo: WDD Archive)*



*Pomos dam (1966)
(Photo: WDD Archive)*



*Yermasoyia dam (1968)
(Photo: WDD Archive)*



*Lefkara dam (1973)
(Photo: WDD Archive)*

The period from the Turkish invasion to this day is characterized by significant achievements in the water development sector with the implementation of major projects, such as the Paphos Irrigation Project, the Khrysochou Irrigation Project, the Vasilikos-Pendaskinos Project, the Pitsilia Integrated Rural Development Project and the Southern Conveyor Project. At the same time, the town



***Paphos Irrigation Project. Central Canal**
(Photo: WDD Archive)*



***Paphos Irrigation Project. Land consolidation and farm roads**
(Photo: WDD Archive)*

and village water supply was substantially strengthened. The Water Treatment Plants of Khirokitia, Kornos, Limassol, Tersephanou and Asprokremmos were also constructed.



Pitsilia Integrated Rural Development Project.
Agii Vavatsinia dam
(Photo: WDD Archive)



Pitsilia Integrated Rural Development Project.
Pharmakas Ponds 1 and 2
(Photo: WDD Archive)



Vassilikos-Pendaskinos Project.
Kalavassos dam
(Photo: WDD Archive)



Vassilikos-Pendaskinos Project.
Kornos Water Treatment Plant
(Photo: WDD Archive)



Khrysochou Irrigation Project.
Evretou dam
(Photo: WDD Archive)



Khrysochou Irrigation Project.
Triple outlet
(Photo: WDD Archive)



Southern Conveyor Project.
Kouris dam
(Photo: WDD Archive)



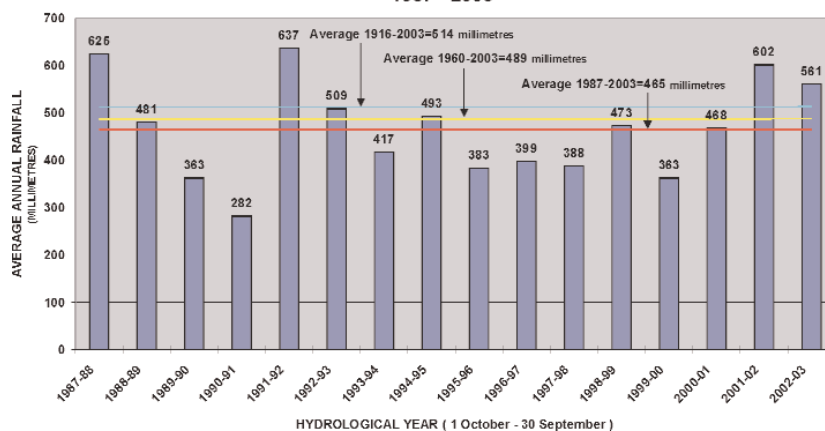
Southern Conveyor Project.
Reservoir and pumping station for irrigation at Kokkinokhoría
(Photo: WDD Archive)

Today, the total storage capacity of the dams is about 307, 5 million cubic meters (MCM) of water, compared to 6 MCM in 1960, a performance which is really impressive when compared to other countries of the same size and development level as our country.

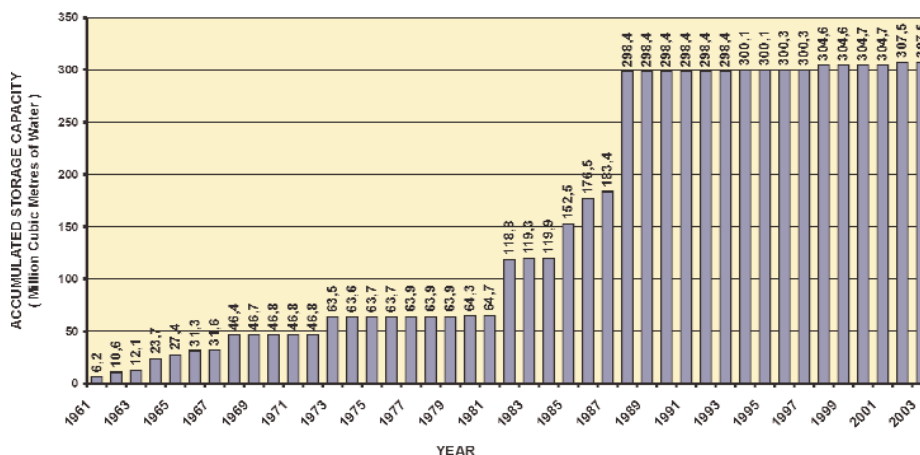
Despite the remarkable work performed in the sector of water development, unfortunately, due to the increased demand of water and the declining trend of rainfall, to the, well known now in the world, climatological changes and

Based on the findings of the recent study that was prepared by the Water Development Department in cooperation with the Food and Agriculture Organization of the United Nations, the mean rainfall during the period after 1970 (1971-2000), is lower than the mean rainfall of the previous period (1917-1970). This reduction ranges in various areas of Cyprus, from 10% up to 25%. The mean reduction is estimated at 20%. The greater reduction was observed at Troodos. This decrease resulted in

**AVERAGE ANNUAL RAINFALL OF CYPRUS
(AREA UNDER GOVERNMENT CONTROL)
1987 - 2003**



DAM CONSTRUCTION 1961-2003



the greenhouse phenomenon, the available quantities of water for water supply and irrigation are not adequate, and as a result, restrictions to the supply of water were applied during the last years, with adverse effects on the agricultural sector, the social life and the economy of the country in general.

a significant reduction of the available water in the country. The decrease in the mean annual flow in the dams ranges from 24% up to 58% with a mean value around 40%. Thus, the quantities of surface water that are available today in the island are by 40% less than those that were estimated to be available prior to 1970.

According to the study, the groundwater resources of Cyprus are overpumped every year by 40% over the allowable safe yield. This results in a continuous decline of the groundwater level, the depletion of reserves and the rapid and continuous expansion of the areas of the aquifer that are destroyed by sea intrusion.

In order to face the situation, desalination units were constructed aiming at rendering the water supply of the major residential and tourist centres independent of rainfall. On 1st April 1997, the first desalination unit at Dekelia started its operation, whereas in April 2001 the second desalination unit started operating close to Larnaca airport. The Larnaca airport

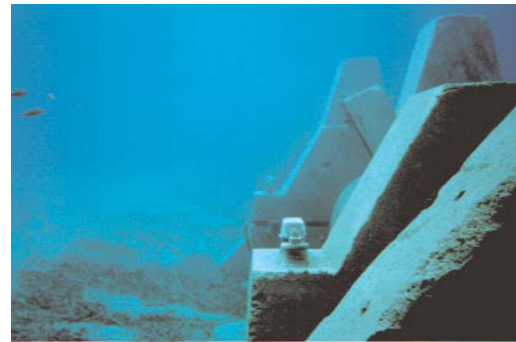
unit, which is the biggest water project in Cyprus as regards desalination, together with the Dekelia unit produce 33 MCM of water every year. This quantity coupled with the quantity of water from the dams constitutes a safe yield for the complete lifting of the restrictions in the supply of potable water. After lots of years of hardships caused by the known restrictions, as of January 2001 each household in the free part of Cyprus enjoys a continuous supply of water. The restrictions belong now to the past.

The government water policy is not limited to the subject of desalinations, but also focuses on the exploitation of other not traditional sources of water, such as the recycled water,



Placing pipelines in the sea during the execution of the construction works of the Larnaca desalination unit.

(Photo: WDD Archive)



Placing pipelines in the sea during the execution of the construction works of the Larnaca desalination unit.

(Photo: WDD Archive)



Dekelia desalination unit.

(Photo: WDD Archive)

the use of which releases equal quantities of good quality water. Recycled water, which originates from the treatment of the effluent of the sewage systems, is used for the purpose of irrigation of agricultural cultivations and for the recharge of the underground aquifers. The full utilization of the effluent is a long and expensive procedure.



*Point of discharging sewage at Vathia Gonia
(Photo: Ministry of Agriculture, Nat. Res. & Env. Archive)*



*House sewage and industrial waste treatment plant at Vathia Gonia
(Photo: Ministry of Agriculture, Nat. Res. & Env. Archive)*



*Irrigation with recycled water.
(Photo: Ministry of Agriculture, Nat. Res. & Env. Archive)*

FUTURE PLANNING

Regarding the installation of central systems for the collection and treatment of sewage, within the framework of harmonisation with the European acquis, a relevant programme aiming at the installation of central sewage systems to all residential areas with equivalent population over 2000 person has been prepared. The programme of harmonisation, which has to be completed until 2012, includes the 4 greater urban areas of Nicosia, Limassol, Larnaca and Paphos, the two tourist areas of Ayia Napa and Paralimni and 38 rural communities with equivalent population over 2000 persons. An aid of one million euros has been obtained by the European Union for the preparation of techno-economic studies, detailed designs and environmental studies for 28 of the rural communities, which are included in the harmonisation programme. At the same time the installation of sewage treatment

systems is forwarded to smaller rural communities, which did not fall within the obligations for harmonisation (with population less than 2000 persons), but they face sewage problems.

Moreover, the execution of additional water works, which are envisaged within the plan for water development, which was prepared for the period up to 2015, is proceeding. Within the framework of this plan, the construction of Arminou dam on Dhiarizos river has already been completed, as well as that of Tamassos dam on Pedieos river, whereas the construction of Kannaviou dam on Ezousa river has begun and is under way.

Furthermore, the submission of tenders for the construction of Akaki-Malounda dam is anticipated very soon.





*Arminou dam
(Photo: WDD Archive)*



*Tamassos dam
(Photo: WDD Archive)*



*Kannaviou dam (under construction)
(Photo: WDD Archive)*

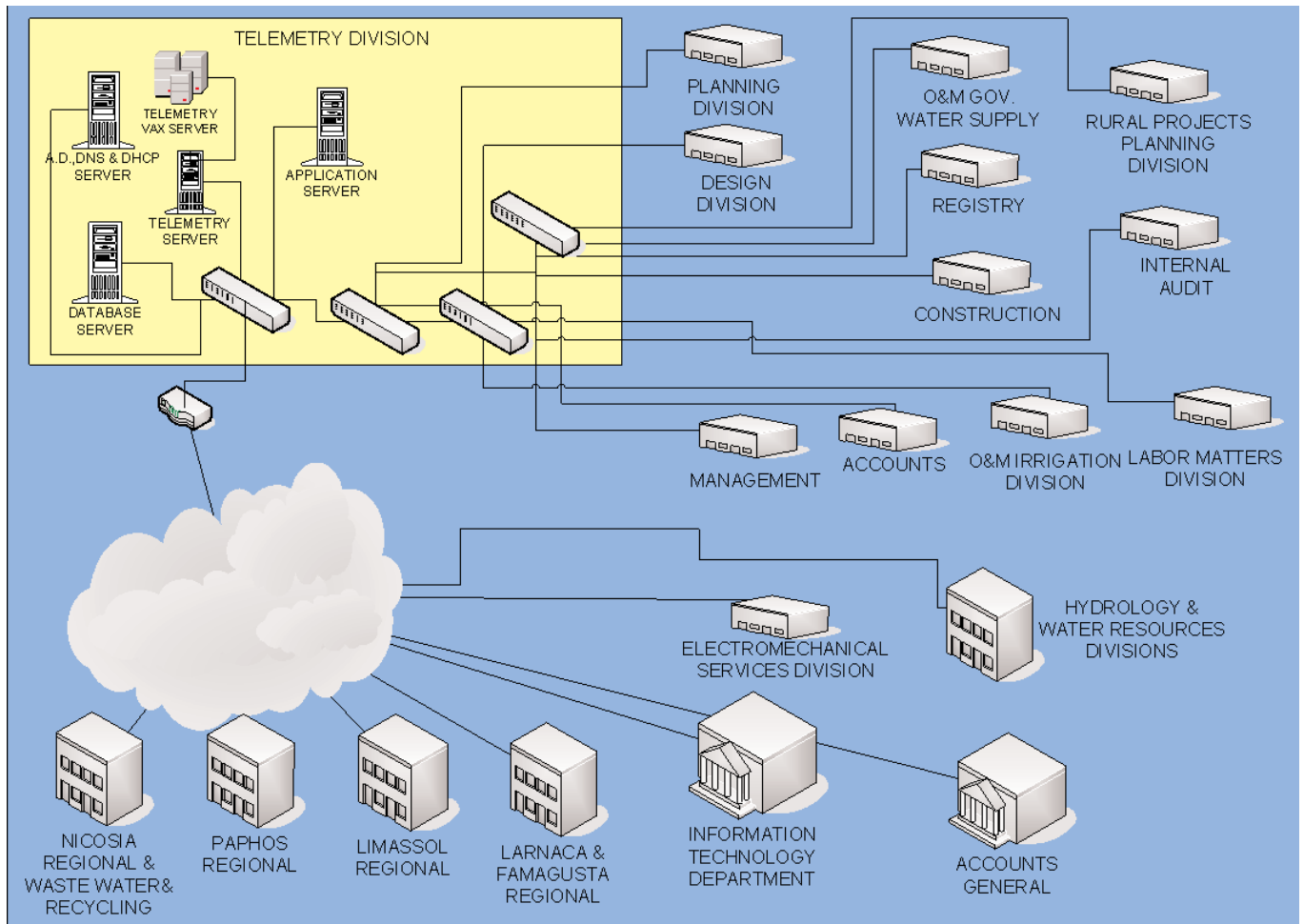
In parallel, a systematic effort is made for the reduction of water demand with the application and the subsidization of water saving measures and the formation of water conscience for the proper use of this unique good of nature.

The use of computerized systems for carrying out the WDD work, greatly contributes to the effort for the right water management.

In addition to the above measures, the establishment of a Water Entity is pursued, which will bring together all the authorities for water management.

HOW TO SAVE POTABLE WATER - INSTRUCTIONS FOR CONSUMERS

1. Immediately repair any defective hydraulic installations, taps, W.C. tanks etc.
2. Check the water meter regularly in order to timely detect any losses.
3. Adjust the W.C. tanks or place into them a plastic bottle full of sand, in order to use as little water as possible.
4. In new buildings install appliances, W.C. etc. which utilize less quantities of water.
5. Take a shower instead of filling the tub with water and never let the tap running while soaping yourself.
6. Do not allow children waste water while playing.
7. When brushing your teeth and while shaving do not let the water run.
8. Do not leave the tap running when doing the dishes.
9. Wash fruit in a basin and utilize the same water to irrigate flowers.
10. Use cloth and dish washers only when they are full.
11. Clean your verandas, yards, pavements and any other outside space by sweeping rather than using great quantities of water.
12. Wash your car with a bucket of water using a sponge rather than using a hose.



Internal electronic network in Water Development Department

Furthermore, the implementation of the Framework-Directive for Water, which was the result of long discussions and negotiations among the countries of the European Union, constitutes an integral part of government policy.

The Framework-Directive on water inter alia:

1. Protects water in general - river, lake, coastal and underground.
2. Sets ambitious targets to ensure that all water will respond to "good condition" until 2015.
3. Creates a management system on the level of river watershed.

4. Requires transboundary cooperation between the countries and all involved part (in the case of international areas of river watersheds).

5. Secures active participation of all bodies, including the non-governmental organizations and local authorities, in the activities of water management.

6. Secures reduction and control of pollution from all sources, such as agriculture and industrial activity.

7. Requires water pricing policies and ensures that the polluter pays.

8. It balances the interests of the environment with the interests of those who depend on it.

The overall government policy will give satisfactory solutions to all aspects of the water problem. The water, however, should not be taken for granted. Lack of water is one of the most crucial problems of humanity. It seems that water is a good which nature will provide in less and less quantities, and therefore, it is a must that we use it properly and restrict its waste. So, pay attention to the use of water. Use and do not abuse.





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