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DRAFT PROJECT OUTLINE FOR THE TECHNICAL
AND ECONOMIC EVALUATION AND COMPARATIVE ANALYSIS
OF WATERSUPPLY SYSTEMS OF MEDITERRANEAN ISLANDS
AND WATER DEFICIENCY COASTAL AREAS

Split, May 1982

Title of Project: Draft Project Outline for the Technical and Economic Evaluation and Comparative Analysis of Watersupply Systems of Mediterranean Islands and Water Deficiency Coastal Areas

Implementation: Urbanistički zavod Dalmacije - PAP/RAC, acting as Supporting Organization

Duration of Project: November 1982 - October 1983

<u>Cost of Project:</u>	Total	US \$ 205,000
	MTF	US \$ 150,000
	PAP/RAC	US \$ 55,000

Substantive Assistance by: IMCO

Technical Responsibility for the Project:

Water Authority - Regional Office for Dalmatia, Split, Yugoslavia

DRAFT PROJECT OUTLINE FOR THE EVALUATION
AND COMPARATIVE ANALYSIS OF WATERSUPPLY SYSTEMS
ON MEDITERRANEAN ISLANDS

1. Objectives of the Project

The long-term objective of the project is to help interested Governments of Mediterranean Coastal States in solving the problem of watersupply on the islands lacking fresh water.

The immediate objective of the project is to analyze existing modes of watersupply; to compile and appraise all available data on the subject; and to provide interested Governments with adequate methodology in planning and selecting the most appropriate ways of supplying Mediterranean islands with fresh water.

2. Background Data and Justification

One of the key prerequisites of the future economic and social development of a large number of Mediterranean countries is to ensure enough amount of fresh water of adequate quality in a given time.

Seasonal rainfall distribution in the Mediterranean is unfavourable, with practically total amount of rainfall in autumn and winter, and with rainless spring and summer when water is needed most.

Generally speaking, all Mediterranean islands suffer from water deficiency /and if there is any, its quality is frequently unacceptable/, because rainwater is quickly lost to the sea and ground water is scarce, often containing salt.

The lack of fresh water imposes constraints to economic and social development of Mediterranean islands and indirectly leads to extensive migration of local population. Many small islands are already completely deserted.

Mediterranean islands significantly vary in size, in population and in development level, but all have favourable climate which is a good

basis for the development of both tourism and agriculture. However, these economic activities are heavy consumers of water, particularly in summer, which coincides with the driest period of the year. In the peak tourist season visitors coming to some islands largely outnumber the residents. Consequently, water consumption drastically increases together with the risks of polluting sources of potable water.

The only secure way of satisfying needs for fresh water on the islands is to transfer water from the nearest source which has enough water of adequate quality.

There are several ways of supplying islands with fresh water:

- local water sources;
- rainwater collectors;
- transfer of water by underwater pipelines;
- transfer of water by specially designed boats;
- desalination.

In view of technical, technological and economic considerations, all the above listed ways have certain advantages and disadvantages conditioning their application. They vary in investment to be employed and in running cost. Also, the choice of a particular type of supply is determined by natural conditions prevailing in the area /sea depth, type of coastline, distances etc./.

Several countries of the Mediterranean region have practiced one or the other way of watersupply. Their experiences, together with an analysis of recent technical achievements in the field may help Mediterranean Governments which are facing the problem of watersupply in planning and selecting the optimum solutions.

It has been reported that the problems of supplying the islands with water are strongly felt mostly in developing countries, such as Cyprus, Malta, Yugoslavia, Greece, Tunisia etc. On the other hand, developed countries have obtained precious experiences in solving these problems /Italy, France, Spain/.

Development of a project in the field of watersupply of Mediterranean islands was recommended by the Intergovernmental Meeting of Mediterranean coastal States /Geneva, 5-10 February 1979/ as the part of the Priority Actions Programme of the Mediterranean Action Plan, and later confirmed by Intergovernmental Meetings convened in Cannes /1981/ and in Geneva /1982/. Also, the seminar on water management within the frame of the Blue Plan, convened in Tunis in January this year, accentuated the watersupply of Mediterranean islands as a critical problem.

3. Currently Used Systems

3.1 Local Water Sources

Before starting thinking of any supply system, local water resources /if there are any/ should be investigated for potential exploitation. It is therefore necessary to accomplish detailed hydrological investigations.

In case water is found, but cannot meet the entire demand, local sources can serve as a temporary solution until the final system is decided on.

3.2 Rainwater Collectors

This system of supply has been practiced on many Mediterranean islands from yore, and on some is still in use.

It can easily be claimed that it is the most inadequate way of watersupply, only applicable when combined with water transfer, since the amount of water to be consumed depends solely on two factors: one, which can be influenced /catchment surface and reservoir space/, and other, which cannot be influenced /amount of rainfall in a right time/. Just because of the latter, if rainwater collectors /cisterns/ are decided on as a choice, account must be taken of providing water in dry season, either by sea transport in case of islands, or by road transport when other coastal areas are concerned.

3.3 Underwater pipelines

The contemporary system of supplying islands with fresh water is by underwater pipelines. Of course, this system, as any other, has advantages and disadvantages. It might appear to be inapplicable in cases when water consumption is too low to ensure depreciation of the installed mains, that is, when the distance of islands exceeds rational investment which varies from case to case and depends on many factors.

In principle, underwater pipelines can be divided into low-pressure and high-pressure ones made of either steel /high-pressure mains/ or various plastic materials /low-pressure mains/. Since in any watersupply system which contains the underwater section the pipelines are a very delicate issue, the choice of material must be dedicated special consideration and care.

In great many situations the entire supply system concept by itself determines the choice of the pipeline material. However, modifications of the concept to fit the requirements of the pipelines are also possible, such as in deciding on the location of pumping stations which happen to be unavoidable because of frequently limiting profiles of the mains and large losses along the lines.

In making decisions on setting up underwater pipelines, as well as on the choice of appropriate material, it is necessary to make economic and technical calculations containing:

- hydraulic parameters;
- oceanographic characteristics;
- staging of construction;
- possible use of materials produced by local manufacturers; and
- other.

3.4 Transfer of Water by Boats

Transfer of water by boats is practiced usually when there is no other way of supply possible.

This system is often used in combination with some other solutions /such as rainwater collectors, utilization of brackish waters etc./. It is generally applied in the initial stages of development of an island when demand for water exceeds the available amount and financial resources are insufficient for setting up a better system.

Water can be transported by cistern boats, barges or plastic containers tugged by boats, or by conventional boats carrying reservoirs.

To enable efficient transport of water by boats certain technical requirements must be met, both at the loading point and at the point where water is taken over by local distribution systems.

Size of boats transporting water is frequently conditioned - apart from the amount of needed water and other parameters - by the characteristics of the destination harbour /draught, manoeuvring space etc./.

3.5 Desalination

Another system which, when compared to other alternatives, comes to the last place, especially now when the energy situation is expected to increasingly deteriorate.

However, in specific cases /large distances from the water source; low amount of water needed; use of solar energy; existing brackish sources of sufficient yield and acceptable salinity/ this mode of providing water may be considered.

In addition to islands, all the five systems may be applied to isolated coastal areas with poor communications which cannot be directly supplied from local or regional watersupply systems.

4. Description of the Project

Within the framework of this project, information on existing or planned modes of watersupply of Mediterranean islands and water-deficiency areas will be compiled, sorted out and processed. Also, data on recent technical efforts and technologies in the domain will be analyzed in detail. The project will assist in exchanging experiences between Mediterranean countries regarding watersupply systems applied in the critical areas, and will identify and confront advantages and disadvantages of different modes of watersupply.

5. Activities

The project will be carried out in three stages:

- i Compilation of information on the existing state and watersupply projects for Mediterranean islands; and identification of interest of Mediterranean States for co-operation in the project.
- ii Review of technical solutions, technologies and economic parametres relative to existing watersupply systems and their comparative analysis; identification of criteria necessary for selecting the most appropriate ways of watersupply.
- iii Expert meeting to review and discuss results of the preceding two stages and to appraise the applicability of proposed solutions.

The PAP/RAC, acting as the supporting organization to this project, will recruit in the first stage 3-4 consultants for a fact-finding mission to those Mediterranean countries where watersupply of islands and water-deficiency areas is the major constraint to development. Furthermore, they will have to identify interest of individual Mediterranean country to participate in the project.

The second stage will include designation of a professional institution from Yugoslavia closely connected to university institutes to prepare, together with the consultants appointed in the first stage:

- /a/ survey of existing ways of watersupply in general, and approaches of individual Mediterranean country to the problem in particular;
- /b/ studies for the comparative analyses of possible ways of supplying Mediterranean islands and arid coastal areas with water;
- /c/ criteria and parametres for selecting the most appropriate systems of watersupply;

in the form of a report which will be considered by an Expert Meeting in the final stage. The meeting will be expected to appraise the work on the project and formulate suggestions for its eventual continuation through the development of several special projects on watersupply of islands and coastal areas in interested Mediterranean countries, which would be the subject of a new project.

<u>BUDGET</u>	<u>MTF</u> /US \$/	<u>PAP/RAC</u> /US \$/
I Stage:		
- Compilation of information	43,000	10,000
II Stage:		
- Review of technical solutions; identification of criteria	84,000	20,000
III Stage:		
- Expert Meeting	17,000	25,000
IV Stage:		
- Printing of reports	6,000	
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