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LEGAL ISSUES IN WATER RESOURCES ALLOCATION WASTEWATER USE AND WATER SUPPLY MANAGEMENT

REPORT OF THE SECOND CONSULTATION OF THE
FAO/WHO WORKING GROUP ON LEGAL
ASPECTS OF WATER RESOURCES, WATER SUPPLY
AND WASTEWATER MANAGEMENT
(GENEVA, 10-12 SEPTEMBER 1991)



WORLD HEALTH ORGANIZATION, GENEVA, 1992



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This report presents the recommendations of the second FAO/WHO consultation on legal issues in water resources allocation, wastewater use and water supply management (Geneva, 10-12 September 1991). The major issues identified during the first consultation (Geneva, 25-27 September 1990) by the Working Group on Legal Aspects of Water Resources, Water Supply and Wastewater Management were addressed in more detail at this second meeting, which resulted in the formulation of projects to remove constraints in allocation of water resources, to develop legal regimes for wastewater use, and to improve the general institutional and legal framework of the water sector. The present report gives in Part One the results of the second consultation and summarizes the projects formulated in accordance with the conclusions of the Working Group. Part Two contains a case study illustrating a conflict over shared water resources.

L. Laugeri, WHO/CWS, Secretary of the Consultation.

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Les opinions exprimées dans les documents par des auteurs cités nommément n'engagent que lesdits auteurs.

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ABBREVIATIONS

| | |
|------------|--|
| AyA | Costa Rica Institute for Water supply and Sewerage |
| CGE | Compagnie Générale des Eaux |
| CEFIGRE | Centre de Formation Internat. à la Gestion des Ressources en Eau |
| CWS | Community Water Supply and Sanitation |
| EIER | Ecole Inter-Etats des Ingénieurs de l'Équipement Rural |
| EMRO | WHO Regional Office for the Eastern Mediterranean Region |
| EPFL | Ecole Polytechnique Fédérale de Lausanne |
| FAO | Food and Agriculture Organization of the United Nations |
| GTZ | German Agency for Technical Cooperation |
| HLE | Health Legislation |
| KfW | German Bank for Financial Cooperation |
| IRC | International Water and Sanitation Center |
| IRCWD | International Reference Center for Wastes Disposal |
| IWSA | International Water Supply Association |
| LEG | Legal Counsel |
| m/m | man/months |
| NAN.C.I.E. | Centre International de l'Eau, Nancy |
| UNDP | United Nations Development Programme |
| UN/DTCO | United Nations/Department of Technical Cooperation for Development |
| WASH | Water and Sanitation for Health |
| WHO | World Health Organization |
| WPRO | World Health Organization, Western Pacific Regional Office |

PART ONE - REPORT OF THE CONSULTATION

INTRODUCTION

The Consultation

A consultation was held at the Headquarters of the World Health Organization (WHO) in Geneva, from 10 to 12 September 1991, to address selected legal issues in water resources, water supply and wastewater management and to formulate projects to remove constraints in these areas. The Working Group on Legal Aspects of Water Resources, Water Supply and Wastewater Management, which had been constituted at the time of the previous consultation (Geneva, 25-27 September 1990), had 26 members present. The Chairperson was Ms J. Walker, economist, Water and Sanitation for Health (WASH) project.

The Group was composed of senior sector officials from seven countries of four WHO regions, technical and financial advisers from bilateral, multilateral and international support agencies, WHO lawyers, engineers and economists, including a WHO/EMRO regional adviser in environmental health; and Pr. H. Shuval from the Hebrew University of Jerusalem, technical adviser.

The Secretariat was provided by Mr S. Burchi, legal officer, Development Law Service, Food and Agriculture Organization (FAO) of the United Nations and Mr L. Laugeri, institutional development specialist, Community Water Supply and Sanitation (CWS) Unit, WHO. The participants of the Working Group, including the thirty five members of the first and second consultations and the Secretariat are in Annex I. The breakdown into committees is in Annex II.

The consultation was opened by Dr D. Warner, Manager, Community Water Supply and Sanitation Unit of the World Health Organization, who welcomed the members and recalled the background and objectives of the meeting. The first consultation, which had taken place from 25 to 27 September 1990, had resulted in the publication of a report on the three major issues identified by the Working Group: reallocation of water resources, legal regimes for wastewater use, institutional issues in water supply and wastewater management. The second consultation had the following main objectives:

- to formulate an action plan on the basis of specific proposals from the participants, covering legal and institutional issues to be addressed in sector review and project development and evaluation;
- to identify with technical and financial agencies possible sources and methods of technical and financial cooperation;
- to identify areas for further research by the Working Group.

Several brief presentations were made by the representatives of Costa Rica, India, Maldives, Morocco, Myanmar, Portugal and Sudan, and by the Chairperson on the subjects of sewerage and wastewater use, effluent standards, water resources management and institutional development. Pr. H. Shuval presented a paper entitled "Approaches to Solving Water Resources Conflicts in Arid Areas - Israel and her Neighbours as a Case Study", which is in Part Two of this report.

The Committees

During its discussions in plenary, the Working Group decided to adopt the same breakdown of issues to be addressed by separate Committees, as in the case of the previous consultation:

- Committee I. Reallocation of Water Resources;
- Committee II. Legal Regimes for Wastewater Use;
- Committee III. Institutional Issues in Water Supply and Wastewater Management.

The Secretariat provided broad guidelines for the formulation of technical support projects. The proposals of the Committees, as finalized by the Secretariat, are presented as a continuation of this report. The conclusions and recommendations of the consultation were summarized and discussed in a plenary session, in the presence of Dr D. Warner.

The Projects

The projects retained by Committee I include four main types of activities to improve water resources management:

- establishment of a legal framework for water resources management (legislation, administrative framework, enforcement);
- publication of a catalogue of experience of selected enforcement mechanisms evolved from current legislation in various countries;
- development of a guidance document to establish a legal framework and operational procedures for water resources management;
- compilation and publication of case studies on the legislation concerning water sources protection and its enforcement.

The strategy proposed by Committee II is entirely focused on wastewater ownership, allocation, use and administration, and includes two pilot projects:

- establishment of a legal regime for wastewater use in one specific country (Morocco), to serve as a demonstration of the feasibility of this type of projects and as a model for undertaking others;
- evaluation of legal and institutional framework for wastewater use in selected countries.

The projects retained by Committee III deal with a variety of other issues, mostly focused on institutional and human resources development:

- strengthening awareness of legal issues among decision-makers in water supply and wastewater management, through case studies and workshops;
- preparation of guidelines for institutional development and coordination;
- review of comparative experience of private participation in water supply and wastewater management, and dissemination of results.

Additional comments and suggestions on privatization of water and wastewater services and related institutional issues were provided after the consultation by members of Committee III and are summarized in Annex III.

PROJECT FORMULATION SUMMARY

| NAME OF PROJECT | DURATION | MAN-MONTHS (For. + Local) | COST* |
|---|------------------|------------------------------|-----------------------|
| COMMITTEE I - REALLOCATION OF WATER RESOURCES | | | |
| 1. Establishment of an appropri. legal frame for water res. management** | 1 year | 8 + 20 | 136 (+ 5) |
| 2. Catalogue of experience of selected law enforcement mechanisms | 1 year | 1 + 12 | 36 (+ workshop) |
| 3. Development of guidelines for the establishment of legislation and administering institutions and processes in the field of water resour. management | 4 months | 3 + 2 | 40 (+ publication) |
| 4. Legislation on the protection of the sources of public water supplies: analysis of selected experiences with implementation and enforcement | 6 months | 1 + 8 | 28 (+ publication) |
| COMMITTEE II - LEGAL REGIMES FOR WASTEWATER USE | | | |
| 5. Establishment of a legal regime for wastewater use in Morocco | 2 years | 20 + 30 | 300 (+ training) |
| 6. Evaluation of leg. and inst. framework for wastewater use in select. countries | 4 months | 2 + 8 | 40 (+ publication) |
| COMMITTEE III - INSTITUTIONAL AND HUMAN RESOURCES DEVELOPMENT | | | |
| 7. Case studies and workshops for decision-makers | 1 year | 2 + 12 | 48 (+ workshops) |
| 8. Guidelines for institutional development and coordination | to be determined | to be determined | |
| 9. Review of experience of private participation | 1 year | 2 + 12 | 48 (+ workshop) |

* All costs in thousands of US dollars (US\$ 000). For foreign consultants, estimated cost (all inclusive) in foreign currency US\$ 12 000/man-month. The detail of local costs has not been fully estimated as they will vary between the different countries concerned. Most of these projects require a large component of local inputs and have considerable training benefits for national staff. Where local specialists can be identified for given disciplines, a pro-forma figure of US\$ 2 000 per man-month is used. The figures or other indications in brackets represent other identified costs (see text).

** Duration and costs are for one country only.

REALLOCATION OF WATER RESOURCES (Report of Committee I)

Although the stated objective of Committee I was to formulate projects designed to improve water resources allocation, the Committee broadened its mandate to cover overall water resources management, including legislation and enforcement mechanisms, and some aspects of water resources protection. The projects formulated by Committee I include activities to create or improve the legal framework for water resources management, compilation and publication of case studies and other background documentation, and development of a guidance document for water resources management.

PROJECT I ESTABLISHMENT OF AN APPROPRIATE LEGAL FRAMEWORK FOR WATER RESOURCES MANAGEMENT

DESCRIPTION

This technical assistance project is designed to help the governments of a number of countries to establish an appropriate legislative and administrative framework, and to identify suitable enforcement mechanisms for water resources allocation and management. The approach followed in each country will be documented so that other countries can have the benefit of lessons learned. Target countries are to be identified in different geographical regions. In each country, the target groups will be government, the private sector, and the users.

For each country, the project will have a duration of one year; follow-up activities will be required in order to assist in the implementation phase.

JUSTIFICATION

A legislative framework is essential to enable adequate planning of allocation and reallocation of water resources and to ensure that the requirements of domestic water supply to satisfy the basic needs of the population are given adequate priority. This framework needs to take into account the traditional and customary regulations already in place and match these with the trend followed by an increasing number of governments, to declare all water to be government property. Proper legislation is particularly important to safeguard the rights of domestic users. However other groups such as government and private sector agencies will see their task greatly facilitated by the enactment of realistic and enforceable legislation.

ACTIVITIES

For each country, the project will include the following activities:

- inventory and review of existing legislation: the systematic approach

which has been designed by FAO can be followed to facilitate and accelerate this process;

- review of the administrative procedures and arrangements for implementation of the legislation;
- assessment of enforcement of existing legislation;
- development of proposals for adaptation of the legislative framework, procedures and enforcement of approaches, by using experiences from other countries;
- report on the process and its results, informal publication;
- support to the development of an enabling environment to facilitate the implementation of the legislative framework.

INPUTS AND OUTPUTS

The project team should be composed of national and expatriate advisers as well as government staff dealing with water resources management. The team should be multidisciplinary, as it should include water legislation experts as well as water supply and sanitation specialists, specialists of other sectors and behavioral scientists. The core group should consist of the following :

- one expatriate legal expert for 5 m/m;
- one expatriate expert in water resources management and policy for 3 m/m;
- one local legal expert for 12 m/m;
- one local water resources management specialist for 8 m/m;

The output will be the proposed legislative framework for water, together with an administrative framework for implementation, and a documented overview of the process and results of the approach.

The foreign exchange component of this project would amount to US\$ 96 000 for each one of the countries for which a complete legislative and administrative framework is to be developed. The local cost would be of the order of US\$ 40 000 in staff. A realistic total budget would be of the order of US\$ 150 000 to US\$ 200 000 per country including a small training component and the publication of documentation on the experience gained (at a cost of US\$ 5 000 to US\$ 10 000 for 3 to 4 countries).

PROJECT II CATALOGUE OF EXPERIENCE OF SELECTED LAW ENFORCEMENT MECHANISMS

DESCRIPTION

The project consists in review and dissemination of experiences that facilitate compliance with water allocation and distribution legislation (including enforcement). Where legislation exists but is not well enforced, it may prove ineffective in achieving its stated objectives, and result in misallocation, over exploitation, inequitable distribution and environmental deterioration of water resources.

The project will have a duration of one year.

JUSTIFICATION

There is a need to highlight and give examples of compliance mechanisms that have proved effective in achieving the orderly allocation and development of water resources.

This overview should be published in the form of a "Lessons learned" document to assist lawmakers, policy makers and administrators at the appropriate levels to evolve mechanisms and approaches conducive to compliance by all concerned with water allocation and development laws and regulations and administrative decisions made under them.

ACTIVITIES

A series of country studies will be prepared which will review and analyze selected experiences with mechanisms and approaches conducive to compliance. The studies will cover, in particular:

- creation of public awareness through support to NGO's, action groups on the environment, other target groups;
- feedback information from public through public meetings and consumer groups;
- advocacy and media campaigns;
- fees, financial incentives and penalties;
- physical penalties (disconnections, reduced allocations);
- criminal procedures.

These country studies will form the basis of a report containing a comparative analysis and drawing conclusions and recommendations. At the inception of the project a workshop could be convened with the participation of all the prospective contributors to design a standard format of country studies.

INPUTS AND OUTPUTS

Local expertise from selected target countries and international-level expertise will be required.

The output of the project will consist of a publication containing the country studies, and their comparative analysis (lessons learned).

The foreign exchange component of the project should be of the order of US\$ 12 000 (not including the workshop), representing the input of an international expert to the analysis report. The local component should amount to US\$ 24 000 (2 man-months of six experts from six countries).

PROJECT III
DEVELOPMENT OF GUIDELINES FOR THE ESTABLISHMENT
OF LEGISLATION AND ADMINISTERING INSTITUTIONS AND PROCESSES
IN THE FIELD OF WATER RESOURCES MANAGEMENT

DESCRIPTION

The guidance document should contain:

1. Water legislation:
 - 1.1 methods to review existing legislation including traditional and customary law;
 - 1.2 key issues for possible improvement.
2. Water rights administration:
 - 2.1 organizational arrangements required;
 - 2.2 staff needs;
 - 2.3 techniques for data collection and handling;
 - 2.4 possibilities for gradual process, dealing initially with large users and high risks areas;
 - 2.5 measures to address the judicious usage of water resources.
3. Law enforcement and promotion:
 - 3.1 promotional effort orientated towards the agencies and the public;
 - 3.2 training requirements and organization.

The project will have a duration of four months.

JUSTIFICATION

The uncontrolled over-abstraction of water, in some cases leading to water scarcity, is a severe ecological problem. In order to ensure a sound use of available water resources, it is fundamental to regulate water use, and to create an efficient and effective water rights administration.

Such an administration however can not be developed in isolation. It is part of a series of issues including water legislation and environmentally sound water master plans, and users awareness and willingness to follow the regulations.

Experience exists on the development of these different components, but it has not been brought together into a comprehensive document to serve countries now embarking on the establishment of a legal framework, and the adoption of practical instruments for sound use of available water resources.

The objective of the project is to bring together key experiences concerning the development of:

- water legislation taking into account ecological requirements;
- water rights administration;
- promotional efforts to support enforcement of the above.

ACTIVITIES

The main activities of the project would be as follows:

- formation of a small task force to prepare a detailed outline;
- development of different chapters by key authors;
- compilation of draft guides and documents;
- review meetings;
- finalization after external review;
- publication.

INPUTS AND OUTPUTS

The inputs component will consist of two specialists - a lawyer and an expert in institutions/administrative processes, at a cost (net of meetings and reproduction of report) of some US\$ 40 000. The total cost, including meetings and report publication and reproduction, would be of the order of US\$ 80 000.

The expected output consists of a publication containing guidelines for use by lawmakers, policymakers and administrators in the framing of water resources management legislation and in the designing of institutional arrangements and administrative processes for the administration and implementation of such legislation.

PROJECT IV LEGISLATION ON THE PROTECTION OF THE SOURCES OF PUBLIC WATER SUPPLIES - AN ANALYSIS OF SELECTED EXPERIENCES WITH IMPLEMENTATION AND ENFORCEMENT

Adequate legislation is a key instrument to ensure the protection of the sources of public water supplies. Implementation and, above all, enforcement of the legislation are major problems in both developed and developing countries. In a majority of countries, the existing legislation is not adapted to the needs, as a result of the large variety of local conditions. Most of the legislation is in fact copied from texts applied in other countries.

A comprehensive approach is required to enhance water sources protection as a key element of public health and environmental protection. The objective of the project is therefore to review the lessons learned in relation to the existing water source protection legislation in a number of selected countries, and, in particular, in relation to the implementation and enforcement of such legislation.

The project will have a duration of six months.

The beneficiaries will be water users, water sector investors, investors in other sectors of the economy and the general public.

ACTIVITIES

The main activities of the project will be the following:

- development of a case study format;
- inventory and assessment of existing legislation in relation to water sources protection;
- review of traditional and customary laws pertaining to the protection of the water sources and their legal status;
- review and assessment of the effectiveness of current law enforcement practices;
- analysis of conflicts involving competing uses or impairment of the quality and dependability of water sources;
- preparation of case studies covering the above;
- organization of a workshop to review case studies and the lessons which can be learned.

INPUTS AND OUTPUTS

The inputs will consist of international and national consultants for preparation of case studies, and the organization of workshops and seminars to exchange experience and information.

The primary output of the project will be a publication containing (a) country studies, (b) an assessment of the role of customary law, and (c) guidelines for the framing of workable and enforceable legislation on water source protection. A related output is training both in service and through seminars and workshops.

The budgetary implications of the project (net of training and reproduction of the publication) will depend on the number of countries selected for the study. Country studies will cost about than US\$ 5 000 each, while an international expert should be available to draw the guidelines component for a fee of US\$ 10 000. The total cost should be of the order of US\$ 28 000 for 3 to 4 countries.

LEGAL REGIMES FOR WASTEWATER USE (Report of Committee II)

INTRODUCTION

The variety of issues which are related to legal regimes for wastewater use should be identified in order to establish a comprehensive legal framework. The Committee reviewed the findings and conclusions of the first consultation of the Working Group and the more pressing issues were highlighted.

In addition, the specific case of Morocco was discussed in order to derive basic issues of interest to other countries, including the identification of the authority or authorities responsible for the administration of the legal regime and the determination of the type of legislation required by Morocco.

The two pilot projects proposed by the Committee are part of a strategy to ensure the establishment of appropriate legal regimes for wastewater, in countries experiencing water shortages. The strategy involves the promotion of wastewater as a resource as well as actions to include its development in the countries' long term economic plans.

FINDINGS

The following legal issues were identified as requiring coverage in legal regimes for wastewater use:

- the ownership of wastewater;
- who decides on the allocation of wastewater;
- consideration of existing users of wastewater flow;
- legal mechanisms for charging for wastewater use as a function of quality and assigned use;
- licensing of wastewater use and the conditions, terms of renewal and sanctions to which these licences are subject;
- strict control of industrial wastewater discharges with due consideration of wastewater use needs;
- legal mechanisms for cost allocation and recovery for wastewater disposal and wastewater use;
- government agencies responsible for the administration of wastewater legislation;
- format of the legislation (whether there should be one general Act or various specific Acts);
- adoption of wastewater quality standards relative to the potential users of wastewater.

RECOMMENDATIONS

The United Nations and the technical agencies concerned should urge governments to include in their long term economic plans wastewater use

as an economic resource, particularly in arid and semi-arid regions:

- FAO and WHO should urgently help governments to formulate wastewater use standards for different beneficiaries in the respective countries;
- a survey should be carried out of a cross section of countries which use wastewater or will be using wastewater as a resource and which either:
 - . have no legislation on wastewater use; or
 - . have recently started developing legislation on wastewater use; or
 - . have developed a legal regime on wastewater use.
- FAO and WHO should develop model legislation for the regulation and control of all aspects of wastewater use;
- a demonstration project on model water legislation should be developed and implemented in selected countries;
- action should be taken to increase awareness of the economic value of wastewater sludge and research and development programmes on this subject should be encouraged.

PROJECT V

ESTABLISHMENT OF A LEGAL REGIME FOR WASTEWATER USE IN MOROCCO

DESCRIPTION

This is a pilot project for the establishment of a legal regime for wastewater use, formulated specifically for Morocco and intended to serve as a demonstration of the feasibility of this type of project. The specific objectives include the definition and setting-up of laws and regulations, institutional responsibilities as well as standards for wastewater use.

The project will have a duration of two years.

JUSTIFICATION

Traditionally, the use of wastewater in Morocco has been uncontrolled and unregulated, with resulting health problems. Given the growing water scarcity and demand, wastewater has become a much needed resource. Therefore, wastewater use has been determined as a prime option in wastewater management. There are wastewater master plans in progress for 10 to 12 large cities, as well as wastewater use demonstration projects in Ouarzazate (irrigation), Agadir (groundwater recharge) and others. Legislative problems were encountered for the first time in Ouarzazate.

ACTIVITIES

It will be necessary to survey and assess the existing situation, with particular attention given to:

- wastewater use practices;
- institutional and legislative structures and impact;
- economic, agricultural, socio-cultural and health impact;
- wastewater quality.

In addition, the following activities will need to be undertaken:

- elaboration of wastewater quality and treatment standards for different uses (agriculture, recreational use, recharge, etc.);
- activation of the structure in charge of creating the legislation and of all concerned governmental and non-governmental agencies;
- formulation of the legislation, taking into account the issues identified by Committee II :
 - . formulation of an institutional framework;
 - . development of institutional strength to implement the legislation by training personnel for monitoring control and enforcement;
 - . public awareness campaign.

INPUTS AND OUTPUTS

The project personnel will include the following consultants and technicians from abroad, with one of them serving as project coordinator:

- water law specialists with experience of water legislation in Moslem countries;
- specialists in wastewater use standards;
- specialists of public administration and economics.

The outputs from this project will include the report resulting from the survey and the assessment of the existing situation in relation to wastewater use in Morocco, a revision of existing legislation and institutional responsibilities, the formulation of draft legislation and eventual enactment of an institutional framework, and the strengthening of the institution by training of its personnel.

The budget should include the cost of services of expatriate consultants as follows:

- water law specialist and wastewater use standards specialist (3 man months per year for each, including at least two visits of 3 weeks duration for each);
- specialists of public administration and economics (2 man months each per year with 2 visits of 2 weeks duration).

The foreign exchange component of the project should amount to US\$ 240 000, not including the training component. The services of a local legal consultant will be required for 18 man-months. Two other national consultants, with expertise in agronomy and environmental health, will be employed by the project. The inputs required will be of eight man-months for the agronomist and four man-months for the environmental health specialist. The total local staff cost should amount to US\$ 60 000, raising the total project budget to US\$ 300 000.

PROJECT VI
EVALUATION OF THE LEGAL AND INSTITUTIONAL FRAMEWORK
FOR WASTEWATER USE IN SELECTED COUNTRIES

DESCRIPTION

This project is primarily a survey of a cross section of three to four countries in order to give a broad idea of the different legislative and institutional experiences in wastewater use. Its objectives will be to understand existing legislative practices and the factors influencing them, to give external support agencies the information on which they can base their assistance for countries intending to develop a legislation on wastewater use, to help the countries wishing to create legislation on wastewater use in the identification of the most important issues.

The project will have a duration of four months.

JUSTIFICATION

Although there has been some progress in the development of legal regimes for wastewater use in a few countries, the lessons learned have generally not been disseminated to those countries which are currently undertaking large wastewater use programmes. These are often subject to severe time constraints, particularly in arid zones, with the result that the institutional and legal issues are overlooked.

ACTIVITIES

The activities to be undertaken in this project are to formulate terms of reference, to recruit a suitable expert of each country to undertake the study for that particular country, to collect relevant information and to produce reports which will be subjected to a comparative analysis resulting in a consolidated summary.

The project will require four country studies of one man-month each, one month for the production of the four national reports, and two months for the analysis and consolidation of the results by an international expert.

INPUTS AND OUTPUTS

The inputs needed consist of:

- eight man-months of local experts;
- one expatriate lawyer with experience in the water and sanitation sector for 6 man-weeks;
- one expatriate environmental/public health specialist with expertise in the wastewater use field for 2 man-weeks.

The outputs from this project will consist of specific country reports as well as a comparative report on all countries studied. The total cost should amount to US\$ 40 000 (not including the publication).

INSTITUTIONAL AND HUMAN RESOURCES DEVELOPMENT
(Report of Committee III)

PROJECT VII
CASE STUDIES AND WORKSHOPS FOR DECISION MAKERS

DESCRIPTION

This technical support project is designed to strengthen awareness of legal issues among decision makers in water supply and wastewater management. It therefore comprises a study phase, during which legal issues and constraints will be identified in selected countries and case studies will be prepared, and a dissemination phase, during which the information contained in these case studies, as well as the experience of senior professionals, will be conveyed to national officials through seminars and workshops.

The activities leading to the production of national case studies will last six months and the whole project, including initial workshops, will last one year.

JUSTIFICATION

Legal issues have become a crucial constraint in water supply and wastewater management. However, they have yet to be recognized as such by most decision makers. This project is therefore aimed at making decision makers aware of the legal issues involved in the management of water and wastewater; emphasizing the need for well defined policies, strategies, programmes and plans and for developing or reviewing appropriate legal instruments; and for exchanging information and experiences at intercountry level on relevant legal issues and assessing the needs of sub regions or regions in the field of water legislation.

ACTIVITIES

The main activities of the project will be the following:

- assessment of weaknesses and strengths of the legal framework of the water supply and sanitation sector in selected countries of particular regions;
- drafting of national case studies on water legislation;
- workshops and seminars on specific legal issues pertaining to water supply and wastewater collection and disposal.

INPUTS AND OUTPUTS

The inputs include the involvement of one international and six national experts, and several workshops. The outputs include (a) the publication of case studies, and (b) workshops and seminars, and publication of their consolidated results. Through these studies and workshops government entities and decision makers will gain a better insight of critical legal issues in water supply and wastewater disposal. Such insight may lead to the formulation of national programmes aimed at addressing, with financial and technical assistance from the international community, priority legal and institutional issues.

The foreign exchange component of this project will include 2 man-months of an international expert responsible for the comparative analysis report, and several 2-5 days intercountry workshops. National expertise will be provided to prepare six country studies, at a total cost of about US\$ 24 000, representing inputs equivalent to twelve man months. The total project cost will be about US\$ 48 000.

PROJECT VIII GUIDELINES FOR INSTITUTIONAL DEVELOPMENT AND COORDINATION

DESCRIPTION

This project has not been formally defined yet, but results from the discussions of the Committee. The duration of the project and the inputs remain to be determined. Essentially, the Committee has discussed the organizational, managerial, financial and legal aspects of institutional development, with emphasis on specific alternatives such as privatization of services.

In the field of cost recovery, for instance, the Committee endorses the principle of water charges being enforced universally, eliminating class exceptions. This principle should be fully applied, with legislation allowing for water rate adjustments as warranted by economic (inflation) or other (resource depletion) circumstances.

Publicly-owned institutions should no longer be considered as privileged categories of users with respect to payment. Where individual metering is difficult, appropriate collective levels of responsibilities for payment should be defined. Through common billing for water supply and sewerage, the latter would benefit from possible sanctions applicable to water supply. Numerous other aspects were envisaged by the Committee. The conclusion was that, when the supply agency is a public institution, some functions such as maintenance, metering, billing or collection can be transferred to the private sector. Further details on such transfers are provided in Annex III.

In urban areas, a contract between the government and the water supply and sewerage agency should provide for automatic rate adjustments, on the basis of the evolution of relevant economic parameters for a given period, as well as performance criteria of supply. It should also provide for the control of this performance by the government. Some appropriate channels should be available for municipalities and consumers to express their views and specific interests.

In rural areas, legal provisions should be made in order to enable rural communities to manage their own water systems.

In the broader field of water resources allocation, human needs should prevail over other needs. As a prerequisite for the implementation of this principle, all abstraction rights should be registered, and all abstractions should be measured and paid according to the value of the resource to the economy.

The project would consist in the preparation of a general legal instrument identifying critical areas and establishing guiding principles to remove sector development constraints.

JUSTIFICATION

Because of its complexity and the large number of agencies involved in water resources management, the water supply and sewerage sector needs coordinating mechanisms to ensure consistency between institutions and disciplines, with respect to standards, planning procedures and operations. There is need in many countries for a sector restructuring and institution-building programme, with adequate emphasis on legal and administrative issues. With respect to administrative management of water resources and to quantitative and qualitative protection of water, the Committee has recommended that national guidelines be drafted including proposals for actions to be initiated in collaboration with all parties concerned. The external support agencies which provide funds or technical assistance to the sector might consider encouraging this kind of activities.

ACTIVITIES

The activities, inputs and outputs will be determined at the time when a project is formulated in more details for a given country.

PROJECT IX REVIEW OF EXPERIENCES OF PRIVATE PARTICIPATION IN WATER SUPPLY AND SANITATION

DESCRIPTION

The project consists of an evaluation of past experience, as a prerequisite to decision-making. This evaluation should concern the economic, financial, legal, institutional, social, cultural and technical implications of full or partial transfer of water supply and sanitation activities to the private sector.

The project will have a duration of one year.

JUSTIFICATION

In recent years, privatization of water supply and sewerage services has often been discussed as a one time transfer of activities and responsibilities. This may be a reason why less consideration was given to the option of gradually increasing the role of the private sector. It can also be argued that such options could offer further space to enhance efficiency and reduce the financial burden to households and agencies.

The objective of the project is to improve the basis for decision making on full or partial privatization of water supply and sanitation functions. In a second phase, the results of the exploratory phase should be disseminated to decision makers in order to ensure an impact on decisions, on system efficiency and eventually on users. The groups which will benefit from the project are the water and sewerage users, the sector investors and the service providers.

ACTIVITIES

The activities required to achieve the objective of this project are as follows:

- study of existing documentation;
- review of comparative experiences of private sector participation.

This review should include an exhaustive identification of the economic, financial, legal, institutional, social and technical issues, as well as their comprehensive cross evaluation, with special emphasis on legislation, information exchange and administrative procedures.

INPUTS AND OUTPUTS

The inputs required to carry out the project activities are as follows:

- consultancy services;
- printing and dissemination of the review and evaluation report;
- in a second phase, study teams and seminars for information exchange and dissemination.

The project is expected to result in:

- comparison of the relative advantages and disadvantages of private sector versus public sector involvement;
- comparison of gradual transfer versus one time transfer of water supply and sewerage services.

The cost of this project should be of the order of US\$ 48000, including consultancy services, local costs, and printing and dissemination of the review and evaluation report. The costs of workshop and seminars are not included in this evaluation.

SECOND CONSULTATION ON LEGAL ASPECTS OF WATER
RESOURCES, WATER SUPPLY AND WASTEWATER MANAGEMENT
(WHO Geneva, 10-12 September 1991)

ANNEX I
List of Members
of the FAO/WHO Working Group

| | | |
|-----------|------------------|--|
| Ms I. | Arce Umaña | Legal Director, AyA, Costa Rica |
| Mr C. | Bonnal | Consultant, CGE, France |
| Dr D. | Caponera | Water Legislation Expert |
| Ms M. | Cardoso da Silva | Project Director, WHO/UNDP, Portugal |
| Mr P. | Chaix | Study and Co-operation Manager, NAN.C.I.E, France |
| Mr E. | Döring | Technical Adviser, GTZ, Germany |
| Mr P. | Faivre | Directeur aux Affaires intern., NAN.C.I.E., France |
| Mr Y. | Glemarec | UNDP Geneva |
| Dr F. | Greiner | Senior Technical Adviser, GTZ, Namibia |
| Mr S. | Hameed | Parliamentary Legal Officer, Maldives |
| Mr Y.A. | Hassan | Dir. Public Health Eng., Min. of Pub. Works, Sudan |
| Mr M. | Ibrahim | Director, Water & Sanitation Authority, Maldives |
| Mr J.G. | Janssens | Technical Director, IWSA, Belgium |
| Mr E.S. | König | Sector Eco. Water And San., KfW, Germany |
| Mr El M. | Lamqaddam | Chef, Division Hyg. du Milieu, Morocco |
| Mr J. | Lau-Hansen | Health Legislation Editor, WHO/HLE |
| Mr B. | Locke | Deputy Execut. Secr., W&S Collaborative Council |
| Mr A.H. | Maiga | Sanitary Engineer, EIER/EPFL |
| Mr M.A.M. | Mullick | Regional Adviser (CWS), EMRO |
| Mr U. | Myint | Chief/Dep., Environ. Sanit. Division, Myanmar |
| Mr B. | N'Deurbelaou | San. Eng., Hydrosult Development S.A., Lausanne |
| Mr Y.J. | Picaud | Manager - East Africa Division, CEFIGRE, France |
| Mr K. | Podlaski | Director, Water Management, Poland |
| Mr J.A.V. | Roxo Pires | Manager, U.N.D.P. Project, Portugal |
| Ms T. | Santa Maria | Legal Off., Compagnie Générale des Eaux, France |
| Ms I. | Sen | Joint Secretary, Ministry of Water Develop., India |
| Mr S.N | Sharma | Dir. Gen., Water and Sew., Nepal |
| Dr S. | Shubber | Senior Legal Officer, WHO/LEG |
| Pr. H. | Shuval | Director, Environmental Health, Univ. of Jerusalem |
| Mr M. | Solanes | Interreg. Adviser Water Law, UN/DTCD |
| Mr M. | Strauss | Project Officer, IRCWD, Switzerland |
| Mr T. | Tamplin | Reg. Adviser on Environmental Health, WHO/WPRO |
| Mr S. | Valverde Segura | AyA, Costa Rica |
| Mr J.T. | Visscher | Senior Programme Officer, IRC, Netherlands |
| Ms J. | Walker | Associate Director, WASH, United States of America |

SECRETARIAT

| | | |
|---------|-----------|---|
| Mr S. | Burchi | Legal Officer, Development Law Service, FAO |
| Mr J. | Hueb | Sanitary Engineer, WHO/CWS |
| Mr P. | Koenig | Economist |
| Mr L. | Laugeri | Institutional Development Specialist, WHO/CWS |
| Ms F. | Sigalotti | WHO/CWS, Secretary |
| Mr D.B. | Warner | Manager CWS, WHO, Geneva |

SECOND CONSULTATION ON LEGAL ASPECTS OF WATER
RESOURCES, WATER SUPPLY AND WASTEWATER MANAGEMENT
(WHO Geneva, 10-12 September 1991)

ANNEX II
Committees

| | | |
|----------------|---------------------|------------------------------|
| Committee I: | Reallocation | |
| Chairman: | Ms Indrani Sen | India |
| Rapporteur: | Mr J.T. Visscher | Netherlands |
| Ms | M. Cardoso da Silva | Portugal |
| Mr | P. Faivre | France |
| Mr | F. Greiner | Germany |
| Mr | J.G. Janssens | Belgium |
| Mr | B. Locke | WHO/CWS |
| Mr | M.A. Mullick | EMRO, Regional Adviser (CWS) |
| Mr | B. N'Deurbelaou | Switzerland |
| Ms | J. Walker | United States of America |
| Committee II: | Wastewater Use | |
| Chairman: | Mr Yusri A. Hassan | Sudan |
| Rapporteur: | Mr S. Hameed | Maldives |
| Ms | I. Arce Umaña | Costa Rica |
| Mr | S. Burchi | Development Law Service, FAO |
| Mr | P. Chaix | France |
| Mr | El M. Lamqaddam | Morocco |
| Mr | M. Ibrahim | Maldives |
| Pr. | H. Shuval | Israel |
| Mr | M. Strauss | Switzerland |
| Mr | S. Valverde Segura | Costa Rica |
| Committee III: | Other Issues | |
| Chairman: | Mr U. Myint | Myanmar |
| Rapporteur: | Mr S. König | Germany |
| Mr | C. Bonnal | France |
| Mr | J.P. Lau Hansen | WHO/HLE |
| Mr | Y. Picaud | France |
| Mr | J.A. Roxo Pires | Portugal |

SECOND CONSULTATION ON LEGAL ASPECTS OF WATER
RESOURCES, WATER SUPPLY AND WASTEWATER MANAGEMENT
(WHO Geneva, 10-12 September 1991)

ANNEX III

Privatization: Concepts and Catchwords

1) Legal issues in Privatization and in Contractual Cooperation with the Private Sector (By S. König)

I. Privatization (full transfer)

If comprehensive contractual arrangements already exist between a water supply/sanitation utility and the government which have developed in practice and proven useful, privatization will normally require less complementary legal and contractual preparation than if WSS systems were planned and operated, previously, for instance by a division of the responsible ministry.

Catchwords:

1. Product liability to the users (for quality, quantity and availability over time) by:

- water supply/sanitation company;
- state;

- a) referring to the final product/service paid for by the user,
- b) referring to primary products/advance services or related infrastructure to which the supply company has no direct access (for instance provided by the government or a municipality or by a different company); examples: watershed quality, water catchment areas, water protection zones, dams, long-distance pipelines, waste collection systems, waste dumps.

2. Assumption or distribution of the economic risk of under-utilization of capacity:

- a) as far as it results from an unexpectedly low demand;
- b) as far as it can be traced to causes attributable to item 1.b).

- 3.
- a) Laws, procedures and agreements providing for and facilitating coordination among sector agents at national and local level in policy-making, strategic planning, investment planning, operations; allowing for appropriate participation of supply/sanitation company in the process;
 - b) possibilities (and/or responsibilities), to ensure or pass on risks according to items 1. and 2.

4. Overall complex of legal succession, taking special account of water and real estate legislation.

5. Appropriate legal forms of the water supply/sanitation company, among other things as a function of the degree of desired government/municipal influence and participation, of fiscal aspects, financing aspects; linkage with the questions of "assets transfer" and "operational model".
6. Aspects of company law
7. Contractual agreements between the state, state authorities, municipalities, corporate bodies on the one hand and water supply/sanitation company on the other.
8. General business conditions, of the water supply and sanitation company applying to the users.
9. Mutual compatibility of the agreements/conditions mentioned under items 7. and 8.
10. Compliance of the agreements (item 7.) with sector-policy goals and laws, compliance of the general business conditions of the water supply/sanitation company with traditional law and legal perceptions of the users.
11. Compliance of the relevant laws (among other things labor law, law on the administration of the economy) and of the agreements stated under item 7 with the requirements of a performance-oriented, sufficiently autonomous management.
12. The rights of state authorities to practice surveillance and sanction of the water supply/sanitation company, including distribution of surveillance tasks and burden sharing for cost of surveillance system.
13. Possibility for the water supply/sanitation companies to sanction state and other public authorities in case of delayed payment for services.
14. Existence of and dealing with "mandatory connections".
15. Permitted/accessible forms and techniques for investment and management of liquidity surpluses (deposits, marketable securities, ...).
16. Compliance and enforcement aspects/legal security in the national context particularly in terms of:
 - supervision capacities;
 - real-world technical standards (also for private home installations) and legal basis for their application;
 - actual significance of ordinances and decrees;
 - procedural law, practice of settlements;
 - general legal practice;

- legal means and their factual application (time frame);
- realization of securities (time frame);
- country-specific business practice and mechanisms to enforce performance of contracts and their applicability in the field of water supply/sanitation, taking into account item 10.

II. Contractual cooperation of water supply/sanitation utilities/authorities with private sector (partial transfer)

Catchwords:

1. Legal, statutory, contractual exclusions and rules that hamper the contractual cooperation with the private sector (domestic and foreign) in a general manner or in terms of the assignment of certain functions (for instance rules, procedures, authorities engaged for the award of public contracts, administrative practices affecting smaller enterprises):
 - a) relating to the execution of investment in facilities;
 - b) relating to operation and maintenance of systems.
2. Liability of the water supply/sanitation utility providing contractual services of third parties:
 - a) to the users;
 - b) to the state control instances;
 - c) to the contractor or its agents (for instance in the event of accidents to be attributed to operational failures of the contractor's equipment).
3. General national/institution-related limitations regarding the use of domestic and foreign financing services (for instance permitted financing forms, permitted/accessible collateralization techniques).
4. Admitted fields of cooperation with private sector in the national context:
 - consulting;
 - supply of equipment;
 - maintenance and repair services;
 - connection services;
 - logistics;
 - data processing;
 - metering, billing, collection;
 - staff training;
 - advertising, public relations, hygiene education;
 - financing, etc.
5. Aspects listed in item I.16

2) Legal Issues in Urban Water Supply Construction and Operation (by C. Bonnal)

1. Who owns the facilities?

It can be:

- government (State, province, communal authorities, etc);
- the water company.

In most cases in Africa the company is the owner; in Guinea, a real estate company has been formed between government and an operating company.

2. The water supply company

It can be national, mixed or private:

- national companies have a number of characteristics (field of activity, statutes, structure, organization, control, personnel policy, fiscal regime - corporate taxes/custom duties, profit allocation, right to create branches etc);
- mixed regimes have same characteristics, plus a percentage of private participation;
- private companies have private regime for public utility management.

3. State-Water Company Relationship

- a) Governed by general agreement, long-term (several decades) duration or short-term (3 to 5 years);
- b) surveillance rights (quality, quantity, reliability, maintenance, assets renewal);
 - planning;
 - extension and renewal;
 - construction of new works;
- c) financial transfers (government subsidies, loans, debt-service);
- d) monopoly of the utility;
 - scope;
 - case of private industrial supplies (abstraction rights, royalties);
 - case of industrial supplying own staff from public or private system.
- e) expropriation rights.
- f) others
 - transfer to water company;
 - protection perimeters (sources, wells);
 - secondment of civil servants to water company;
 - tribunal (competence, penalties).

4. Water Company - User Relationship

- Public service versus financial equilibrium (public body) or profit incentive (private company);
- obligation to serve any household within system;
- clients to be treated equally;
- connections (ownership or rental of house);
- water tariff (in general agreement with State, base rate, actualization);
- tribunal in case of litigation.

5. Privatization contracts

- Concessionary agreements;
- other (goal transfers);
- partial transfers.

PART TWO
CASE STUDY

**APPROACHES TO SOLVING WATER RESOURCES CONFLICTS IN ARID
AREAS--ISRAEL AND HER NEIGHBOURS AS A CASE STUDY**

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INTRODUCTION

Conflicts between nations over the use of shared water resources are particularly acute in the water short arid areas. Such conflicts are not necessarily limited to questions of the apportionment of the quantities of the shared water resources which are in dispute but may include conflicts over a multitude of issues such as: environmental pollution, water quality degradation, energy production, transportation, as well as geopolitical issues, national pride, sense of independence and fears of domination by other nations who control up-stream sources of surface or ground water.

WATER STRESSED NATIONS-THE WATER COMPETITION LEVEL

In arid regions, one of the major causes of water conflicts is the severe water scarcity affecting all partners, which makes an "equitable division" of the very limited water resources, to meet the legitimate interests and needs of all the disputants, a seemingly impossible task. When playing a "zero sum" game with very high stakes it is difficult to find a solution which avoids anyone from becoming a loser.

Professor Malin Falkenmark of Sweden (Falkenmark, 1986) has shown that the "water competition level" defined as the number of persons competing for the use of one hydrological flow unit of one million cubic meters per year (MCM/Yr)-or the "hydraulic density of population" (Forkasiewicz and Margat 1980)-is a powerful instrument for demonstrating differences in water stress among nations.

It can be shown that the very adequate water competition level for Central and Southern Europe is about 300 persons per MCM/yr or about 3350 cubic meters per person per year(CM/P/Yr). Above 2000 CM/P/yr will be considered the "Water Abundance Zone". Falkenmark suggests a tentative lower

limit of water competition for operating a modern semi-arid society using sophisticated water management techniques at 2000 persons per MCM/Yr. or 500 CM/P/Yr. Below that level of total available water resources shall be considered the "Water Stress Zone" where there will be water shortages, with severe constraints on agricultural self-sufficiency and economic development.

I would suggest that when conflicts over shared water resources arise between nations which are below the safe lower limit of water competition and are in the Water Stress Zone, solutions involving control or redistribution of water resources under dispute, based on the principles of international law and precedent will be particularly difficult to achieve through compromise and negotiations. Ways must be found to introduce additional water resources to the area to meet the legitimate water needs of all the disputants. What is needed is a bigger pie.

THE ROLE OF INTERNATIONAL LAW IN THE RESOLUTION OF THE WATER RESOURCES CONFLICTS

A comprehensive system of principles and practice in international water law has evolved over the years. Thus international water law has been accepted as legally binding based on the consistent practice of peaceful states in dealing with shared water resources issues, which has resulted in the formation of customary rules of international water law. However, there is no supra-national authority which can compel unwilling members of the international community to abide by such rules (Burchi, 1991).

There are numerous international agreements, treaties and conventions as well as national laws which provide insights, guidelines and legal precedents which can assist disputants in reaching an agreed upon solution, through negotiations or arbitration. But in the final analysis only an agreement based on consensus between the partners, which results in an treaty or convention can provide a binding solution. The legal principles of international water law discussed below are drawn mainly from the work of Caponera and Alheritiere (1978) and the ground water legislation review of the Economic Commission for Europe(1986).

An early example of enlightened water legislation can be seen in the Chinese water laws of the Chin Dynasty, 250 B.C., which were based on the concept that it is the duty of society to find an agreed upon solution for water disputes, "...taking into account the legitimate interests of all parties, in such a manner that there will be no winners and no losers."

In the course of history some nations have claimed the right of unrestricted use of waters as the upstream country under what has been called the "unrestricted territorial sovereignty" doctrine. This, much challenged, doctrine holds that all water resources are the sovereign property of the country in which they arise and that downstream countries have no rights. On the other hand, other countries have insisted on the "natural water flow" doctrine, which holds that the water flowing through a sovereign territory, which is used by its inhabitants is part of the land and thus is under the absolute sovereign ownership of the territory. According to this doctrine, upstream countries do not have the right to alter the flow in a way which would interfere with the use of the downstream country, otherwise this is considered a violation of its territorial integrity. These two doctrines, which are completely counter to one another, have in the past led to political conflicts and even to wars over water rights.

Authorities in international water law, as well as the normal practice of most peace loving nations have generally rejected the doctrine of "absolute sovereign rights" of the upstream country over shared international water ways. They point out, for example, that if the doctrine was indeed the sole basis for the distribution of water rights on shared bodies of water, then Egypt would have no rights to the Nile River, which has served as the life blood of its civilization for thousands of years, since 100% of the Nile is derived from upstream sources in Ethiopia, Kenya, Sudan, Uganda and Zaire. Similarly under such a doctrine, if it was accepted as absolute, Turkey could deprive Iraq and Syria of the major share of the water they have used throughout the ages from the Tigris and Euphrates Rivers whose main sources are in Turkey.

Experts in international law likewise reject the doctrine that downstream countries have absolute and immutable sovereign rights over water which they have historically used as it flowed through their territories. This doctrine, could result for example in Egypt denying Ethiopia the right to use the bountiful flow of the Nile sources that flow through its territory, to aid in overcoming the massive human suffering resulting from the severe droughts in regions of that country, just because this war never done in the past.

In the current era, where peaceful cooperation between nations over the use of shared resources is becoming the normative pattern in international relations, new views in international water law have developed. More recent concepts are those of "equitable apportionment" and "community of interest" based on the emerging principle of "limited territorial sovereignty" over shared resources.

This more enlightened and peaceful approach is summed up in the so called "Helsinki Rule" of 1966- non-binding recommendations of the International Law Association which propose that water disputes be settled by negotiations- recognizing the legitimate rights and needs of both the upstream and downstream riparian partners. The Helsinki Rule states that "Each State is entitled, within its territory, to a reasonable and equitable share in the beneficial uses of the waters" (Art.IV). This rule further provides for taking into account possible alternative sources of water that might be available to one of the parties, the possibility of economic compensation and the economic and social needs of each state. It also provides for the establishment of joint commissions for inspection, monitoring, control and management of shared water resources so that all parties can be assured that the terms of the agreement are in fact being adhered too. It is generally agreed that the principles of the Helsinki rule apply to shared ground water no less than to shared surface water resources.

Thus, based on modern principles of international water law the parties to the Middle East water conflicts are directed in the first instance to negotiate directly between themselves to arrive at a settlement based on the principles of "equitable apportionment" and "community of interest" rather than to enter some type of confrontational litigation, expecting some supra-government authority to enforce a judgement based on what each side views as its legitimate rights.

WATER STRESS IN THE MIDDLE EAST

The disputes between Israel and her neighbours over water resources are an example of an apparently intractable conflict over shared water resources which has been exacerbated by severe water shortages or Water Stress, on all sides. The conflict has been associated with acute political disputes as well as military clashes in the region for the past 40 years.

The Middle East, although perceived by many as a totally water stressed area contains both extremely arid areas as well as areas of plentiful water supplies. Middle Eastern peoples that fall into the Water Stress Zone include: Israel, Jordan and the Palestinians all with water resources less than 500 CM/p/yr. According to the author's preliminary calculations based on information from various sources (Global Viewpoints Forum, 1990; Kally, 1990; Naff and Matson, 1984; and Salameh, 1990) the Water Stress Index for Israel and Jordan in 1991 was about 300 CM/P/Yr while the Water Stress Index for the Palestinians was about 165 CM/P/Yr. This last figure is based on the actual allocation of water rather than on estimates of the water resource

potential which is one of the issues under dispute. While Syria and Egypt fall into an intermediate zone, Turkey, Iraq, and Lebanon clearly are well into the Water Abundance Zone with over 3,000 CM/p/yr. (See Fig 1.).

WATER RESOURCES CONFLICTS UNDER CONDITIONS OF WATER STRESS

From the above analysis it is clear that Israel, Jordan and the Palestinians are already deep in the Water Stress Zone and their conditions will deteriorate considerably as their populations increase and their needs for more water for reasonable economic and agricultural development grow. Under these conditions the chronic disputes over the use of the shared water resources, particularly the Jordan/Yarmuk water-shed and the mountain aquifer (as explained below), will be exacerbated and could lead to political stress and even to war. The claims, counterclaims, fears, concerns and needs of the various partners to the dispute which may serve as obstacles to progress in reaching an accommodation are assessed and presented below:

CLAIMS, COUNTER CLAIMS, FEARS AND CONCERNS

Arab Claims and Concerns

1. Syria, considers the Jordan River which originates mainly in its territory as an "Arab River" and never approved of the 1955 Johnston Plan allocations of water from the Jordan/Yarmuk watershed between Israel and Jordan (Gruen, 1964; Naff and Matson, 1984; Brecher, 1974). Among the reasons given by Syria and the Arab League was that any recognized water allocation given to Israel would be a form of recognition of its legitimacy which they were not prepared to accept at that time.
2. Jordan, on the other hand reached an informal agreement with the United States for the defacto division of the Jordan and Yarmuk Rivers with Israel under the provisions of the Johnston plan. In return the United States provided financial aid to both countries to construct major water projects. Jordan, however, now claims that Israel is extracting more than its allotted share (Pearce, 1991; Nordell, 1991).
3. The Palestinians claim that the flow of the mountain aquifer that is derived from rainfall over the West Bank, 85% of which is currently extracted from deep wells within Israel, should be allocated for their use, and that Israel's much criticized, long term, over-pumping of the aquifer is a serious threat to the Palestinians future essential water reserves (Global Viewpoints Forum, 1990).
4. The Arabs are concerned that Israel, due to development requirements resulting from the mass immigration of Jews from the Soviet Union and other

countries will use more than its agreed upon share of water from the Jordan/Yarmuk water-shed system and from the mountain aquifer. Some Arab leaders have requested that the Soviet Union stop the emigration of Jews to Israel which they view as a threat.

5. Israel has blocked the Jordan/Syrian plans to develop the Unity Dam at Mukheiba on the Yarmuk river aimed at hydroelectric power production, regulating flow and increasing irrigation projects and water supply in the area. This is viewed as a serious threat to much needed Syrian and Jordanian agricultural and economic development. Jordan has staked much of its economic future on the completion of the project (Naff and Matson, 1984; Kreshner, 1990).

6. Israel saline water diversion works and agricultural and industrial wastes are polluting the lower reaches of the Jordan river and making its quality unfit for agriculture or domestic use. The Israel flow regulation out of the Sea of Galilee makes the down-stream use of the water by Jordan and Palestinians almost impossible, particularly during the summer irrigation period.

7. The Palestinians claim that Israel has effectively frozen Palestinian utilization of water sources in the occupied territories and has allocated insufficient amounts for urban and industrial use and practically no water whatsoever for increased agricultural development to meet the needs of the growing population. They claim that during the period of the occupation the Israel authorities have developed many new water supplies in the occupied territories and have allocated significant amounts of water for agricultural and urban use for new Jewish settlement in the areas (United Nations, 1983). The Palestinians claim that by doing this Israel has violated the Geneva Convention and misused its authority as the "belligerent occupier" (El Hindi, 1990). Particularly aggravating to water short Palestinian villagers is the perception of wasteful Israeli water use and landscape practices which often include the irrigation of lawns and the construction of swimming pools.

8. The development of new deep wells by the Israel authorities in the occupied territories in the mountain aquifer which the Palestinians hold should legitimately be for their own use, is aimed almost exclusively at supplying water to new Israel settlements. The Palestinians claim that in the process of drilling new deep wells there have been cases of lowering the aquifer and drying out traditional shallow wells used for domestic and agricultural purposes in neighboring Palestinian communities. Even when the Israel authorities supply water to the communities that lost their original wells, the cost to the villagers is increased, while this is viewed as a method of control and domination (Global Viewpoints Forum, 1990).

9. The Palestinians fear that even if a peace settlement is achieved, with an appropriate Palestinian entity being established, the agreed upon division of the very limited shared water resources will leave them with in-sufficient amounts of water to allow for normal population growth and the resettlement of the Palestinian diaspora with the required urban, industrial and agricultural development to allow them to be economically viable.

10. The Palestinian claim that Israel is mainly to blame for the severe salination of Gaza's natural ground water resources which have been severely overpumped and degraded with extensive sea-water intrusion. They claim that Israel has dug many wells on the Israel side of the boarder, along the periphery of the Gaza Strip which has severely reduced the natural ground-water flow which formerly replenished the Gaza aquifer.

11. In the event of major regional projects to import water to the area for Jordan, Palestinian and Israeli use, there is concern and fear over the possibility that Israel will obtain practical as well as political control over the waters to be supplied to the Palestinians and Jordan through, for example, the use of the Sea of Galilee as a long term inter-seasonal and inter-annual storage reservoir. There is likewise concern that other nations of the region, who may supply the additional water or through whose country water pipelines pass, will use the water supply lines for purposes of political control, as Turkey did in the case of the Iraqi oil pipelines during the Gulf War of 1990-91.

12. In general the Palestinians claim the rights to complete and total control of "Palestinian" water (the mountain aquifer) and prefer that complicated schemes to import water from other nations be allocated to Israel which in return should forego claims to "Arab" water sources.

Israel's Claims and Concerns

Israel is concerned with the following real and potential threats to the quantity and quality of its currently available water resources which it claims as legitimate riparian rights based on the historic use of water flowing through its sovereign territory.

1. Syrian threats, actual engineering plans and initial construction to divert significant portions of the sources of the Jordan River currently used by Israel under the terms of the 1955 Johnston plan which established a de-facto distribution of water rights between Israel, Jordan and Syria. Israel perceives the past Syrian actions as a serious case of water rights aggression which may be repeated in the future. The likelihood of such diversion works

has been reduced as a result of Israel control of the major sources of the Jordan such as the Banyas and Hasbani Springs on the Golan Heights occupied in response to the Syrian military attack on Israel during the 1967 war. Now the possibilities of negotiations with Syria over the Golan Heights have naturally renewed these concerns.

2. Pollution of the Jordan River/Sea of Galilee/ Yarmuk River watershed by urban wastewater, agricultural and industrial wastes which might result from improper environmental management, inspection and control on those portions of the Jordan River watershed in Syrian, Lebanese and Jordan territory.

3. Diversion and storage of significant portions of the Yarmuk River by the construction of the Unity Dam at Mukheiba and other planned hydroelectric dams and diversion works by Syria and Jordan which would reduce the quantity, and quality of Yarmuk River water presently utilized by Israel.

4. If the Palestinians achieve autonomy or independence as part of the Hashemite Kingdom of Jordan or separate from it in all or part of the currently Israel occupied territories of the West Bank, they may well insist on making good their claim that all of the water of the shared Yarkon-Tananim Aquifer (mountain aquifer) that is derived from rainfall within the West Bank (estimated to be between 60-80% of the total flow of the aquifer) be allocated exclusively for their own use. This fear is compounded in Israel's eyes by Palestinian goals of returning large segments of the Palestinian diaspora to any independent entity which is established.

If this threat is carried out by a major increase of pumping from that aquifer in the West Bank area, it might mean a drastic reduction of Israel's most important, high quality, source of drinking water which has been developed at great expense by hundreds of deep wells in Israel territory, drilled over the past 43 years, mainly prior to 1967. It might mean a reduction of Israel's current utilization of that aquifer by some 200-300 MCM/yr. or the cutting off of the drinking water supplies for some 2-3,000,000 people. This would result in a serious threat to Israel's viability that it would find to be completely unacceptable.

5. Even if an equitable agreement is achieved on the division of the waters of the mountain aquifer between Israel and any future Palestinian entity, there is serious concern about the possible degradation of the quality of the water of the shared mountain aquifer as a result of inadequate monitoring and control of urban pollution, wastewater and toxic agricultural and industrial

wastes in the West Bank that could cause serious pollution in the highly exposed and permeable karstic limestone aquifer in the downstream areas of Israel making the water unfit for human consumption.

There is also concern that unregulated overpumping of the mountain aquifer in the West Bank areas could lead to a serious lowering of the water table with the resulting danger of sea-water intrusion and irreversible damage to the shared aquifer which could be a real threat to both partners.

6. Jordanian opposition to the construction of the important Israel hydroelectric power project- the Mediterranean/Dead Sea Canal (MED-DEAD) may block a project viewed by the present Israel government as of national importance in its development program.

7. Arab calls for the ending of immigration to Israel from the Soviet Union and other countries for various reasons, among them, so as not to increase the burden on the limited water resources of the area, is seen as an unacceptable interference in Israel's internal affairs. Israel views unrestricted immigration of Jewish refugees as the foundation stone and raison d'etre of the country and any demand to restrict immigration is seen as inadmissible.

CAN A SOLUTION BE ACHIEVED BY NEGOTIATIONS CENTERED ON DEBATING THE CLAIMS AND COUNTER CLAIMS OF THE PAST?

No attempt shall be made in this paper to examine and evaluate all the claims and counter-claims as well as the deep routed fears, concerns and suspicions on both sides. With full understanding for the strong feelings of both sides, there is no doubt that the partners to the dispute can all marshal detailed evidence and counter evidence and present persuasive arguments and counter arguments in defense of their position. Without deprecating the importance of such a debate to clear the emotionally laden air, negotiations concentrating on the past could be endless and would most likely not bring the disputants nearer to a solution and accommodation.

In this paper I shall not attempt to go into the political, legal and military history of the disputes over water rights in the Israel-Arab conflict nor shall I try to unravel where justice, if any lies. It should be clear that a simple reshuffling of the already inadequate water resources of the partners in the Arab-Israel dispute, is a "zero sum" game with very high stakes. All partners start the game with less than enough so that taking significant quantities of water from one to increase the share of another will be perceived as a serious hazard and unacceptable threat to its viability, unless adequate forms of compensation are assured.

It is not likely that such negotiations will get far if the partners fear that the outcome might involve committing water suicide by foregoing control of water resources essential for their survival. Only if additional sources of water and appropriate guarantees on joint monitoring, inspection, control and management, are a sure outcome of the negotiations, is there a chance that they will succeed.

THE ONLY SOLUTION: ADDITIONAL WATER FOR ALL
IN REGIONAL WATER-FOR-PEACE PLAN

The only possible solution to the real water needs of this severely water stressed area, which will be a *sina qua non* in the evolution of a lasting and equitable peace plan, is the development of a broadly cast and imaginative regional Water-for-Peace master plan which will bring in quantities of additional water on a commercial basis to all countries of the region from the large water resources reserves available for many years to come in countries such as Turkey, Lebanon and Egypt and/or by the construction of major sea-water desalination plants.

Along with these projects for supplying additional water from outside, the partners to the dispute must each be assured that they will have direct access from within their territories to adequate and equitable allocations of good quality water for domestic, municipal and industrial use as well as to a certain limited amount of assured water for the irrigation of essential fresh food products for the direct use of the population.

Water for additional agricultural purposes including export crops would draw on existing local fresh and brackish water resources and recycled wastewater as well as imported or desalinated water as a function of available arable agricultural land potential and economic feasibility and not on the basis of equal per capita allocations. Obviously there are differences in the agricultural potential and requirements for irrigation water between fertile valley areas and rocky mountain areas. Equal allocations on a population basis would not be appropriate for determining overall agricultural water needs.

ASSURED FAIR AND EQUITABLE ALLOCATIONS OF BASELINE
WATER FOR DOMESTIC, INDUSTRIAL AND AGRICULTURAL USE

The partners to the dispute could hardly be expected to accept the insecurity associated with the possibility that their essential water supplies for survival--for domestic, municipal and industrial use be imported and controlled by neighboring countries no matter how friendly--a fortiori under the tensions of the Middle East. The same is true for the limited amounts of agricultural water required to assure that the local population be supplied

with fresh food products--to assure food security. Thus, a basic element of a settlement must be to agree to the principle of a sufficient, fair and equitable allocation of essential baseline water for domestic, urban, industrial and fresh food use from sources within the territory of each partner. It is proposed, for example, that the basic allocation for domestic, urban, and industrial use be 100 cubic meters/person/year (CM/P/Yr). This figure, while modest, is considered as an adequate minimum baseline water allocation to support a good hygienic standard of urban life and industrial development, if coupled with sound measures of water conservation. Water allocations for further urban and industrial development can become available in the framework of the regional Water-for-Peace plan, as it develops.

There should also be a small but equitable allocation of water for essential fresh food production including animal husbandry of 25 CM/P/Yr. Since it is difficult if not impossible to plan for all future developments and population growth it is suggested that allocations for a 30 year period be decided upon as a starting point. As an hypothetical illustration it can be assumed that the estimated populations in the year 2020 will be as follows: Israel-10,000,000; Palestinians-5,000,000 and Jordan 7,000,000. Based on these assumed populations the required allocations of water from sources within each territory are shown in Table 1.

Table 1.

| | Population Millions | Domestic MCM/Yr | Agricul. MCM/Yr | Total MCM/Yr |
|---------------|------------------------|--------------------|--------------------|-----------------|
| Palestinians: | 5(2) | 500(200) | 125(50) | 625(250) |
| : | : | : | : | : |
| Jordan | 7(3) | 600(300) | 150(75) | 750(375) |
| : | : | : | : | : |
| Israel | 10(5) | 1.000(500) | 250(125) | 1250(625) |

Table 1. An illustration of a possible basis for fair and equitable allocations of essential baseline water for domestic and fresh food use for the Palestinians, Jordan and Israel from available sources within the territory based on estimated populations for the year 2020 and uniform allocations of 100CM/P/Yr for domestic and 25 CM/P/Yr for agriculture. The numbers in parentheses(---) represent estimated values for 1991.

Without going into details it is not unreasonable to estimate that most of the above minimal quantities of essential water supply required up to the year 2020, can be made available to each party to the dispute from existing or potential sources with direct access from within their territory.

This may require, however, that Israel agree to allocate an increased share of the eastern and/or western mountain aquifer to the Palestinians so that they can have direct access to the essential baseline water allocation. A possible arrangement might be to provide Israel with a larger allocation of Jordan or Yarmuk River water or an alternate source of desalinated water, in compensation for ground water from the shared mountain aquifer, which it has historically used. Jordan might also be expected to help in meeting the Palestinians basic needs by agreeing to construct the Western Ghor canal from the Yarmuk along the western side of the Jordan River as called for in the original Johnston plan.

After the year 2020, as populations grow and water demands increase it may be necessary to increase the amounts of water for the above purposes partially from imported water and/or from desalinated seawater.

A REGIONAL WATER-FOR-PEACE PLAN

Since there will not be sufficient amounts of water from existing or potential local sources to allow for optimal urban, agricultural and industrial development of the partners to the dispute it is essential to develop additional sources of imported water under a regional Water-for-Peace plan. The actual amounts of water that can and should be imported into the region over the next 30 year planning period have not been determined as yet, and only very preliminary rough estimates can be given. Kally (1990) has estimated that the Palestinians will require some 200- 350 MCM/Yr of imported water for the West Bank and Gaza. Israeli planners have suggested that they will require some 200-400 MCM/Yr. of additional water. The requirements of Jordan are not clear but as a preliminary estimate a figure of 200 MCM/Yr is presented. These add up to a minimum of 600 MCM/Yr. of water to be imported and/or desalinated. However long term planning needs might eventually bring the figure up to 1000 MCM/Yr.

It is proposed that the major economic powers including the United States, the European Community, Japan and the Gulf States interested in promoting the peace process in the Middle East finance these major water projects through both grants and loans, as one sure way of making the peace process attractive to all participants. The investments involved might reach some five billion dollars, but this sum is small compared to the amounts spent on the arms expenditures of the major powers in the Middle East and the direct and indirect costs of the wars of the region.

At this stage it is premature to go into the detailed engineering or economic considerations of the possible alternative or complementary elements of the Water-For-Peace Plan in the Middle-East which could include all or some of the following projects to eventually bring into the area the additional water required (see Fig. 2):

1. NILE RIVER-EL ARISH-GAZA AND NEGEV: It is proposed that a pipeline be built from the Nile through El Arish to the Gaza area, as suggested by Dr. Elisha Kally (Kally, 1990) to relieve the critically severe water situation in the Gaza Strip area which threatens its very viability. Although Egypt will eventually face water shortages it will have a surplus of water from the Nile River for some years to come. Egypt has expressed its interest in promoting the peace process and should also consider that it has a moral responsibility to help solve the Gaza problem since under Egyptian administration from 1948 to 1967, serious unregulated over pumping of the ground water resulted in severe, irreversible sea water intrusion causing much of the area's water to be contaminated and unfit for domestic or agricultural use. The possibility that the pipeline could supply water to areas of the Israel Negev could be an attractive element of the project with appropriate compensation and economic motivation for Egypt, so that all partners to the conflict would benefit from the project. At the end of the normal investment life of the project, in about 40 years, it would be possible to replace it with a desalination plant which should be considerably cheaper by that time. This project might be able to supply some 100 MCM/Yr.

2. LITANI RIVER-GALILEE-WEST BANK-JORDAN: Along the lines of Kally's (1990) ideas it is proposed that a project be developed to supply water from the Litani River in Lebanon to Israel, the West Bank and possibly to Jordan, on a commercial basis, with Lebanon receiving fair compensation for the sale of the water. Lebanon also has a significant water surplus in the South. The Litani river flow is utilized mainly for power production and is only partially used for irrigation at this time and is wasted to the sea, through a diversion to the Awali River. Here too at the end of the 40 year investment life of the project it could be replaced by desalinization. This project might be able to supply some 100 MCM/Yr or more if the water diverted to the Awali River is tapped.

3. TURKEY-SYRIA-JORDAN-WEST BANK: A pipeline from Turkey through Syria and Jordan to Amman and to the Palestinian communities in the West Bank. This concept has been described as the Turkish Mini-Peace Pipeline (Kollars, 1990). The Sea of Galilee and/or the Unity Dam could also be used as reservoirs for supplying water to Jordan and the Palestinians.

Another possible layout for the line which would have the advantage of fewer crossings of international borders, as proposed by Mr. Edmond de Rothchild (personal communication) would be an under-sea line from Turkey to Cyprus supplying water on the way to both North and South Cyprus which suffer from serious water shortages. The line would continue on to the coast of Israel where water would be supplied both to Israel and the West Bank.

Turkey has significant water reserves at this time, of some 180.000 MCM per year, only about 15% of which is currently utilized. Within the next 50 years and with optimum economic and agricultural development more than 30% of the country's water reserves will remain untapped, so that the Mini-Peace Pipeline would not deprive Turkey of needed water resources in the foreseeable future.

The Mini-Peace Pipeline differs from the original grand Peace Pipeline proposed by Turkish President Ozal which would have extended some one thousand five hundred kilometers through Iraq to Kuwait and western Saudi Arabia with a second parallel pipeline through Damascus and Amman to Mecca in the East, at a cost of some 20 billion dollars (Kolars, 1986; Gould, 1988). The Mini-Peace Pipeline could be of a smaller diameter and would be only about 600 km long, costing roughly 2-3 billion dollars. It would bring immediate and important benefits to water short areas of Syria and Jordan and most important it could help solve the potential water shortages of the West Bank areas. The original plan for the Eastern section of the Turkish pipeline envisioned a flow of some 3.5 MCM/day which could annually supply about 1,200 MCM/Yr (Gould, 1988). Even only half of that flow or 600 MCM/Yr, could meet most of the needs of area.

Even if it is feasible from an engineering and economic point of view there remains the question of whether such a complicated multi-national project can be achieved in the tension laden Middle East between long term rivals with little faith in each other. The Edmond de Rothchild version of the plan overcomes some, but not all, of the problems by reducing the number of countries through which the pipeline must pass. However there is no certainty that the concept is technically or economically feasible.

The supply of Turkish water to Israel through such a system is improbable both because of difficulties in obtaining agreement of all the countries involved and no less because of Israel's serious concern with being dependent on water sources which can be cut off at any time by potentially hostile neighbors. However even if the Turkish project supplies the additional water needs of Syria, Jordan and the Palestinians only, it can make a major contribution to alleviating the water problems of the area.

4. SEAWATER DESALINATION- The desalination option envisages the development of major multinational seawater desalination plants at an appropriate site on the coastline between Israel and Gaza and on the border between Israel and Jordan at Aqaba and Elat and possibly at other sites. The Gaza plant could supply significant amounts of desalinated water to Israel, Gaza and the West Bank area and could provide an alternative solution if the above pipeline projects prove to be too complex or as an additional water source at some future time when desalination becomes more economical.

Here too, since the desalination plant must operate at full capacity twelve months a year it will be essential to provide a system of flow regulation and storage. Recharge of the mountain aquifer during the winter months with an agreed upon schedule of withdrawal by Israel and the Palestinians during the summer irrigation period should be evaluated as a possible solution to allay concerns of domination and control and to provide a method of direct access to additional water sources for the Palestinians. The Aqaba-Elat plant could alleviate the serious water shortages in both Israel and Jordan's southern vital resort and ocean port areas. Additional possible sites for joint desalination plants have been discussed publicly with the Minister of Agriculture in Israel.

Based on current estimated costs of desalination of about \$1.00 per cubic meter (\$4.00 per thousand gallons) such an expensive source of water would not be economically viable for most normal agricultural purposes. Some, more optimistic engineers are prepared to predict that desalination costs will go down to 80 cents per cubic meter in new plants currently on the drawing boards. There are, however, no indications that desalination will become dramatically less expensive in the near future, although in time some further reductions of cost can be expected. Reports indicate that modern "high-tech" agriculture such as growing tomatoes in special hot houses can produce yields of some 300 tons per ha/year producing an income of \$100,000 per ha. This is more than adequate income to pay the full cost of desalinated water. However, such projects are still in the experimental stages.

The three pipeline projects, mentioned above, have been estimated roughly at one quarter to two thirds the cost per cubic meter of desalination. These estimates may be too optimistic. It should be pointed out that there are decided economic and engineering advantages to piping in water even with long pipelines. While initial capital costs may be high, operating costs are low and dependent only to a limited degree on energy costs. A major portion of the cost of desalination of seawater is fuel for energy. Energy costs are bound to increase substantially over the next thirty years as fuel supplies

get more scarce. This will make desalination more, rather than less expensive, in the future based on the less efficient plants built with today's technology. Postponing desalination plants for 30-40 years at which time much more efficient processes will be available, can be very advantageous. This can be achieved by building pipeline projects now which will eventually be abandoned at the end of their normal investment life in some 40 years.

Nevertheless desalination, while expensive, might well be the most attractive solution politically, particularly for Israel and Jordan, since it would not involve water supply sources from across international borders and long exposed pipelines from potentially hostile countries. It also may be the simplest, since it would require the least degree of multi-national agreement. The additional cost, provided as a grant, may be justified as part of the international contribution to peace in the Middle East since it may be the only solution offering an assured source of additional water for Israel, Jordan and the Palestinians that will not require third party agreement.

AN AGREEMENT ON WATER DISTRIBUTION AND JOINT CONTROL:
AN ESSENTIAL ELEMENT OF A PEACE TREATY IN THE MIDDLE EAST

In the peace negotiation process on the question of the shared water resources in the Middle East the partners to the dispute will have to give serious consideration to ways of applying the principles of the Helsinki Rule including an agreed upon formula for equitable apportionment and eventual joint monitoring, inspection and control on both sides of the border. This is essential to assure all partners that the water allocations, from surface and ground water sources, agreed upon are being abided by. There must also be arrangements for the joint management and operation of water import facilities and joint desalination plants. No less important is to assure that there is proper control of potential and actual sources of environmental pollution which might threaten the quality of the shared water resources. This will require a recognition of the reality that the use and management of a shared resource such as water for mutual benefit, means that both sides must accept a certain degree of limitation on their territorial sovereignty.

Accepting a degree of limitation on territorial sovereignty may well be a hard pill to swallow for the parties to the dispute in the Middle East, but it is not hard to find examples where powerful sovereign nations have accepted that principle in treaties, in order to end conflicts and protect their mutual interests in shared water resources. An outstanding example of international cooperation is the joint management of the Rhine River which started in 1815

and today has evolved into the ten-nation International Rhine Commission (IRC) which regulates and controls chemical, microbial and thermal pollution, fishing, flood control, navigation and water use. The IRC carries out joint monitoring, inspection, control and research on all aspects of the river's management (Van der Kleij et al, 1991). Another example of such an agreement is the International Joint Commission established by the United States and Canada for the control and management of the shared Great Lakes and St. Lawrence River Seaway project. Both countries have agreed to a limitation of their territorial sovereignty in order to achieve shared goals of orderly management and pollution control of shared international bodies of water.

An essential element of the agreement is that the riparian rights of the Palestinians, Jordan and Israel to a fair portion of the shared Jordan/Yarmuk River waters and the mountain aquifer be recognized and regularized. Another important section of the treaty should be an agreed upon procedure for resolving differences that may arise out of the agreement, by negotiations, mediation and finally by binding arbitration or adjudication before the World Court.

ISRAEL-ARAB COOPERATION ON WATER: UTOPIAN DREAM OR HARSH NECESSITY

The ideas presented in this article on possible ways of increasing the water resources of Israel and her Arab neighbours through cooperation in a regional Water-for-Peace plan may appear complex, in addition to being costly. However, they just may succeed since the partners to the dispute have few if any realistic alternatives to solving their critical water shortages. Going to war over water will solve little, since the reserves of all the disputants combined are sorely inadequate.

Encouragement may be obtained by the examination of another water conflict between India and Pakistan on the division of the rights to the Indus River which appeared equally intractable. Those two hostile and culturally alien nations finally reached an agreement after years of negotiations. The obstacles to agreement were overcome with the extensive financial support provided by the World Bank to develop water projects of both sides.

Closer to the Middle East another illustration of just such possible cooperation is the case of the proposed Syrian/Jordan Unity Dam project at Mukheiba on the Yarmuk River, which would bring important hydroelectric power to Syria and vital additional water supplies to Jordan. Israel has effectively opposed this project since it would affect its current water usage negatively. While the Arab States have publicly opposed any accommodation with Israel on

the division of the Jordan and Yarmuk water rights, according to new sources (Kreshner, 1990) the Jordanians, and thus indirectly the Syrians as well, have been secretly negotiating with Israel through the good offices of the United States and are close to finalizing an agreement under which Israel's share of the Yarmuk will be recognized in return for withdrawing its opposition to the construction of the dam. The promise of generous financial assistance for water project development on both sides, has helped smooth the way in these American mediated negotiations as well. This illustrates once again that when there is real mutual benefit for both sides, even the most hostile partners may be able to reach an accommodation.

While providing a solution to the water conflicts in the Arab-Israel dispute is not a sufficient condition for peace it is undoubtedly a necessary condition. The United States and the other major powers should help to broker the peace process in the Middle East by sponsoring a Water-for-Peace Plan with an assured major infusion of funds for the benefit of all the partners. Just because the situation is so desperate, the partners to the dispute may finally realize that only by joining hands in a cooperative effort can they survive.

A bold and generous Water-For-Peace Plan can not only remove an important obstacle to peace but can provide a real motivation for peace which will enable the partners to the dispute to solve urgent problems for the security, well being and economic benefit of all.

Figure 1
Water Stress in the Middle East
1991

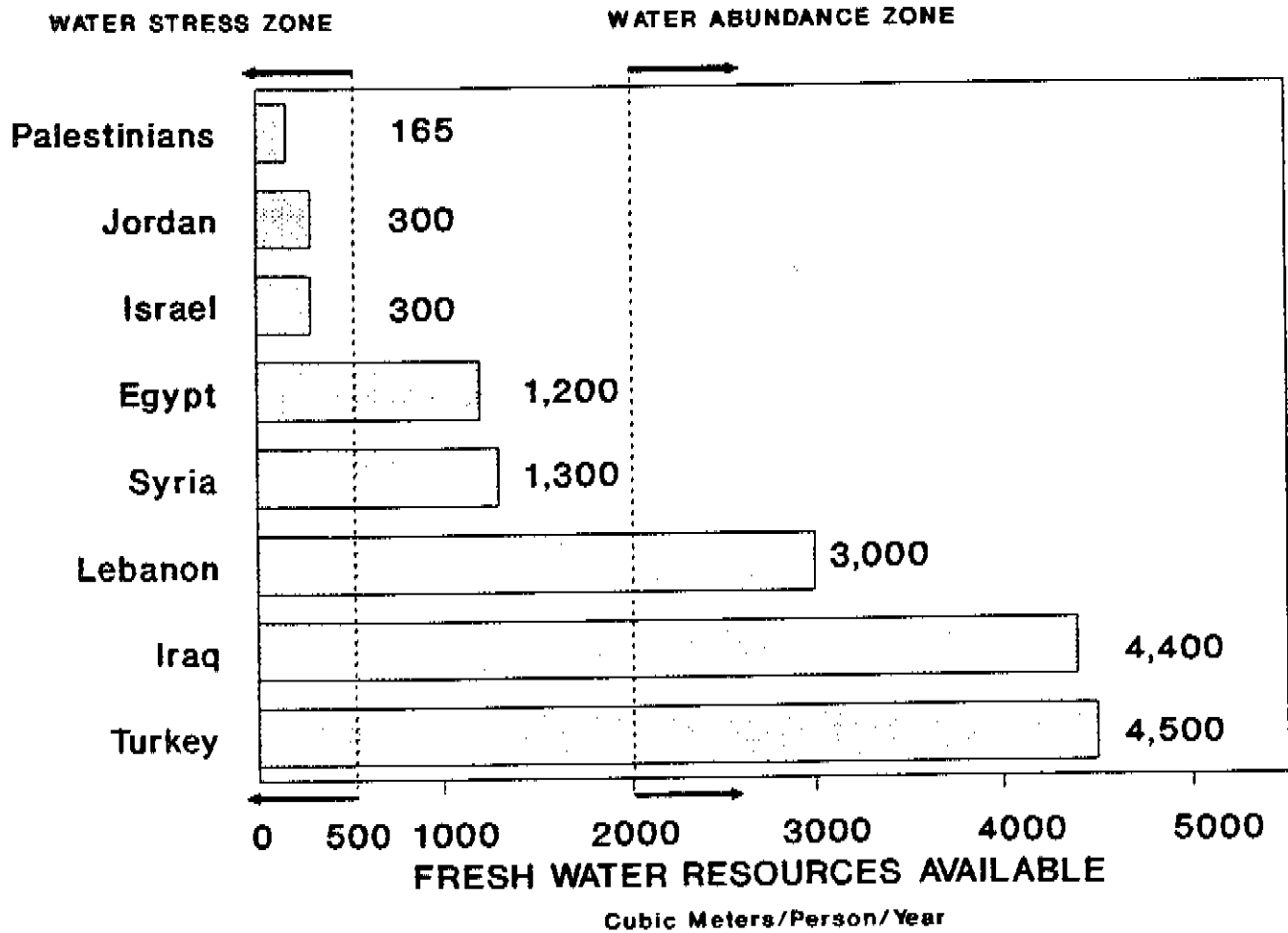
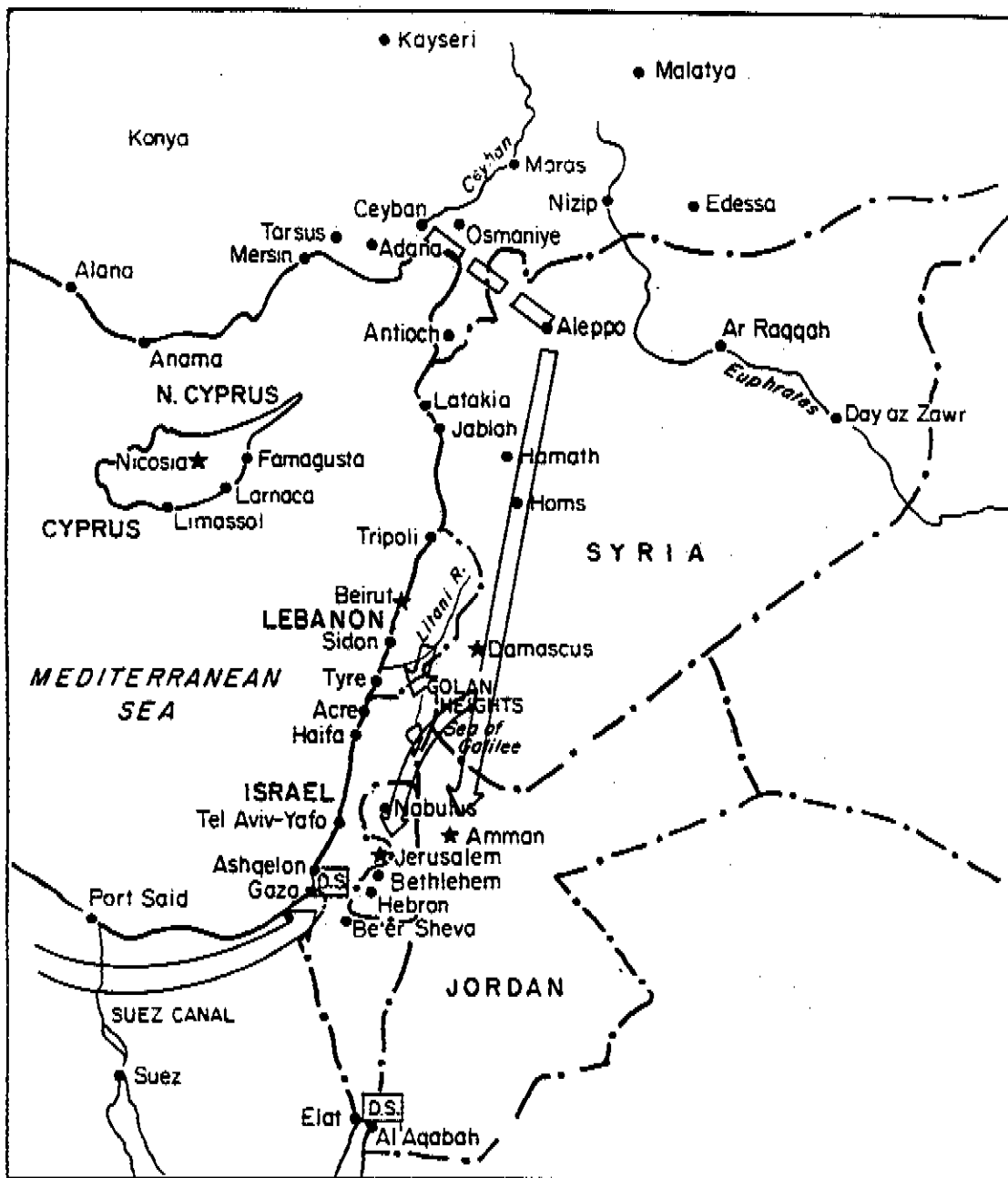


Figure 1. Water Stress in the Middle East- 1991
Total long term water resources available for all purposes including agriculture, industry and domestic in various countries in the Middle East-in thousands of cubic meters per person per year. Countries having less than 500 cubic meters per person per year are considered to be in the Water Stress Zone. Above 2,000 cubic meters/person/year is considered the Water Abundance Zone.

Figure 2
Proposed alternative or complementary projects



Projects for bringing in additional water supplies to meet the urgent needs of Jordan, Israel and the Palestinians as part of a multi-billion dollar Water-for-Peace Plan. The following pipelines are proposed: Nile River to Gaza Strip and the Negev; Litani River in Lebanon to West Bank and Israel; Turkey to Syria, Jordan, Israel and the West Bank. A possible alternative route for the Turkish pipeline would be undersea to Cyprus, Israel, Gaza and the West Bank, avoiding the need to cross international borders (not shown). Major seawater desalination plants (DS) could be built on the Mediterranean coast between Israel and Gaza and on the Israel-Jordan border between Aqaba and Elat.

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