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# EUROPEANS AND ARABS IN A DIALOGUE

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WATER AND ENVIRONMENT:  
PERSPECTIVES ON COOPERATION  
BETWEEN EUROPE AND THE ARAB WORLD

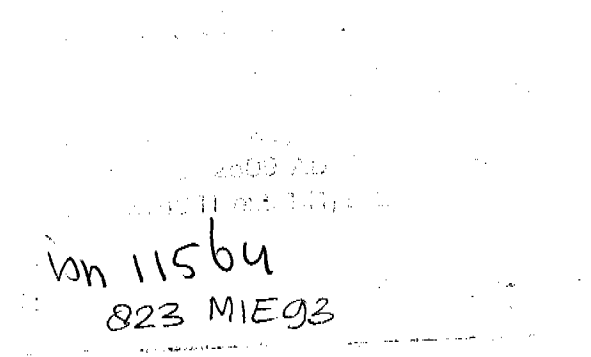
مؤسسة  
لطفية ربابي

THE LUTFIA RABBANI FOUNDATION

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THE LUTFIA RABBANI FOUNDATION  
THE HAGUE 1993

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## ***THE LUTFIA RABBANI FOUNDATION***

The Euro-Arab Dialogue Forum is organised by the Lutfia Rabbani Foundation which was established on January 30, 1979 in The Hague, The Netherlands. Its name honours the late Mrs. Lutfia Rabbani, the mother of the founder, Mr. Mahmoud S. Rabbani. It is his way of showing gratitude for the great sacrifices with which, widowed at an early age and expelled from her homeland, Palestine, she brought up her four children.

The objective of the Foundation is to promote mutual understanding between Europe - especially The Netherlands and Flanders - and the Arab world through cultural and academic exchange. In this spirit, the Foundation provides a number of scholarships to Arab students to pursue their education in Europe, and to European youth to study in an Arab country. During their study periods in each others' countries, students are in a position to gain first-hand knowledge of cultural, social, political, religious and economic issues.

The Lutfia Rabbani Foundation has organised five Euro-Arab Dialogue Forums in which prominent speakers have expressed their views on various aspects of Euro-Arab relations. Previous topics include 'The Mediterranean: A Challenge for Euro-Arab Cooperation', 'Information and Misinformation in Euro-Arab Relations', 'Who is Speaking to Whom in the Euro-Arab Dialogue', 'Motives, Issues and Obstacles in a Dialogue', and finally this year's topic, 'Water and Environment: Perspectives on Cooperation between Europe and the Arab World'.

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## CONTENTS

Chairman's Introduction: Mr. Mahmoud S. Rabbani	7
Opening Statement: Dr. Esmat Abdel-Meguid, Secretary General of the League of Arab States represented by Dr. Adnan Omran, Assistant Secretary General for International Political Affairs of the League of Arab States	11
Keynote address: H.R.H. Crown Prince El-Hassan Bin Talal, of Jordan, represented by Mr. Samir Kawar, the Minister of Water and Irrigation of Jordan	13
Presentation to the theme by Mr. L.J. Brinkhorst, Director General of the Commission of European Communities for Environment, Nuclear Safety and Civil Protection <i>European Community Water Policy for the Mediterranean Area</i>	17
Presentation to the theme by Dr. Atef Obeid, The Minister of Cabinet Affairs of Egypt represented by Dr. Mahmoud Abu-Zeid, Senior Under-Secretary of State and Chairman of the Water Resource Centre of the Ministry of Public Works and Water Resources <i>Water: Challenge and Prospects</i>	25
Introductory Statement to the Panel: Drs. N. Kroes, President of Nijenrode University and former Minister of Transport and Public Works of The Netherlands <i>The Dutch Perspective of Euro-Arab Cooperation in Water Management</i>	37
Prof. J. A. Allan, School of Oriental and African Studies, University of London	41
Dr. Jad Isaac, Director of The Applied Research Institute, Jerusalem	57
Dr. Ir. P.J. Huiswaard, Partner/Director BKH Consulting Engineers	67
Dr. Anis Mouasher, Chairman of The Mouasher Cousins Company and former Minister of Finance of Jordan	69
Mr. Salih Osman, Assistant Executive Director, Policy Development and Inter-Agency Affairs of the UN Environmental Programme, the UNEP	71
Closing Statement: Prof. Dr. U. Vermeulen, Catholic University of Leuven and University of Ghent, Belgium	75
List of Contributors	77



*The Chairman of the Lutfia Rabbani Foundation, Mr. M.S. Rabbani, opens the fifth Euro-Arab Dialogue Forum*

## CHAIRMAN'S INTRODUCTION

**MR. MAHMOUD S. RABBANI**

On behalf of the Board of Trustees and Board of Advisors of the Lutfia Rabbani Foundation, it is a privilege and an honour for me to welcome you to the Lutfia Rabbani Foundation's fifth Euro-Arab Dialogue Forum, on the theme 'Water and Environment, Perspectives on Cooperation between Europe and the Arab World'. I address a special word of welcome to today's speakers whose expert contributions will form today's programme.

The Lutfia Rabbani Foundation seeks to promote cultural exchange, between Europe, the Netherlands in particular, and the Arab world, and to promote mutual understanding through study and dialogue. In this spirit, the Foundation provides scholarships to selected Arab students to pursue their education in Europe, and to European youth to study in an Arab country. The scope of the Foundation however, is much wider. Since the organisation of our first Euro-Arab Dialogue Lecture in 1985, we have continued to strive to provide a forum for cultural exchange in the broadest sense. In our present times, peoples and cultures have become more interdependent. Modern methods of communication and transportation make distant parts of the world seem closer every day. This requires a true understanding and appreciation of other people's views, backgrounds and motivations. A means to achieve this understanding, and to continually evaluate the relationship, is through dialogue.

Formal and informal contacts between Europe and the Arab world, in a dynamic exchange, can pave the way for fruitful mutual consultation and cooperation, now and in the future. This is what the Euro-Arab Dialogue was designed to do when called into being by the EC and the Arab League in 1973. Prior to hosting the first Forum, euro-arab dialogue was, to say the least, languishing. We observed, to our great satisfaction, that President Mitterand convened a Euro-Arab Summit in 1989 following the Euro-Arab Dialogue Forum held earlier that year which was opened by our distinguished Minister of Foreign Affairs, Mr. Hans van den Broek. This led us to the assumption that we had found a worthy successor and the decision was made to leave it where we thought it was best suited. However, after the Gulf war, we felt that a continuing dialogue between Europe and the Arab world could be served by an informal initiative. In the hopeful perspectives of the new world order, and the Peace Conference on the Middle East, as well as the emergence of a United Europe, the chance for rapprochement should not be missed; hence today's Forum.



I firmly believe that only through full involvement in the mediation process in the Middle East, can Europe regain its influential position. The Arab people are exposed to the international media and are aware of the shift towards democracy taking place in many regions of the world. We hope that the West can play a major role by carefully encouraging and supporting democratic initiatives that arise in the Middle East. These initiatives will allow for constructive cooperation between Europe and the Arab world. The Euro-Arab Dialogue, then, should address all pending issues in international relations, whether cultural, economic, technical or political. The motivation should be a genuine wish to proceed towards global peace and welfare. Let us learn a lesson from the latest devastating war in the Middle East. Prior to the Gulf Crisis, it was feared that Iraq could have nuclear, chemical or biological weapons at its disposal. Other states, which until recently did not have weapons of mass destruction, may have decided to arm themselves as a means of protection against their stronger adversaries.

The need for individual states to arm themselves with weapons of mass destruction will be unnecessary if the superpowers, and in particular, NATO, guarantee the safety of these states against attack by any state in possession of nuclear arms. In return, such states would be bound to a rigorously enforced non-proliferation treaty. Such protection would never be subject to a "yes, but...". It would have to be an irrevocable and a confirmed guarantee that any party within this nuclear-free zone would be actively defended from aggression by any number of nuclear powers, irrespective of circumstances and regardless of other strategic considerations. I invite NATO to take the initiative, under United Nations auspices, and declare its readiness to extend its nuclear umbrella to any country in the region which is willing to forswear the acquisition of weapons of mass destruction. This would restrict the potential for military aggression in the region, lead to effective disarmament and, most importantly, serve the noble causes of world peace and the environment.

Herewith we arrive at the theme of this fifth Euro-Arab Dialogue Forum. What could be more closely related to our common future, the future of our children and grand children, than water and the environment? It is only recently that the issues of water and the environment have come to public attention as matters of priority for mutual consultation and common initiatives between Europe and the Arab world. The European Commission has for some time been active in dealing with water pollution and other environmental questions in the Mediterranean region. Both the EC and the

Arab League have played active roles in the recent conference on 'Euro-Mediterranean Cooperation on Environment in the Mediterranean Basin', which was held in Cairo in April, 1992. Other important developments in this context are the current Middle East peace negotiations which began in Madrid and included a multilateral component on water and the environment, held in The Hague this October, and of course the recent conference on Environment and Development held in Rio de Janeiro.

The fifth Euro-Arab Dialogue Forum must be considered an auspicious occasion to both evaluate these developments and suggest additional modalities for Euro-Arab cooperation. Today, we do not intend to focus on the political and economic controversies surrounding the use of water, nor will we go into accusations about environmental pollution. Rather, we stress the need for greater effort to formulate a common approach towards these problems. We wish to offer a forum to discuss issues concerning water and environment which are relevant to the relationship between Europe and the Arab world, and to thereby expand the possibilities to transmit knowledge and experience, to find fruitful modes of cooperation, and to come to lasting solutions, acceptable to all parties. Europe and the Arab world are neighbours with a longstanding history of close contact. Although it may appear at times to be the opposite, these contacts have been enriching and mutually beneficial. Before giving the floor to our first speaker, may I take this opportunity to thank our sponsors for their commitment and generosity to this Forum.



*From left to right:*

*Mr. M. H. J. C. Rutten, member of the Board of the Lutfia Rabbani Foundation; Dr. Mahmoud Abu-Zeid, Senior Under-Secretary of State and Chairman of the Water Resource Centre of the Ministry of Public Works and Water Resources; Mr. Mahmoud S. Rabbani, Chairman of the Lutfia Rabbani Foundation; Mr. Samir Kawar, the Minister of Water and Irrigation of Jordan; Dr. Adnan Omran, Assistant Secretary General for International Political Affairs of the League of Arab States; Mr. W. Ch. J. M. van Lanschot, RMWO, Vice Chairman of the Lutfia Rabbani Foundation*

## OPENING STATEMENT

***DR. ESMAT ABDEL-MEGUID, Secretary General of the League of Arab States represented by DR. ADNAN OMRAN, Assistant Secretary General for International Political Affairs of the League of Arab States***

In an area such as the Middle East, already deeply troubled by a host of political, economic and social problems, the threat of water shortage has become an issue of physical survival. In the Arab countries, the use of water per capita is estimated at 1744 cubic meters per annum while the international rate is 12900 cubic meters. The preservation of water resources is also a major component in the overall effort towards the conservation of the environment.

Several countries in the region risk depleting the water resources available to them. At the same time, a large financial investment is required to enlarge the capacity of this resource. The problem is complex especially when taking into account that many countries share the same river or underground water resources. Should a country elect to increase their water quota, it would be at the expense of another.

Studies conducted to date indicate that the region faces a severe water shortage before the turn of the century. This conclusion requires a plan to identify water distribution priorities, determine the extent of self-sufficiency, pursue the exploration of fresh resources, and enhance the existing resources. The plan should observe three factors, namely, the integration between surface and underground resources, the rationalisation of the use of the totality of resources and the reduction of the rate of waste. In this manner, existing resources can be protected and utilised effectively.

In response to the potential environmental risks, the Arab States established the Council of Ministers in Charge of Environmental Affairs. In 1986, the Council issued the Arab Declaration on Environment and Development which was followed by the first Arab Ministerial Conference on Environment and Development which convened in Cairo in 1991. The document, 'Arab Declaration on Environment, Development and Future Prospects' was introduced in Cairo to protect and preserve the marine environment in the Gulf, the Red Sea, the Gulf of Aden, the Mediterranean and the Atlantic. The document was considered a comprehensive framework for the regional protection of marine environment. It was also significant that a number of Arab States were included in such international conventions as the Vienna

Convention, the Montreal Protocol on the Ozone Layer, as well as the Basel Convention on the control of Trans Boundary Movement of Hazardous Wastes, and further regional conventions related to the environment. Euro-Arab cooperation is fundamental to resolving water resource and environmental problems.

Early efforts to build and secure Euro-Arab relations were developed in order to cope with change and development. Today, Euro-Arab relations remain essential. Cooperation in a climate of peace and stability is integral to the success of Euro-Arab relations. In this spirit, a resolution of the Arab League Council was passed in September 1991, stating that peace in the Middle East is the main objective of the Arab countries; a peace which should be lasting, just and comprehensive.

Our concern and interest in a European role emanates from a feeling of respect and admiration for Europe and its peoples, and our faith in the principles and values which have been championed throughout its history. Our interest in a European role is also based on our conviction that European culture is objective. For these reasons, we attach great importance to a European role.

With all due respect, it was disappointing to learn that the leadership that Europe had so long enjoyed, was sinking into semi-stagnation. It appears that the European role has been transformed from that of leading actor to supporting player. Short term considerations should not blind Europeans to the long term issues at stake. Strategic, economic and security interests should not be abandoned in the Middle East which is poised on the edge of conflict. It is hoped that Europe will once again look towards investing in future development across the Mediterranean basin.

Against this backdrop, environment and water resource issues in the Middle East, and elsewhere, should be given full priority as they affect the fate of our planet. They are issues directly related to life and security for every community. We truly are an 'international community' when it comes to the environment as we each enjoy and suffer depending on the behaviour and actions of those around us. In this sense, every individual and community is responsible for the environment and security of water.

We hope to see these important issues placed on the agenda of Euro-Arab Cooperation and look forward to your input and the substance of your deliberations.

## KEYNOTE ADDRESS

***H.R.H. CROWN PRINCE EL-HASSAN BIN TALAL OF JORDAN, represented by MR. SAMIR KAWAR, the Minister of Water and Irrigation of Jordan***

Before turning to our main theme, I would like to take this opportunity to consider the value of inter and intra regional dialogue for the Middle East. In the region, dialogue is increasingly recognised as the best way to explore areas of potential cooperation and to advance the cause of peace. It is our hope that the ongoing dialogue, as represented by the Middle East Peace Process, will lay the foundation for an equitable and sustainable resolution to the Arab-Israeli conflict and its core issue, the Palestinian question. In addition, the peace process can only benefit from discourse which encompasses the experience of other regions. The challenges to the Middle East are comparable to those faced by any region with experience of long term conflict including arms control, limited resources and refugees among others. The European-Arab dialogue, promoted by the Lutfia Rabbani Foundation, carries a special significance, for we in the Middle East look to Europe as an inspiring example. It is a region with a history no less bloody than our own however, one that has learned to live with its differences, and as a result progress. Despite the resurgent challenge of ethnic nationalism and the controversy over closer union, we believe that the European model provides valuable insights into regional cooperation. It is not however, a model that should be adopted without adaptation to regional needs. The 1990 Palma de Mallorca Report on the meeting of the conference on security and cooperation in Europe (CSCE) was very encouraging. All parties to the CSCE affirmed the relevance of the CSCE process within the Mediterranean region. The path of European peace and cooperation, particularly the final Helsinki Act of 1975 and its declaration of principles, provided the basis for a process in which crucial issues of security in the broadest sense can be discussed neutrally, a structure which the Middle East needs if it is to move forward.

It is our hope that the Middle East, through dialogue with Europe, can tap the experience of a region that has learned that peace is greater than war, that cooperation is greater than conflict, and that the needs of people outweigh the exigencies of power politics. As the Middle East peace process enters its second year, the very fact of its ongoing existence provides grounds for hope, as does the continued support and input of parties from other regions,

including Europe. This forum offers a welcome and timely opportunity to focus upon the complementary dialogues on water and environment, coming as it does after the conclusion of the third round of multilateral peace talks. The insights gained at this forum will prove valuable to the working groups on both issues as they prepare for the fourth round, due to convene early next year.

The Arab people have long understood the relevance of water and the environment in relation to the rise and fall of societies. From its earliest dawn, human civilisation has tended to be riparian in character. From the Tigris and Euphrates to the Jordan, the Nile Valleys to the banks of the Indus, irrigated agriculture unquestionably formed the cornerstone of early cultures. Conversely, the downfall of the Assyrians and Babylonians followed the environmental degradation of irrigated lands in Mesopotamia. Where the role of Baghdad in the rise of Islamic civilisation was founded upon the rehabilitation of agricultural lands and the associated irrigation networks, the cut-off of the water supply of Petra, ancient capital of the Nabateans, necessitated its surrender to the besieging Roman forces.

The keen Arab awareness of the critical role of hydrological and environmental issues is in part due to the fact that the Arab people inhabit the lion's share of the world's deserts and semi-arid regions. The environmental web is fragile under such conditions, and livelihood and progress have always been tenuous at best without adequate water resources.

In recent times, the population dependent upon our finite fresh water resources has increased steadily, and is not expected to curtail its growth in the foreseeable future. The land and water resources of Jordan, for example, are capable of sustaining about one and a half million people. Today they have, largely due to forced migration within the region, almost four million dependents. This has exacerbated the environmental hazards associated with such imbalance. Modern technology has facilitated the use of water, has forged new patterns of water demand which subsequently has led to new forms of environmental threat. Given the water scarcity of the region and the environmental impact of a wide range of activities, from agriculture to industry and urbanisation, and from tourism to transport, water scarcity has increased almost exponentially as human activities have intensified. Suffice it to note that the average per capita share of renewable fresh water does not exceed 200 cubic meters in Jordan, compared to 110,000 cubic meters enjoyed in Canada. The impact of the same level of pollutants on water resources is clearly not the same for both countries. This has serious

implications for the environment and resources allocation policies.

A new course of action is needed. Today's population levels have led to unprecedented strains on natural resources. The synergy between people, water, energy and the environment is clearer than ever, and demands that the issues be approached in a manner that recognises their interconnection. It is not possible to discuss water, for example, without also addressing demography. Any solution to the problem of resources which does not utilise this approach in a trans-national context will be incomplete.

The population water resources equation, with the surpluses or deficits therein, assumes the sustainability of available resources, setting supply on one side, and demand on the other. The equation is therefore sensitive both to losses in water resources caused by environmental degradation on the one hand, and to the changes in demand levels that accompany population increases, improved living standards, expanded socio-economic activity and increased pollution on the other.

Today, the population resources equation of the majority of Arab countries is characterised by large deficits. These cannot be controlled without environmental protection, demand control and the enhancement of water supplies. Of course, attention to the demographic aspect is vital to a comprehensive approach to each of these requirements, for the impact of human migration on the finite water resources of asylum states is perhaps clearer in our region than anywhere else. The waves of Palestinian mass migration, and those of Jewish immigration, have doubled the stress on the water resources and agricultural resources base of the region.

Public awareness campaigns have been mounted and sustained, some more effectively than others. They have focused on the rationalisation of water use and the hazards of re-using treated waste water, and have pointed to the energy cost in the overall cost of water supply. They have further initiated specifications for waste water treatment and re-use, and for the treatment of industrial wastes before disposal into the waste water collection networks.

Rational as these measures are, the challenge of meeting the deficit in water supply and implementing environmental and public health protection measures, has imposed costs beyond a level affordable to middle-income people. Tariff structures have been devised for cross subsidies, with the imbalance being met by the government; a prescription for water market distortion that should not be allowed to continue. A vigorous regional economic development effort is clearly required to enhance water supply and to curb government subsidies. This must in turn attract international support,



to make the high marginal cost of water supply and waste water treatment affordable. We hope that this proposal will be seriously examined and pursued by the respective working groups in the multilateral component of the peace process. The accumulated legacy of years of water stress must also be addressed. Many Arab countries have attempted to increase their water supply to meet current needs by pumping from groundwater aquifers beyond the level of sustainability. Others have diverted irrigation water to municipal use. Some countries have resorted to both tactics. Only time, expertise and investment can mitigate the resulting adverse consequences for the environment in general and for long term sustainable water resources in particular.

A collective effort must also devise means to control the deficits in the population water resources equation. Demand control, and the enhancement and efficient management of water supplies, are among the suggested strategies to this end. Above all, the preservation of water quality against environmental hazards and degradation must be kept in mind. It is perhaps surprising that the decades of conflict in the region, and the competing demands for water resources have not caused more damage to riparians on the international rivers than has been the case. The unilateral actions of some riparians have worked to the detriment of others, both in terms of equitable sharing and excessive environmental damage. Credit must go to those riparians who have played a pacifying role; opting to endure such damage rather than risk plunging the region into the horrors of a hydraulic war. The prospect of such a war has prompted suggestions for a regional water charter and an environmental charter for the Middle East. Such charters should clearly outline the responsibilities of the parties, their environmental protection, and regional structures within which these matters can be addressed. Neither the flow of water nor the hazards to the environment respect political boundaries. They are by their very nature trans-national and interconnected, as must any approach to the resolution of the issues of water and the environment be in the Middle East.

We take heart from the fact that cooperation on water use and protection in Europe has been successfully consolidated. The cooperation that exists between the nations on the Rhine Basin, on the Danube, and so on, is a living example of the potential of peace and the utility of dialogue. Dialogue with Europe is therefore extremely welcome, and we hope that it will help to promote cooperation between the neighbours of the Mediterranean.

## EUROPEAN COMMUNITY WATER POLICY FOR THE MEDITERRANEAN AREA

***MR. L.J. BRINKHORST, Director General of the Commission of European Communities for Environment, Nuclear Safety and Civil Protection***

The Mediterranean region is traditionally one where economic, political and cultural links are close. This is not only a result of proximity, but also to ensure that the different societies can serve the needs of the populations. The Mediterranean societies are thus also interlinked by necessity.

The special climatic characteristics of the region pose a number of advantages and disadvantages. One of the most basic problems is the ongoing availability of sufficient amounts of good quality water to serve the social and economic needs and, in periods of water scarcity, to ensure that demand is balanced to meet the available supply. The arid or semi-arid character of the Mediterranean climate makes this problem an acute challenge, especially throughout the long, dry summer. The problem is much more severe in the southern part of the Mediterranean basin than to the north. However, several regions in the northern part of the basin are moving towards a situation where water scarcity is becoming the determining factor. For the European Community this is increasingly becoming the case, especially in parts of Spain, Italy, and Greece, where water in some cases is becoming a cause of conflict.

The solution to the water problem is a question of sustainability and of promoting a course of development which is compatible with the natural conditions in the region, especially with the availability of quality water which is suitable for meeting the basic needs for water; drinking water, water for industrial use and water for agricultural production. These are all legitimate uses for any society aspiring to improve the prosperity of its population. In the European Communities, we have begun to grasp this problem and have started to take action to ensure that this aim will be achieved. Earlier this year, the Commission of the European Communities adopted its fifth environmental action programme since 1972, entitled 'Towards Sustainability'. This programme is very different from its predecessors in that it poses the question of how to promote an economic and social development policy in the Community which is compatible and in harmony with the natural conditions in which we live. Availability is becoming a problem throughout the Community not only in the dry

Mediterranean region. In the north, industrial and agricultural activity are threatening to pollute both ground and surface waters to an extent that it is increasingly difficult to find water resources suitable to meet existing and future needs. In some cases, these problems may occur less in the southern part of the Community, but this is off-set by the dryness of the climate. Water has been singled out in the action programme as one of five top priority policies. The role of the European Communities is to mount a massive effort to ensure the preservation of quality water resources and their improvement where quality has deteriorated or threatens to deteriorate.

In the past, a number of initiatives have been taken in order to achieve these aims whether by determining standards of environmental water quality or by limiting discharges of pollutants to the environment. In 1976, the Council of the European Communities adopted a Directive on discharges of dangerous substances which provides for a drastic reduction of discharges of certain substances which are deleterious to the environment and to human health. More recently, Directives have been adopted regulating two major sources of water pollution in the Community. These concern the treatment of urban waste water and the pollution of ground and surface waters by nitrates from agriculture. These Directives are to be implemented by the turn of the century and are expected to bring considerable improvement to environmental water quality by imposing secondary treatment of urban waste water all over the Community. In addition, codes of good agricultural practices will be introduced.

Existing legislation does not address the problems related to water scarcity relative to demand; that is to sustainable management of water use and availability. The efficacy of existing legislation has been impeded by the fact that only traditional legal instruments have been used to ensure the realisation of water policies. Experience proves that for several reasons, these measures have not been sufficient to protect the environment. Though the legislation on urban waste water and nitrates from agriculture has not yet been implemented, it is now clear that supplementary measures are required. This is partly due to the fact that the waters and discharges required to maintain water quality are not covered by the existing Directives.

The Fifth Action Programme recognises that a number of supplementary actions are required. The premise is to introduce an integrated management of water resources and to ensure the availability of water through an efficient protection of all resources. This will be furthered by the use of a broad range of instruments, including economic ones to achieve policy objectives.

With respect to the management of water resources, the Commission intends to submit proposals to the Council of Ministers on a regular basis. The objectives will be manifold: to evaluate water resources available, to economise water use, to promote good management practices for existing water uses, to ensure long-term planning of the use of the resource and finally, to ensure that well-founded decisions will be taken when necessary with respect to water use priorities. The adoption of new instruments does not mean that traditional legal regulations will be abandoned, however, reliance on them will be restricted to areas where they serve their purpose most efficiently. Other areas will be approached by more appropriate means through information, awareness raising and economic instruments. The pricing of water will be addressed firsthand as it must correspond to its production price plus the cost of treating and discharging it after use. This in itself would, in many areas, lead to substantial increases with the result that people would be encouraged to save water. It is however, open to debate whether these measures will be sufficient to ensure that all legitimate claims for water can be honoured. Therefore, it remains to be investigated whether supplementary economic instruments will be necessary to promote the sustainable use of water.

All water resources need to be protected sufficiently to ensure the production of water for human use as well as for other legitimate economic and recreational purposes such as fishing and tourism (bathing water). With this in mind, increased protection of groundwaters against pollution from pesticides, industrial chemicals and salt water intrusions is essential. Proposals need to be developed to include a general protection of all important surface waters against significant localised sources of pollution, whether stationary or mobile, as well as significant sources of diffuse pollution, such as seepage of polluted water from land, atmospheric deposition, etc. Such measures will ensure that a maximum of water is available for the various legitimate uses of water. We expect that these measures will facilitate the task of establishing sustainable water management, thus easing the large potential conflicts related to access to the resource.

The commitment of the European Community to the principles of the Barcelona Convention, to the actions undertaken in the framework of the Mediterranean Action Plan, and to the different sub-regional agreements clearly demonstrates its supportive role in the development of Mediterranean environmental cooperation. An important step in the advancement of this

common goal has been the adoption of the Charter on Euro-Mediterranean Cooperation on the Environment in the Mediterranean Basin, the 'Nicosia Charter'. This political commitment, made by the Ministers responsible for the environment of the Mediterranean countries and by the Member of the Commission responsible for the environment, was the result of a three day conference organised by the Commission in April, 1990.

A consensus has been reached on the necessity to mobilise all the available resources in order to achieve, by the year 2025, a clean Mediterranean environment, compatible with sustainable development. A number of short term actions have been agreed upon, to be carried out according to well defined priorities. Integrated management of coastal zones and water management are among these priorities. In April 1992, the Ministers and the Member of the Commission met again in Cairo. During this meeting the participants proceeded to evaluate progress made with regard to the implementation of the 'Nicosia Charter'. They adopted a programme of specific actions, comprising a priority phase to be extended until 1995 and a longer term phase to continue until the year 2000. The objective of this programme is to complete the measures set out in the Nicosia Charter, to elaborate national strategies for sustainable economic development and to implement mechanisms for the integration of economic and environmental policies in the fields of tourism, energy, agriculture, industry and transport. Particular attention has been given to the preparation of national management programmes for water resources to include ground and surface water and to take into account the problems of excessive population growth, rapid urbanisation, the seasonal influx of tourists and desertification. A number of the problems identified rate as serious impediments to economic development.

The novelty of these political commitments is that all participating countries have shown an admirable determination to leave aside the 'big words' for public consumption and move on by translating into action what has been decided upon. The Commission of the European Communities has set the example and matched action to words by a significant increase, during recent years, of financial resources and technical assistance towards cooperation and partnership in environmental matters between the EC and the southern and eastern Mediterranean countries.

Since 1975, the EC has contributed to the economic development of the Mediterranean non-member countries through the conclusion of Protocols on financial and technical cooperation with most of the southern and eastern

Mediterranean countries except Libya. This cooperation encompasses almost all areas of mutual interest to the Mediterranean countries: industry, agriculture, energy, research, environment and any other matters to be agreed upon between parties. In the period between 1976 and 1991, the use of these budgetary resources for environmental protection was foreseen only in a limited number of cases such as sewage and waste water treatment in Egypt; nature reserve management on the Red Sea and the acquisition of general pollution control equipment in Malta. The New Mediterranean Policy actions (1992-98) in favour of the environment is included among the priority objectives. The policy will provide an overall aid package of 4.4 billion ECU, sub-divided as follows:

- 2,075 MECU for the financial protocols (ET, MOR, ALG, TUN, SYR, JOR, IL, LEB)
- 2,030 MECU for more broadly based financial cooperation outside the protocols (including operation of regional interest and cooperation on the environment)
- 300 MECU to provide back up for economic reform

The financial cooperation includes, with a specific reference, an amount of 230 MECU; 115 to 120 MECU of which is earmarked for measures of environmental protection (100 MECU are included to account for interest rate subsidies on bank loans). Another financial instrument, LIFE, can provide support to demonstration projects or technical assistance towards sustainable development in third world countries. Approximately 20 MECU will be made available to this end during the next five years. Finally, there are some encouraging results which indicate that environmental issues are considered priorities for the economic and social development of the countries of the region. Furthermore, although the effort required to achieve the stated objective of a clean Mediterranean is considerable, the EC plays an increasingly prominent role in the promotion of sustainable development in the Mediterranean Basin and hereby lives up to its commitments.

The EC is assured that by improving living conditions and economic opportunities, a contribution is being made towards the political stability of the region. For this reason, the Commission is strongly committed to the process of the Middle East peace negotiations. In this light, it is worth noting that according to UN studies, the population in the Middle East will increase from 205 to 420 million over the next 25 years; a demographic boom. Unless

tough decisions are made in favour of better management of water resources, drought will prevail in the future. Many countries in the region already have a water deficit. Their ground and surface water levels have decreased consistently despite important rainfall over recent years. To a great extent, this is due to consumption by households and industry, however, the problem relates primarily to agriculture which depletes the bulk of the available resource. In fact, many of the crops are profitable only because of an artificially low water price. Subsidies to the water industry prevent the application of the safe yield principle and the sustainable use of the water resources. In the future it will be necessary to proceed to a more efficient use and to a redistribution of the existing resources, which can be boosted by investment in infrastructure, eg. desalination plants, canals, dams, etc. International and regional banks support this type of venture and the European Community could assist through its institutions. The Middle East is certainly one of the most arid zones in the world and its water problem can only be resolved by regional cooperation similar to that undertaken in Europe with respect to the Rhine river, and for the Rio Grande between Mexico and the United States. Peace in the Middle East depends largely on environmental cooperation, in particular, on equitable sharing of water resources. This cooperation cannot be limited by man-made political frontiers however, in the case of water resources, must cover entire hydrological basin areas.

In the multilateral working groups on environment and water resources, the European Commission has contributed in a positive manner. It has taken the lead by offering constructive proposals. The Commission's position is underscored by its willingness and ability to deploy financial resources in support of research, data collection, technical assistance and so on. For example, the European Community has agreed to undertake a study on environmental issues in the eastern Mediterranean coastal area. The report will identify issues of common interest to the regional parties and hopefully bring about discussion to address the environmental problems which obstruct economic development. With regard to contingency plans for oil spills, the Commission supports the development of a sub-regional system for combating major marine pollution accidents likely to affect the territorial sea coasts and the related interests of Cyprus, Egypt and Israel. It is assumed that this contingency plan can be extended to other countries of the region and in particular to the Levant, including the Occupied Territories. Finally, the Commission proposes the creation of a data base, by country and at a

regional level, on the availability of water resources, as well as the drafting of a report on the construction of pilot installations for the desalination of salt water.





*Distinguished participants of the Euro-Arab Dialogue Forum*

## **WATER: CHALLENGE AND PROSPECTS**

***DR. ATEF OBEID, The Minister of Cabinet Affairs of Egypt represented by DR. MAHMOUD ABU-ZEID, Senior Under-Secretary of State and Chairman of the Water Resource Centre of the Ministry of Public Works and Water Resources***

It is easy for many of us to take water for granted. We have only to turn on the tap and there it is. Fresh, cold, ready to drink. We assume that it will always be there and we use this basic gift of nature with little thought of its limitations. We also assume that economic progress requires greater amounts of resources. Yet our experience with energy during the last twenty years reveals that this is not the case. Unfortunately, the world for the most part, has yet to apply to water the valuable lesson energy has taught us; the importance of doing more with less. It is evident that a water efficiency revolution is needed to preserve lakes and wetlands which are shrinking as rivers are diverted to cities and agricultural fields. The question is what it will take to launch such a revolution. Groundwater levels are falling in many areas as farmers, pressed to feed a growing world population, withdraw more water than can be replaced by nature. Irrigation efficiency worldwide is estimated at less than forty percent as most of the water diverted for agriculture is not beneficial to crops.

We need to rethink our whole approach to water. Efficiency must be the option of first choice. With the technological methods available today, agriculture could cut its water demands by 10 - 15%, industries by 40 - 60% and cities by at least 30% with no sacrifice to economic output or quality of life. Waste water - far from being a nuisance to be disposed of - must be considered a productive resource. Not only must supplies be expanded, small scale projects need more consideration. As we enter an era of water scarcity, we need a new ethic, one that promotes efficiency and protection of water systems. Part of this ethic is the acceptance of the obligations accompanying the rights we assume we have to water. We have obligations to protect waters' many ecological functions, to derive as much as possible out of each liter we use and to help others benefit from its uses.

In the post cold war and post Earth Summit era, the world is beginning to focus on relations between people and the environment as well as those between people and political systems. Water issues have the potential to span the old and the new world order, for water has become a strategic resource. A new water ethic is thus not only an ecological necessity, it is also imperative for national security and long lasting peace.

One of the clearest indications of water scarcity is the increasing number of countries in which population levels have surpassed the level that can be sustained comfortably by the water available. As a rule of thumb, hydrologists designate water-stressed countries as those with annual supplies between 1000 - 2000 cubic meters per person. When the figure drops below 1000 cubic meters, water scarcity becomes a severe constraint on food production, economic development and protection of natural systems.

Today, twenty six countries, collectively home to 232 million people, fall into the water scarcity category. Many of them have very high population growth rates with the result that problems associated with water scarcity are worsening rapidly. For a country such as Egypt, which gets little rainfall, water flowing in from upstream neighbours is a precious lifeline. Africa has the largest number of water scarce countries, eleven in all, with four others facing this predicament by the end of the decade. By the year 2000, the total number of Africans living in water-scarce countries will climb to 300 million, a third of the continent's projected population.

Nine out of fourteen countries in the Middle East currently face water scarcity conditions which contribute to making it the worst region of water scarcity in the world. With virtually all Middle East rivers being shared among several nations, tensions over water rights are a potent political force throughout the region.

Numerous physical symptoms of water stress have been identified in both water-poor and parts of water-rich countries. Among the most pervasive problems is that of declining water tables caused by using groundwater at a rate faster than nature can replenish it. If water pumping is not brought into balance with recharge, the underground supply will eventually become too expensive to tap and too salty to use as it is pulled from greater depths. Overuse of groundwater is now ubiquitous in parts of China, India, Mexico, Thailand, the Western United States, North Africa and the Middle East. Some of the worst cases of unsustainable groundwater involve 'fossil' aquifers, which contain water as old as hundreds or even thousands of years. These waters are unlikely to receive much replenishment from rainfall.

Saudi Arabia, Libya and various Gulf States exercise the most egregious levels of unsustainable water use in the world today. These nations are mining fossil groundwater to meet seventy five percent of their water needs and this dependence is increasing. These examples by no means constitute a complete account of the present water problems prevalent in the region today. They do however, illustrate clear signals of water stress.

Desalination is becoming technically feasible and use of the process has grown enormously. More than 7500 desalting plants of various kinds and sizes now operate worldwide, collectively turning four to eight billion cubic meters of salty water into fresh water each year. Sixty percent of this occurs in the Gulf States. Saudi Arabia claims thirty percent of the global total. Despite its rapid growth, desalination still produces just one tenth of one percent of the world's total water supply, and its contribution to global water supply is likely to remain small in the foreseeable future. The early enthusiasm for desalination hinged on nuclear power's ability to produce energy; a hope that has never been realised. Today, desalination ranks as one of the most expensive water supply options. At one to two dollars per cubic meter, it is four to eight times the cost of average urban water, and at least twenty times the cost of what farmers currently pay. Consequently, desalination remains a last resort option. The frequency with which cities and communities are turning to it is more a sign of water scarcity and stress than a sign of comfort.

Desalting brackish water, which is considerably less salty than ocean water, is among the most rapidly growing uses of desalination. At forty to seventy cents per cubic meter, it typically costs less than half as much as sea water desalination. However, these costs are still out of line with what farmers, as the world's largest water consumer's, can pay.

Water resources technology is aimed at controlling both the quantity and quality of water. In the regulation of water quantity, the objective is to match the supply of water to its demand. On the quality side, the technology of interest is designed either to alter the nature of water (desalination) or to change the nature of its use (development of salt-resistant crop, waste water re-use).

As fresh water becomes increasingly scarce, and as cities bid more supplies away from farmers, the use of treated urban waste water for irrigation is likely to become more common. This returns valuable nutrients to the land, helps keep them out of rivers and streams, avoiding pollution. With proper treatment and careful examination of how and where to apply reclaimed waste water, this practice can be beneficial. Waste water re-use has been practiced by many states over a considerable period of time. Lack of knowledge about long term effects of treated waste water has restricted its use on a wider scale. However, the development of new technology and the rising cost of desalination has led to a higher and more substantial rate of waste water re-use in the Middle East.

Water is vital to food production. There are a number of concerns in this area. Water scarcity and increasing competition for limited supplies, poor irrigation practices that damage fertile cropland, and the rising social and environmental costs of large water projects raise doubts about the ability to grow enough food in the years ahead. A close look at water's role and performance in food production reveal the need to build a more stable agricultural foundation.

Some 235 million hectares of land is currently irrigated, a fivefold increase since 1990. As world population grew from 1.6 billion to over 5 billion in this century, irrigation has become the cornerstone to global food security. Today, 36 percent of the global harvest comes from 16 percent of the world's irrigated cropland. Many countries, including Egypt, India and Pakistan rely on such land for more than half of their domestic food production.

A decline in additional irrigated land has been experienced worldwide since the late seventies. This trend is historically new and political leaders and development specialists have not yet fully grasped the consequences. A contributing factor is the cost of expanding irrigation through new distribution channels making the need to build dams and reservoirs more difficult to finance.

In the meantime, existing systems are functioning poorly due to lack of proper maintenance. Water logging and soil salinisation are brought about by poor water management. Adequate drainage and proper soil improvements are becoming essential. Estimates indicate that 15 million hectares in developing countries suffer from salinisation. Large irrigation projects have also compromised human health by contributing to the spread of debilitating water-borne diseases. Among the worst of these is Bilharzia which is widespread in parts of Africa, the Middle East and South America.

With an increase of 95 million people to the world population throughout the nineties, new strategies will be needed to prevent the many emerging irrigation constraints from resulting in drastic food shortages. It is estimated that irrigated areas will grow by no more than one percent annually in the foreseeable future, in contrast to the 1.7% annual growth in world population. Desalination or long-distance water transfers do not offer a practical solution as the food produced is too expensive to reach those most at risk - the one billion people who currently subsist on less than one dollar a day.

New technology will relieve some of the constraints now emerging. Breeding and selecting crop varieties that are more salt tolerant, drought resistant and water efficient, will help bolster crop production as fresh water supplies for

agriculture dwindles. The biggest gains will come from irrigating crops more efficiently.

Nearly 40 percent of the world's people live in river basins shared by two or more countries. India and Bangladesh haggle over the Ganges River. Mexico and the United States over the Colorado and Thailand and Vietnam over the Mekong. Africa has 57 river and lake basins shared by at least two nations. Nowhere, however, are water disputes shaping political landscapes and economic futures as inclusively as in the Middle East.

Talk of a water crisis in the Middle East has become almost legendary. Over the next decade, water issues in the region's three river basins; the Jordan, the Nile and the Tigris-Euphrates will foster either an unprecedented degree of cooperation or an explosive level of conflict. Israel, Jordan and the Occupied West Bank share the water of the Jordan basin. Across the Sinai Peninsula, in the Nile River basin, Egypt with its population of 56 million people, shares the Nile water with eight African countries. Egypt depends almost entirely on its water share from the Nile waters; none of which originates within the nation's boundaries. About 85 percent arises in Ethiopia and flows as the Blue Nile into Sudan. The remainder originates from the White Nile system which stems from Lake Victoria. To meet its needs, Egypt supplements Nile water with small amounts of groundwater, agricultural drainage water and treated municipal water. Of the three Middle East river basins, only the Tigris-Euphrates has a substantial supply remaining once demands have been met. This relative abundance has not alleviated tensions due in part to the failure of three countries namely, Iraq, Syria and Turkey, to reach water-sharing agreements. This has led to an atmosphere of competition and mistrust which could potentially breed future conflict.

Current international water law offers minimal assistance in resolving water conflicts. Upstream countries have been reluctant to accept the notion of an 'international drainage basin' or 'water system' that needs to be cooperatively managed and equitably shared. Indeed, some countries still hold the view that they hold absolute sovereignty over water within their borders with little obligation to their neighbours. An international code of conduct for shared watercourses is still being developed through the International Law Association which in 1969 established the 'Helsinki Rules on the Uses of Waters of International Rivers'. The 'Helsinki Rules' were recognised by the United Nations International Law Commission which in 1991 put forth its 'Draft Articles on the Law of Non-Navigational Uses of

International Watercourses'. Among the principles gaining favour are the need to inform and consult with water sharing neighbours prior to taking actions that may affect them.

There is a growing recognition in Egypt that economic development and the health and welfare of its population are closely linked to the proper management of its natural resources and the environment. Accordingly, in early 1991, the Egyptian government prepared an Environmental Action Plan. The plan involved the cooperation of sectors across the country, including non-governmental organisations and other donor countries' experience. The Egyptian government asked the World Bank to lead a team of experts to conduct the study jointly with Egyptian teams. The draft plan was approved in May, 1992.

Egypt's prosperity depends largely on water productivity. The accelerated increase in population, at 2.5% annually, represent the greatest challenge (56 million in 1991 to an expected 110 million in 2025). As far as water is concerned, the River Nile is the principal resource and is expected to remain so for years to come. The water quality of the river, canals, drains and groundwater aquifers is an issue that water planners concern themselves with. Agricultural drainage water in Upper Egypt is discharged back into the River Nile. This slightly affects the quality of the Nile water. The drainage water in the Nile Delta is of lower quality and consequently, it is collected through an extensive drainage network for disposal to the Mediterranean.

Environmental issues in Egypt, like in most other developing countries, have received limited attention. However, with increasing human activities, the protection of land and water resources is becoming a priority consideration. A reasonably clear and detailed picture of environmental issues confronting the land and water sectors do not exist nor are there accurate estimates of the cost of land and water degradation to the national economy. Current costs are significant and are likely to rise during the 1990's if no drastic action is taken.

Water pollution is already a serious problem in parts of Egypt. While a reasonably clear picture exists of the salinity of water, information on other water quality parameters is extremely limited. In several locations, a large percentage of waste water is discharged in an untreated form into the Nile and throughout irrigation canals and drainage ditches. There is no question that a very high proportion of domestic and industrial effluents are untreated at present. One study estimates that 66 agricultural drains monitored carried an annual discharge of 3.2 billion m<sup>3</sup>, including raw sewage from 5000 rural

agglomerations, semi-treated or untreated waste water from Cairo and other urban centers, in addition to raw sewage from the rapidly expanding and unserved peri-urban areas.

Significant proportions of fertilisers and pesticides leach into the water system. Potential groundwater contaminations from fertilisers are a real concern as groundwater is used extensively for drinking purposes and is more vulnerable than surface water to fertiliser contamination. The application of nitrogen, phosphate and potash fertilisers in Egyptian agriculture increased nearly fourfold between 1960 and 1988. Nitrate contamination of groundwater from agricultural activities has been a major environmental concern in many developed countries. Concern is increasing in a few developing countries, especially those where extensive irrigated agriculture is practiced. Use of pesticides, most of them imported, has increased as well, though not at the same rate as that of fertilisers. The figures vary from year to year, however, it is estimated that between 48 percent to 88 percent of imported pesticides were used for growing cotton. In early 1991, use of herbicides to control aquatic weeds became an important public concern. Aquatic weeds present a major problem in the efficient management of water. Acrolein was used in canals to control submerged weeds and ametryn to control water hyacinths in drains. In 1991, 1300 kilometers of canals and drains were estimated to have been infested by submerged aquatic weeds and another 1900 kilometers were covered by water hyacinths. Chemicals used to control aquatic weeds have been discontinued since 1991 due to political and media pressure. Only manual, mechanical and biological means for weed control are permitted. Extensive use of manual control would likely increase the incidence of Bilharzia among the labourers used for weed removal. Expansion of mechanical control would require additional investments in imported equipment and spare parts, and would also necessitate the construction of roads to access canals and drain banks. For economic, environmental and water use efficiency considerations, the best solution would be to use integrated means for controlling aquatic weeds, including the rational use of herbicides.

Increasing water pollution from industrial and domestic sources, if allowed to go unchecked, is likely to reduce the amount of water available for future use. This clearly is not in the long term interest of the country. In addition, the total economic and health costs related to unchecked water pollution would be substantial.

A legal basis for controlling water pollution already exists in Law 48



passed in 1982 on the 'Protection of the River Nile and Waterways from Pollution'. This law established stringent standards on various organic and inorganic pollutants. Unfortunately, the water quality standards stipulated were overly strict and rigid. Shortly after the law was promulgated, GOE was forced to grant dispensation to certain polluters, many of whom were public sector companies, since it was impossible for them to comply with the regulations. It is now accepted that the law will have to be amended.

Salinity and waterlogging from irrigation practices has long been a problem. However, Egypt has embarked on the construction of an extensive drainage system, a significant part of which is already operational. For the long term sustainability of agriculture, drainage should receive priority.

With regard to environmental health, much has been written on the increase in incidences of schistosomiasis since the construction of the High Aswan Dam to expand the irrigated area. Unfortunately, nearly all of these reports are based on spurious evidence. Data collected over the past twenty years, reveals that the schistosomiasis scare has been sensationalised. A detailed and independent evaluation carried out in 1985 disclosed that in many parts of Middle and Upper Egypt, schistosomiasis is no longer considered a serious public health risk. Between 1977 and 1984, rates have dropped from 30 percent to 8 percent and serious disease linked to high worm burden have become rare.

It is essential to ensure sustainability of development and to estimate the real cost of water related environmental issues to the national economy. The Land Water Section of the Environmental Action Plan examines the extent of water degradation of water and land resources, presents the economic and institutional policy variables, and addresses the policy actions and strategies necessary to manage these vital resources more efficiently.

A number of projects have been proposed by national and international experts involved in the preparation of the Environmental Action Plan. These proposals involve enormous resources to implement. The priorities selected over a ten year period are as follows:

- A. General priority actions to produce the highest economic and environmental benefits
  - phase out subsidies
  - strengthen institutional capacities to allow more efficient administration of environmental programmes
- B. Address water quality degradation
  - protect the Nile River and its two branches

- improve water quality in canals and drains
- reduce heavy metal pollution at source
- rehabilitate existing water treatment plans (operate on commercial basis)

#### C. Land Management

- prepare land use plan
- agricultural land drainage and soil improvement programmes
- protection from desertification

Investment required for the first phase (1992 - 1997) is estimated at 300 million US and the second phase (1997 - 2002) at 1.5 billion US. Actions to be taken before implementation include detailed feasibility studies.

As Herodotus, the famous historian once said, Egypt is the gift of the Nile. Historically water has always been and still is a critical component for development and survival in Egypt. Clearly, it is water and not land which is the major constraint for the country.

During the French occupation of Egypt, Napoleon Bonaparte said, "If I were to rule a country like Egypt, not even a single drop of water would be allowed to flow to the Mediterranean Sea". Unfortunately, this cannot be true now. To keep the salt balance of the Delta and the Nile Valley and to prevent salt water intrusion to the river and the groundwater aquifers of the Delta, million of tons of salt have to be carried and washed from the system. The formula is quite complex, however, with determination and assistance from the rest of the world, especially Europe, we can face the challenges that lie ahead.



*Ms. Heleen Kleijn, Secretary to the Chairman of the Lutfia Rabbani Foundation, handling inquiries at the Information Desk*

## INTRODUCTORY STATEMENT TO THE PANEL:

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President of Nijenrode University and former Minister  
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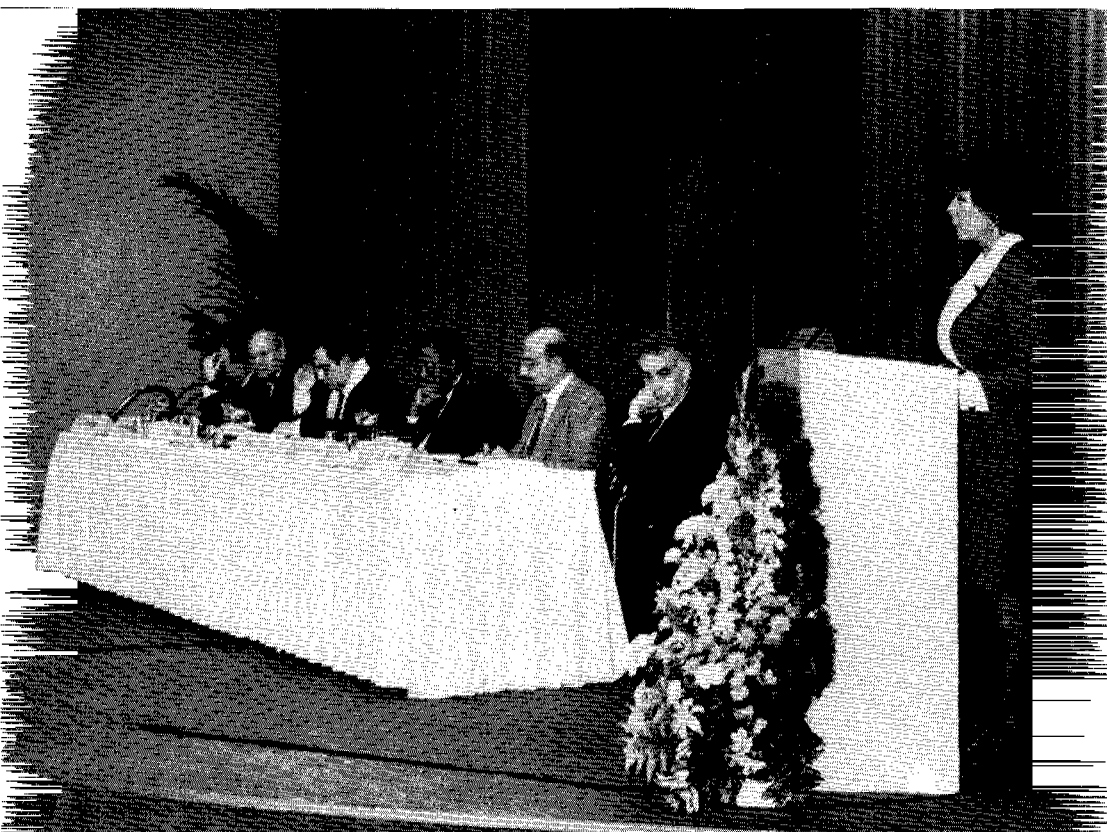
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*The Panel Members from left to right:*

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## INTRODUCTORY STATEMENT TO THE PANEL: THE DUTCH PERSPECTIVE OF EURO-ARAB COOPERATION IN WATER MANAGEMENT

***DRS. NEELIE KROES, President of Nijenrode University and  
former Minister of Transport and Public Works of the  
Netherlands***

For many years a close cooperation has existed between the Netherlands and the Arab world with respect to water. Dutch experts and consultants have been involved in many water related projects. If the emphasis used to be mainly on water for human consumption and irrigation purposes, in recent years it has shifted to the management of surface and groundwater and to health problems related to water. This shift in emphasis is the result of problems associated with the increasing use of ground and surface water. Expanding population, industrialisation and growing affluence have greatly increased the demand for water.

In Yemen for instance, far more water is extracted than is provided by precipitation and natural inflow resulting in a decrease in the ground water table by many meters. If this practice continues, the groundwater supply will be exhausted in due course, leading to disastrous social consequences. At the same time, the increasing water use also causes quality problems. The construction of river dams provides a constant disposal of water and allows for larger scale and intensified irrigation for higher cropping intensities. At the same time, natural drainage is eliminated and salinity problems increase.

The demand to improve drinking water supplies also affects the quality of surface and groundwater. The environment is under great pressure from an increasing population and rapid urbanisation. Improved drinking water is a natural choice. However, in areas under pressure it can, at the same time, lead to an increase in the pollution of surface water, ground water and soil.

The governments of the Arab world are increasingly aware of these problems and have responded by establishing Environmental Agencies. In the coming years, an increasing degree of attention will be devoted to fighting water and soil pollution and attention paid to the adverse consequences of uncurbed water use. The Dutch government strongly supports this policy and will advance it whenever feasible. 'Fighting at the Source' and 'Counteracting Waste' are our keynotes. Nearly all projects in the field of water now have an environmental component. Examples are projects striving to recycle drainage water, fight salination, produce ground

water developments and develop a combined approach to drinking water supply and sanitation in a specified area.

Current projects in the area of water supply and sanitation include:

- The Rada Water Supply and Sanitation Project in Yemen, with Delft Hydraulics, DHV Consultants and Euroconsult
- The Fayoum Drinking Water and Sanitation Project in Egypt with IWACO (Consultants for Water and Environment) and DHV Consultants
- The update of the Waste Water Master Plans for a number of towns in Tunisia with DHV Consultants
- Water Supply and Sanitation Studies in Morocco with HASKONING

Current projects in the area of Groundwater Resources Management include:

- The Fayoum Water Management and Improvement Project in Egypt with Euroconsult and Delft Hydraulics
- Development and Management of Groundwater Resources in the Nile Valley and Delta with IWACO

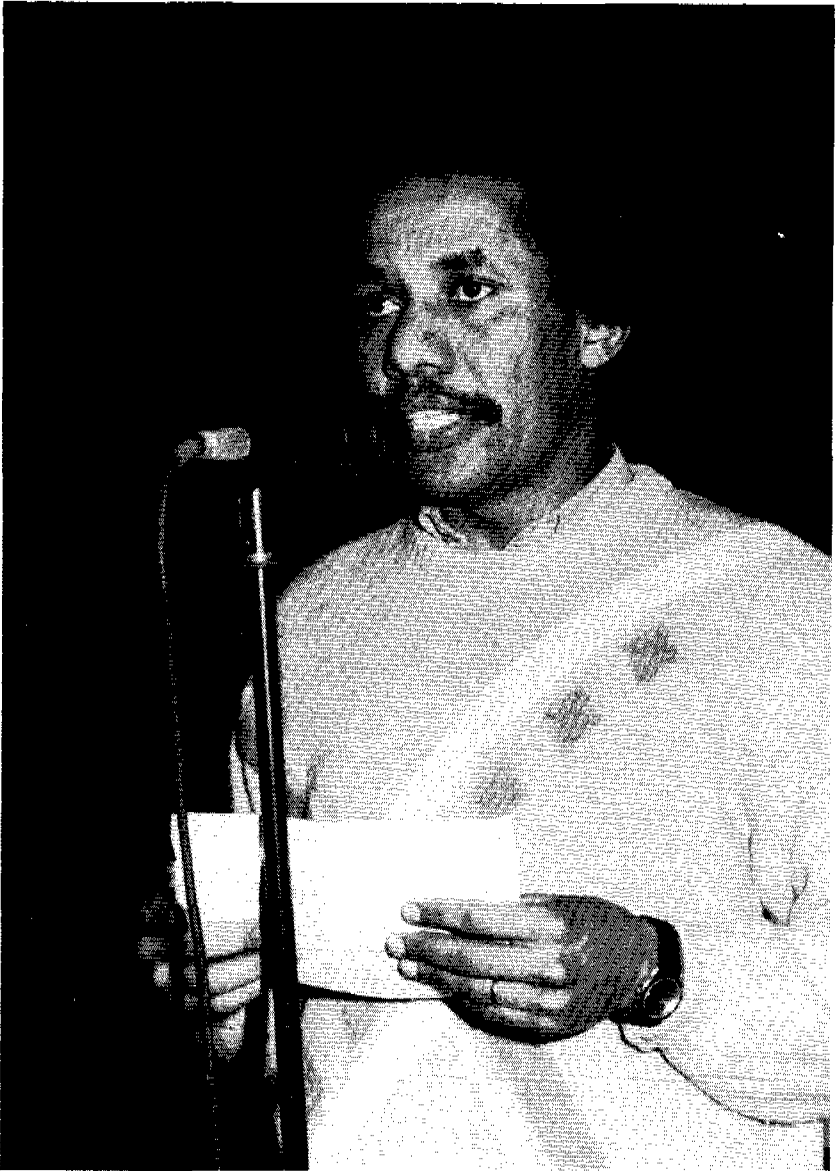
The implementation of a few projects will not resolve the problem. It demands a basic approach - one that speaks to the people's hearts. It is for this reason that the Netherlands pays such meticulous attention to institutional development, the strengthening of hydrological institutes and technical assistance across training facilities. Institutes in the Netherlands which address these concerns are the International Institute for Hydraulic and Environmental Engineering (IHE) and the TNO Institute of Applied Geoscience. In future years the demand for fresh water will grow. The population is expected to double over the next two decades. Fresh water will become an increasingly rare product and, if mismanaged, will become as limited as oil and natural gas. Many lives will be at stake if we do not learn how to manage, to handle and to distribute our fresh water supply.

In many countries, the distribution of water and its quality control has become an international problem. Different countries sharing the same water basin often have conflicting interests. Upstream intervention has direct downstream effects. Intensive consultation between the countries concerned is essential for proper water management and ultimately, fair water distribution.

Water management is a world-wide problem. In Europe, the distribution and management, and the quantity and quality of international basins such as the Rhine River and the Danube play a major role. International river management is essential. However, the development of international management is a process with many hurdles. The road is passable only if all parties concerned are willing to take part through the realisation that a combined approach will bring added value. The development of international river management involves three stages. The target of the first stage should be an exchange of knowledge about the water systems and the way they are managed by partners. A ready exchange of reliable facts and information is therefore essential. This will give insight into the condition of the water systems of the riparian states. In the second stage, combined management instruments need to be developed. This can only be successful if all necessary information has been brought forward during the first stage and if a network has developed between the partners. Finally, the third stage should see the development and implementation of a combined policy, resulting in international management.

The Netherlands, situated in the delta of three international rivers, the Rhine, Meuse and Scheldt, has gained much knowledge and experience in the field of international consultation. The Public Works and Water Management Department within the Ministry of Transport, Public Works and Water Management contributes to the establishment and implementation of international agreements and treaties in the field of water quality and water management. To this purpose, it maintains a large network of international contacts and participates in many international committees. In this framework, many kinds of instruments are developed for policy analysis and policy making at both the national and super national level. It is this combination of scientific, technical, juridical, governmental and organisational knowledge which enables the development of an integral international water management policy to proceed. The Netherlands is ready to advance this knowledge and experience and share it with the Arab world.





*A question addressed to the Panel from a member of the audience*

# ECONOMIC AND POLITICAL ADJUSTMENTS TO WATER SCARCITY IN THE MIDDLE EAST

**PROF. J.A. ALLEN, School of Oriental and African Studies, University of London**

*“Cultivate your world as if you would live forever, and prepare for your hereafter as if you would die tomorrow”*

Sharah al-hadith al-nabwi - a saying of the Prophet in the Hadith as quoted by 'Ali Mubarak (administrator and engineer in the government between 1848 and 1892) in al Azhar, Vol, 4 no 10, May 1891, pp 309-315

It is not just the shortage of water which makes the utilisation of water in the Middle East difficult. A major problem is the lack of awareness at all levels of the 'value' of water and of the costs associated with delivering it. As far as users are concerned, there is an entitlement to water and that entitlement is to free water. When a scarce commodity is perceived as a free entitlement, and where measures to regulate its use are poorly developed, there are bound to be many difficulties related to its economic efficiency and sound use ecologically.

The countries of the Middle East and northern Africa are unique in their scale of water deficiency. The aridity of the region is only relieved by the water which arrives from outside via the Nile and the Tigris-Euphrates systems and the fossil water which underlies extensive tracts of the Saharan and Saudi Arabian deserts. The most important indicator of water deficiency is the level of food imports and here the results are disturbing. With the exception of Turkey, the region has to import over sixty percent of its food. Some of the oil economies import approximately ninety percent. That the states of the region have been able to meet their responsibility for providing their citizens with food is primarily a tribute to their political and economic skills. The availability of cheap food on the world market for the past decade or more and the preparedness of the United States to support the Egyptian and Israeli economies are also major factors.

The water gap is represented by the food gap. The problem facing the Middle Eastern governments and their patrons is that of providing food in sufficient volumes and at affordable prices to meet increased food demands in the coming decades. Economic stability, and consequently, political stability in the region depends largely on the ability of governments to substitute for water and the

major means to achieve this will be through gaining access to food raised by producers who have access to cheap water (Allen, 1992). The countries of the region can be categorised with respect to the scale of their water resources in relation to needs, and with respect to their ability to substitute for water. The latter capacity can be further classified according to how the substitution is achieved. In some cases, Middle Eastern and north African countries can substitute for water from their own resources while for others the substitution can only be achieved with significant political adjustments as determined by an outside patron. The countries can be classified as follows:

TABLE 1

A CLASSIFICATION OF THE COUNTRIES OF THE MIDDLE EAST AND NORTH AFRICA WITH RESPECT TO WATER AVAILABILITY AND PATTERN OF TRADE

<u>COUNTRY</u>	<u>BAL. OF TRADE</u>	<u>FOOD TRADE</u>	<u>WATER DEFICIT*</u>
	\$Bn	\$Bn	Km <sup>3</sup>

*Countries for whom the water deficit is not significant as they are major food importers with strong trading positions. For these countries, the international political economy is not affected by water.*

*Middle East*

Bahrain	-0.1	-0.25	-0.15
Iran	+2.0	-2.00	-0.00
Iraq-pre Aug. '90	+5.0	-2.00	-0.00
Kuwait	+3.0	-0.30	-0.15
Qatar	+1.0	-0.15	-0.10
Saudi Arabia	+4.0	-3.50	-1.00
UAE	+7.0	-0.90	-0.20

*North Africa*

Algeria	+0.2	-2.00	
Libya	+4.00	-1.10	0.30

\* A deficit is difficult to define, in that it depends on current national policy with respect to water allocation. In Egypt, where increased food output is a stated policy, it is possible to estimate the amount of water needed to meet the national goals. In countries such as Jordan and Israel, where adjustments are being made to reduce water use in agriculture, the concept is more difficult to define. Recognising the relevance of the deficit to the agricultural future of the region is more important than quantifying it.

<u>COUNTRY</u>	<u>BAL. OF TRADE</u>	<u>FOOD TRADE</u>	<u>WATER DEFICIT</u>
	\$Bn	\$Bn	Km3
<i>Countries for whom the water deficit is significant or very significant as in Jordan's case, as they are major food importers with weak trading positions. For these countries, the international political economy could be seriously affected by water.</i>			
<i>Middle East</i>			
Israel	-1.4	-0.30	-0.20
Jordan	-2.0	-0.30	-0.10
Lebanon	-1.5	-0.20	0.0
Syria	-2.0	-0.50	-0.15
Yemen	-1.0	-0.10	potential def.
<i>North Africa</i>			
Egypt	-6.0	-5.50	-10.0
Morocco	-1.0	0.00	potential def.
Tunisia	-1.0	-0.20	-0.20

*Countries with weak trading positions. However, as food exporters the water surplus should ensure future food self-sufficiency (provided Sudan can escape internal political disruption). For these countries, the international political economy is not affected by water.*

*Middle East*

Turkey	-5.0	+1.50	+10.0
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*North Africa*

The Sudan	-0.5	+0.10	+4.00
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(Sudan's current internal problems make it difficult to realise the renewable resource potential of the country. It is therefore too difficult to categorise).

Sources: UN and the World Bank data and author's estimates

Table 1 suggests that only Turkey and the Sudan have futures which include, at least for the near future, self sufficiency in food. The others are experiencing significant food deficits and these deficits are on the rise. The measures taken by the government of Saudi Arabia to develop groundwater to produce food, including food staples such as wheat, have been remarkable. It is estimated that the agricultural sector contributed eight percent of the Saudi GDP in 1990, an extraordinarily high level for an oil enriched economy. However, these policies are neither economically nor ecologically sustainable. Water withdrawals are far beyond natural recharge. The capacity

to subsidise the use of irrigation water even for an economy such as that of oil rich Saudi Arabia has to be questioned in light of the military events in the Gulf in 1990 and 1991 when it became apparent that Saudi Arabia's economic stability and also its territorial security is dependent on the will of the Western industrialised community. Saudi Arabia's ideal of food sufficiency (Allan, 1983) is as remote as its wish to be a militarily secure state. Allocating funds towards this end actually weakens the economic position of Saudi Arabia while strengthening the economies of those industrialised countries who supply the agricultural equipment and infrastructure alongside the military equipment and defence infrastructure.

The most interesting feature of Table 1 is the extent of the estimated water deficits in the national economies of the Middle East and north Africa. With the increased demand for water from agriculture and other sectors, these deficits are on the rise. However, no country, other than Israel for a brief period in the early part of 1991, has renounced food self-sufficiency as a major feature of national policy.

The historical, psychological and political backgrounds related to the development of food policy and water allocation are significant. Governments of almost all countries find a natural political alliance between apparently responsible leaders and officials on the one hand and the rural food producing community on the other. The former want to ensure national security including basic food needs. The rural community ensures security through the provision of food. The natural alliance between those responsible for food security and those capable of providing it dominates policy making throughout the water scarce Middle East.

It also dominates policy making in most economies throughout the world, not least in the EC with profound and distorting consequences for world trade in food and for the discussions in the GATT conferences. However, the EC and the Middle East, while resembling each other in terms of area and size of population, are very different with respect to water resource endowment and economic competence. In the EC, water is rarely a constraint while in the Middle East, it is a constraint in all countries with the exception of Turkey, the Sudan and the Lebanon. However, in both the Middle East and the EC countries, despite their differing water resource endowments, water in the agricultural sector is regarded as virtually a free good and in many parts of the Middle East as a real free good. The dangerous fallacy underlying agricultural and especially food production policies of the countries of the Middle East is that water is free. This assumption distorts the expectations of the farming community and also prevents officials at

all levels from making rational judgments concerning the allocation and use of water as the real costs of water are not evaluated. If the real costs of water were measured, preferably using procedures of environmental accounting, (Pearce et al 1990) the future costs of current policies would also be taken into account, and water would then be allocated to uses more beneficial to the economy as a whole. At present, consumers of water have little incentive to use water efficiently. Moreover, governments have no incentive to realise efficient returns to water as there are no institutions or mechanisms in place to recognise its value in transactions of distribution and use by either individuals or the state.

TABLE 2  
*CLASSIFICATION OF MIDDLE EASTERN COUNTRIES BY POPULATION, WATER RESOURCES AND THE ABILITY TO IMPORT FOOD*

<u>COUNTRY</u>	<u>POPULATION</u> '000	<u>PERCENTAGE</u> OF TOTAL REG'L POP.	<u>PERCENTAGE</u>
<b>COUNTRIES SELF-SUFFICIENT IN WATER OR ABLE TO PURCHASE FOOD</b>			
<i>Water surplus countries</i>			
Turkey	56277	17.1	
Sudan	25191	7.7	
Lebanon	3000	0.9	
<b>Total</b>	<b>84468</b>	<b>25.7</b>	
<i>Major food importers able to purchase food</i>			
Iraq	18914	5.8	
Saudi Arabia	14902	4.5	
Libya	4546	1.4	
Kuwait	2141	0.7	
UAE	1592	0.5	
Oman	1554	0.5	
Bahrain	504	0.2	
Qatar	439	0.1	
<b>Total</b>	<b>44592</b>	<b>13.6</b>	

<u>COUNTRY</u>	<u>POPULATION</u> '000	<u>PERCENTAGE</u> OF TOTAL REG'L POP.	<u>PERCENTAGE</u>
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*Oil economies with serious water constraints and limited purchasing power which are major food importers*

Iran	56925	17.3	
Algeria	25056	7.6	
<b>Total</b>	81981	25.0	

#### COUNTRIES WITH FOOD, WATER DEFICITS AND FOOD PURCHASING PROBLEMS

*Major economy with water constraints and purchasing constraints*

Egypt	52061	15.9	
<b>Total</b>	52061	15.9	

*Other economies with food deficits and water and purchasing constraints*

Morocco	25091	7.6	
Syria	12533	3.8	
Yemen	11612	3.5	
Tunisia	8175	2.5	
Israel	4656	1.4	
Jordan	3154	1.0	
<b>Total</b>	65221	19.9	

#### TOTAL OF WATER OR ECONOMIC DEFICIT COUNTRIES

<b>Overall Total</b>	328323	100.0	
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*Source: World Bank*

Countries self-sufficient in water or able to substitute for it by purchasing on the international market are as follows. These countries represent 64 percent of the total population of the Middle Eastern and north African region.

- Turkey and the Sudan may have economic problems however, these cannot be attributed to their water resource endowment. The Lebanon does not have serious water problems however, their serious political problems make investments and institutional development difficult. This area contains 85 million people, representing 26 percent of the region.

- The relatively low population in oil rich countries such as Iraq, Saudi Arabia, Libya, Kuwait, UAE, Oman, Bahrain and Qatar have few water resource problems. These only arise if water is allocated to agriculture. They will, in the foreseeable future, be able to acquire food from the world market. They should avoid using the scarce water supply to raise food at a period in economic history when food is being traded relatively cheaply. Iraq has temporary problems. This area contains 45 million people, representing 14 percent of the region.
- The relatively large population in oil rich countries such as Iran and Algeria, have serious agricultural problems and moreover, Iran has political and international relations difficulties which places it into either an oil rich category or a protected one such as Egypt. Iran will need to address both its traditional sector farming and its modern sector pursuing policies and practices based on the five guiding principles and goals shown in ANNEX 1.
- Algeria faces similar agricultural choices to those of Iran although it does not have a well watered province such as Iran enjoys on the southern shores of the Caspian. Oil revenues have not enabled Algeria to mobilise its scarce agricultural resources successfully and it will require an effective policy and implementation strategy if it is to create a viable rural economy on the basis of its scarce water supply. This area contains 82 million people, representing 25 percent of the region.
- Egypt is a major economy in the region with a large population and modest oil resources. Its problems have been alleviated through external funding. The US government has apparently assumed responsibility for the serious and deteriorating water gap by providing grants and loans which correspond to the food/water deficit reflected in Egypt's increasing food import bill. This area contains 52 million people, representing 16 percent of the region.
- Morocco, Syria, Yemen, Tunisia, Israel and Jordan are countries with significant water resource constraints and with the exception of Israel, they have limited abilities to mobilise investment to improve water management systems. They will have to address their food deficit problems by generating foreign exchange in other sectors. This will enable them to purchase food and thereby reduce pressure on their scarce water resources. Israel and Jordan are already, albeit unwillingly, able to meet this challenge. This area contains 65 million people, representing 20 percent of the region.



This analysis suggests that the first three categories of countries do not face overwhelming water resource problems as long as water is effectively allocated and managed. They either have sufficient water or they do not need it as they can substitute oil revenues to purchase food which cannot be produced at home as a result of the water shortages. Two oil economies, Iran and Algeria, currently have balance of payments and political difficulties which impair their capacity to develop however, they are still in a position to underwrite their food deficits with their limited oil revenues. Egypt, in the fourth category, cannot substitute for water on an economic basis. It has been successful in substituting for water through the acceptance of political support from the United States since the mid-1970's. This is not a satisfactory long term solution, or one which the United States can afford to sustain. It is likely that other sources of funding would be available from other OECD countries if the United States could not continue to meet Egypt's water shortage. Egypt will have to substitute for water in the future through the strengthening of its economy in the industrial and service sectors in order to generate the foreign exchange with which to purchase the food required to support the country's rising population.

OECD investments will be directed to accelerate economic growth to ensure that Egypt will become a self-sufficient economy despite its inability to become self-sufficient in the area of food. The remaining categories represent 36 percent of the population that are currently exposed to difficult water resource circumstances which in all likelihood will continue. These countries face the largest challenge in their need to substitute water in the short term.

Jordan and Israel recognise the difficulty in allocating 70 - 80 percent of their water resources to support agriculture. The ongoing Peace Talk negotiations will hopefully result in policy development in this regard. Since agriculture contributes less than three percent to the Israeli economy and approximately seven percent to the Jordanian economy, the real consequences of reallocating water will not be severe, although the internal political reactions may be considerable. Syria, Morocco and Tunisia will have to adopt the same reallocative policies by substituting industrial sector revenues for the lack of water. However, before this step can be taken, existing water resources need to be more effectively organised. The problems in Yemen are unique in that the water allocation and management institutions need substantial development.

The sources of water available to governments aiming to provide basic food entitlements to their citizens in arid and semi-arid countries are:

- precipitation falling within the national boundaries
- surface water from within the national boundaries
- groundwater from within the national boundaries
- the water content of imports, especially that in food imports
- surface water imported from outside the national boundaries - less than exported
- groundwater from outside the national boundaries - less than exported
- less the water exported in products, especially in agricultural products

The water sources listed above are not recognised by international trade, and therefore have no price, and even the water integral to the production of the traded agricultural commodities is only indirectly valued. None of the surface water or groundwater which crosses international boundaries is subject to market processes and it could be argued that international law has been relatively ineffective in moderating the use of water which crosses boundaries in the Middle East and northern Africa in times when riparians actually want to develop water as opposed to when they have little ability to do so.

International water does not currently enter trade and there are few examples of agreements which attribute costs to investment and values to benefits through the development of schemes aimed at realising additional water, such as the aborted Jonglei scheme. The latter type of arrangement was accommodated within the 1959 Nile Waters Agreement when Egypt and the Sudan agreed to invest jointly in, and benefit equally from, the realisation of additional water from the Sudd swamps. Principles of equity were observed vis-a-vis the two national entities, although not with respect to the communities of the southern Sudan who ultimately took action to veto the project. There was no attempt to identify the economic cost of the water or its value at any stage of the project. Egypt's willingness to invest in the scheme suggests that Egypt valued the new water source. However, there has been no attempt to determine the anticipated new water in terms of its value in alternative uses between the two investing countries. Effective allocation and management of water is best mobilised if principles of economics as well as those of equity are deployed as a basis for developing shared water resources.

In a sustainable commercial market, producers and consumers relate to each other through prices which enable both of them to pursue viable livelihoods. There are many examples of vital and apparently successful markets which are by no means exclusively commercial and which serve interests other than those of the producers, marketing agents and consumers. Many markets have to bear significant intrusions by government institutions which extract taxes without impeding the movement of commodities. Many custom levies exist which affect the prices charged to consumers. The substantial taxes placed on oil and tobacco and oil products at one or more stages in the commercial cycle are examples of how governments as well as producers and traders can benefit from the marketing of a commodity. The price which a consumer is prepared to pay is not necessarily related to the cost of producing and marketing a commodity.

One indicator of the value of water is to determine the cost of delivering it. Even when it is freely available at the border or below ground, there are costs associated with the delivery of the water to the user. These costs include engineering, administration and the energy required to transport the water to the fields. In the UAE, approximately one half of the water budget is provided by desalinated water, with the remainder originating from over-pumped groundwater. The cost of delivering water under these circumstances is exorbitantly high.

Another method of gaining a notion of the value of water is to determine what it would cost to gain access to new water. There are no rules which hold throughout the region. Some countries enjoy significant rainfall, while others have as yet undeveloped water resources. Also, the perceived value of water differs from sector to sector. It has been argued that there is very little 'new' water available in the Middle East and northern Africa. Egypt has by far the biggest problem in terms of the volume of water needed. It could absorb productively, and with significant social as well as economic benefits, another ten cubic kilometers of water annually. An additional thirty cubic kilometers of water would be required to meet its current agricultural needs. The strategic value of water could move governments to go to war to secure water supplies resulting in significant military costs although the economic consequences of war argue against such initiatives. Modern technological warfare can cost upwards of one billion US dollars per day. Needless to say, 'new' water gained by such military means would be prohibitively costly. The recent Gulf War proves only too well the costliness of war. Disrupting access to the world economy both for imports and exports has far reaching effects.

A very crude indicator of the value of water can also be derived from the cost of substituting for it in imported food. We do not have the means to determine accurate costs or values for Middle Eastern water and there are no markets to indicate the capacity of users to pay for priced water. It would appear that importing water integral to imported commodities is the best way to gain access to new water for the country facing current or imminent water shortages. Egypt, Jordan and Israel have few, or no options to gain access to new water. In Egypt's case, radical alternatives are required to its approach to the international management of Nile waters.

The cost of delivering water other than rainfall in Middle Eastern and northern African countries is likely to be between 10 US cents and \$2 US dollars per cubic meter. Meanwhile, the capacity of users to pay is poorly developed and as a consequence, poorly understood. The real value of water for the acquisition of those commodities which can be imported would appear to be about 10 US cents per cubic meter. For water delivered to households for which there is no feasible imported source, other than bottled water, the value is probably between 25 and 50 US cents per cubic meter in the non-oil rich countries and a much higher figure in the oil rich states.

The governments of the Middle Eastern countries have been successful in ensuring that their citizens have access to a basic food entitlement (Sen 1981). The propensity to consume at levels beyond the basic entitlement have been demonstrated in the region as the various oil-rich countries brought their oil to the world markets and gained access to unprecedented purchasing power. This trend is not confined to oil rich countries. Egypt has been particularly successful in this regard despite the challenge of its demography and limited resource endowment.

It can be argued that food gaps are defined, rather crudely, by food imports which in turn represent the water gaps in countries of the Middle East and northern Africa. The challenge of the food/water gap in the context of the food entitlement imperative has had a determining effect on the approach of governments to the management of natural resources and in particular, water. All countries of the region have food self-sufficiency policies which are quite inconsistent with the capacity of their natural resources (Allan, 1983). Consequently, these natural resources are not being managed according to sound ecological and economic principles. Water resources have been depleted and misallocated, as in the case of Saudi Arabia, the UAE and Libya and misallocated in the case of Egypt, Israel and Jordan.

If economic principles were applied, the allocation of water and the

capacity to be self-sufficient would be reexamined. If principles of environmental economics (Lutz and Munasinghe, 1991, Pearce et al 1989 & 1990) were deployed, the ecological impact of water misuse would be taken into account as well as the interests of future generations.

The need for water in the region is palpable. The sources of new water are limited and while there is scope for improved management of water which could lead to a doubling of the agricultural productivity, it will be circumstances external to the region which will enable its peoples to have access to adequate food supplies. The major uncertainty is not so much whether the countries of the Middle East and northern Africa can gain access to more new water. Rather it is whether the Middle East, as the major food importing region of the world, and with no indigenous solution to its water problem, can count on the global market to supply food in sufficient quantities and at affordable prices in the decades ahead.

The social value of water has substantial political implications. Water is job creating and provides livelihoods for families and communities. The use of water on 'new lands' has brought significant social returns in Egypt as well as Turkey and the Maghreb countries. Political leaderships in the Arab countries have not challenged the perception that the social returns to water use in agriculture are a sound basis for the allocation of scarce water. Despite the sound principles enunciated by the Prophet calling on Muslims to cultivate their world as if they would live forever, this particular philosophy is not part of the policy of those government sectors responsible for water use nor is it a policy exercised by individual farmers.

The dominant perception in the Middle East and northern Africa regarding access to free water drives water allocation policies and practices in the region. It is widely recognised that there are theoretical as well as practical limitations to legal regimes promoting economic efficiency (Sandbach, 1980, p 43). It is realistic for the moment to assume that Middle Eastern governments will not confront their farming and professional constituencies with calls to reduce water allocations for agricultural use. The rigidity of this feature of the water allocation and management equation is possibly the major source of international tension with respect to water and of potential military conflict. As long as governments in the region have the option of substituting for water by importing food and especially food staples at historically low prices, there is little incentive to confront domestic agricultural interests.

Arguments for pursuing policies guided by principles of economic

efficiency and ecological sustainability with respect to indigenous scarce resources have been consistently ignored. The natural resource endowment of the region dictates that this outside source of water can only become more significant. It is urgent that all the Middle Eastern economies, not just the oil rich ones, gain the capacity to trade for food in the global market. It is also essential that such governments, and where appropriate, their sponsors, carry out critical evaluations of the capacity of the world to produce sufficient and affordable food for the growing populations of food importers in the decades ahead regardless of whether the environment of the Middle East and north Africa will be affected by global change.

Management goals, ideal guiding principles for management, management policies and instruments

Goals of water using activity	Guiding principles	Policies	Institutional Instruments	Engineering
<i>Facilitation of political circumstances to enable optimum resource use</i>	<i>Minimisation of conflict; promotion of co-operation in the areas of water use at all levels</i>	<i>Conflict resolution; identification of reciprocal arrangements to promote economically and socially beneficial water use and the installation of such arrangements</i>	<i>Water sharing arrangements - traditional and new; recognition of water rights &amp; of the ownership of water; consultation between legislators, officials (local, national and international) - ('democratic' institutions); introduction of new economic and legal instruments to shift access to water to the most beneficial users and uses</i>	<i>Earth observation (remote sensing); in situ monitoring &amp; information systems</i>
Productivity ('Development')	Returns to water, sustainability of water supplies.	Investment in sectors, activities and crops which bring optimum returns.  Economic efficiency and market instruments relevant	Water pricing, agricultural subsidies, crop pricing and other intervention. Advanced pricing systems imply water metering. Agreements both local and international. Subsidies and pricing imply water metering.	Large and small civil works for water abstraction, treatment, delivery and distribution, recycling, water metering. Water efficiency studies and water management programmes.
Equitable use	Social benefits	Identification of the social benefits and disbenefits of water use and the promotion of beneficial uses.	Land reform, water regulation, new legislation, reduction of illegal water use, changes to traditional rights	Water control systems, irrigation management.
Safe use	Provision of adequate volumes & quality of water	Identification of appropriate systems - traditional and new - promoting the safe provision of water use, re-use and disposal	Monitoring, legislation, regulating institutions (traditional and new)	Planning for future demands, water control systems, water treatment, maintenance for reliability.
Environmentally sound use ('Conservation' Cultivating the world as if you would live forever.)	Sustainable use of landscape and amenity including intangibles	Identification of appropriate systems - traditional and new - for sustainable water use	Monitoring, legislation, regulating institutions (traditional and new)	Quality monitoring, water treatment, waste water treatment, waste disposal

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# IMPACT OF THE ISRAELI OCCUPATION ON WATER AND ENVIRONMENT IN THE PALESTINIAN OCCUPIED TERRITORIES

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Palestine is a small country with a long and illustrious history. Serving as the host to the world's three monotheistic religions, it remains a religious and political focal point, drawing global interest. In addition to a broad spectrum of ethnic and religious diversity and climatic variations, historical Palestine has a surprising ecological diversity. World interest has traditionally focused far more upon the political dimension in Palestine than on environmental issues. Nevertheless, environmental problems cannot be isolated from the economic, social, political and military issues. Any attempt to address environmental concerns must place the issue into a broader context which comprehends the complexity of the causal influences at play. The case of Occupied Palestine (West Bank, including East Jerusalem and the Gaza Strip) illustrates the organic relationship between conflict and environmental degradation.

Human infringement upon the composition of Palestine's native vegetative cover has occurred mainly in four ways: the cutting of forests for fuel and lumber, overgrazing by domesticated sheep and goats, converting woodlands into arable land, and forest fires, both planned and accidental. Old Testament references indicate that the cutting of forests in Palestine began centuries ago, a practice which has continued since with varying degrees of intensity. Canaanites, Hebrews, Romans, Byzantines, Crusaders, Mamluks, Turks and Israelis have all played a role. During the Turkish occupation of Palestine, vast areas of the remaining natural forests were lost, as large numbers of trees and shrubs were cut to provide fuel for Turkish railways. Many natural forests across Palestine disappeared and the subsequent reshuffling of the vegetation led to the loss or marginalisation of a large part of the native flora. Under Israeli occupation, new sets of rules affecting the environment and natural resources of Palestine were imposed to serve the objectives of the occupier.

Afforestation is forbidden throughout most of the Occupied Territories and water use is limited through the closure of irrigation wells and through severe drilling restrictions. As rainfall is minimal, particularly in the eastern parts of the West Bank, many Palestinian farmers have been forced to leave their land and join the labour market in Israel. Thus, sizable areas of land have remained uncultivated and returned to semi-desert, in yet another chapter in the long

legacy of environmentally disruptive displacement. Palestine is reliant upon agriculture as a principal source of income, contributing one third to its GNP. However, the area of cultivated land by Palestinians has decreased drastically over the past 25 years. About two thirds of the total area of the Occupied West Bank and 40 percent of Gaza are now under strict Israeli control. The major factors which have contributed to the decline of the Palestinian agricultural sector are:

- the high cost of production, particularly cost of labour, has resulted in very low net returns for farmers, especially those cultivating grains, olives and cereals
- the rising cost of living has forced marginal farmers to abandon their land and seek employment elsewhere, especially in Israel
- high competition with subsidised Israel agricultural products have cornered Palestinian farmers into a marginal or no-profit situation
- inequitable trade laws allow subsidised Israeli produce in the territories while banning produce from Palestinian markets in Israel.

Water has always played a significant role in shaping the geopolitical boundaries of the Middle East. Few realise that the lines on present day maps of the region are, to a great extent, the result of a continuous parade of water related wars, occupations, cease fires and imposed peace plans. To a large degree, water resources in the area have been taken over by force and military intervention. Accordingly, the interrelationship between water resources, conflict, competing ideologies, nationalistic agendas and basic human needs cannot be overlooked. Unless this complex interplay is taken into consideration in future plans, water issues will guide the peoples of the Middle East into further conflict.

The Jordan River is the only source of fresh surface water in Palestine. The Jordan River is fed by numerous tributaries: Baniyas, Hasbani, Dan Zarqa, Yarmouk Quitl, Auja and others. The length of the river is about 252 kilometers from its source near Baniyas to the Dead Sea. Today, both the Jordan River and its tributaries in the north, notably the Dan, are flowing at dangerously reduced levels. The Dan normally flows at an average rate of 8 cubic meters per second in October however, in October 1991, its average flow did not exceed 4.5 cubic meters per second. Several Israeli projects have altered the character of the Jordan River, reducing it to little more than a trickle

of sewage. The greatest part of the Yarmouk River has been redirected to the Eastern Ghore Canal and the remainder has been pumped to the Sea of Galilee, resulting in a major drop in the water level of the Jordan River. The diversion of additional water to the Negev, via Israel's National Water Carrier, dropped the water level even lower. In 1977, Israeli authorities launched the Gilgal Project through which the Jordan River water is pumped to new Israeli settlements built in the Jordan Valley. Thus, by the time the river reaches Palestinian zones, the flow is inadequate to meet the demands of the farmers.

The undergroundwater capacity of the West Bank is estimated at 600 - 800 mcm per annum. Under normal conditions, 600 mcm is recharged annually to the subterranean reservoirs of the West Bank. The following table presents the capacities of the West Bank aquifers and the current distribution quotas as allocated by the occupation authorities:

<b>Basin</b>	<b>(mcm/y)</b>	<b>Palestinians</b>	<b>Israelis</b>
Northwestern	140	30	110
Northeastern	335	25	310
Eastern	125	60	65
<b>Total</b>	<b>600</b>	<b>115</b>	<b>485</b>

Israelis use 485 mcm from West Bank waters per year while Palestinians use only 115 mcm of their own water. Israeli restrictions have drastically limited the water available to irrigate Palestinian lands and thus, today less than 6 percent of the land cultivated by Palestinians in the West Bank is under irrigation, the same proportion as in 1967. By contrast, about 70 percent of the area cultivated by Jewish settlers in the West Bank is irrigated. Military Order number 92 of 1967 concentrated all control of water resources in the hands of the Israeli military administration who thereupon imposed the following restrictions:

- the prohibition to drill any new wells without prior permission from the military
- the freezing of pumping quotas for wells and the establishment of control mechanisms to monitor Palestinian water use
- the expropriation of wells belonging to absentee Palestinian owners

On a per capita basis, an Israeli uses 375 cm/year versus a Palestinian who uses 107 - 156 cm/year while a Jewish settler uses 640 - 1,480 cm/year. Water prices for residents of the Occupied Territories vary drastically, depending upon whether you are Jewish or Palestinian. While the actual cost of supplying one cubic meter of water in Israel is estimated at about \$0.33, Israeli farmers are charged about 10 cents for each cubic meter for agricultural use. Palestinian consumers pay up to \$1.20 per cubic meter of water, with no subsidised rate for agriculture. In 1991, the water situation in the West Bank was so severe that entire villages were left with dry wells. The hardest hit areas were Hebron and Bethlehem, where an underground market was formed and a cubic meter of water was sold for \$4.00.

The Gaza Strip is wholly dependent upon groundwater aquifers for fresh water. Unfortunately, the water quality of the coastal aquifer underlying Gaza has deteriorated to a critical point due to a barrage of infringements including sea water intrusion, sewage contamination and pollution by agricultural fertilizers and pesticides. The problems now being addressed in Gaza are merely one representative part, if perhaps the most advanced, of the problems threatening the entire coastal aquifer. A leading cause of the Gaza water problem is the over pumping of groundwater. Water usage is approximate as follows:

Irrigation	60 - 72 mcm
Drinking and Industry	26 mcm
Israeli Settlement	20 mcm
Total	106 - 118 mcm

The annual inflow to the aquifer is approximately 70 mcm, resulting in an annual deficit of 35 - 50 mcm in Gaza alone. The cumulative deficit of the entire coastal aquifer is estimated by Israel's State Comptroller, after two decades of over pumping, at 1.1 billion cubic meters. Contributing to the groundwater deficit is the capture of water from the Gaza Valley, originating in the southern mountains extending to Hebron and flowing to replenish the aquifers under Gaza. Before crossing the green line the waters are pumped to the Negev as irrigation water, eliminating a high percentage of the groundwater inflow needed to maintain water levels. The drop in groundwater levels results in the intrusion of sea water into the fresh water aquifers. The salinity of Gaza's groundwater increases at a rate of 15 - 25 ppm chlorine annually, although rates vary considerably from place to place depending upon

hydrogeological factors and pollution rates. Also contributing to the increasing rate of salinity is the accumulation of dissolved salts from natural sources, a process accelerated by over pumping and the return flow of effluents used for irrigation. By 1992, according to Israeli Hydrological Service estimates, some 16 percent of the wells in the coastal aquifer will exceed acceptable levels of salinity, making them unfit for agriculture. In Gaza, where the problem is generally at its worst, nearly 60 percent of groundwater stocks have reached a salinity of over 600 ppm, rendering them essentially useless. The inequitable Israeli water policies are rooted in the availability of inexpensive, subsidised water for Israeli agriculture which leads to excessive and wasteful use by Israeli farmers. Agriculture contributes only 6 percent to Israel's GNP and absorbs two thirds of the water resources currently under its control. Three asymmetries are endemic to the way Israel uses water. Firstly, there is a heavy concentration of water use in agriculture at the expense of other sectors and areas, particularly Palestinian farming. Secondly, there is a high level of production of water-intensive crops, such as cotton, bananas, melons, fruits and vegetables. Thirdly, Israel transfers water through the National Water Carrier from the north to the south. This diverted water supply enables the Negev area to artificially produce agricultural goods at a very high and unsustainable cost.

The green cover in the Occupied Palestinian Territories is disappearing due to the disruption of the natural equilibria in this fragile environment. Palestinians are allowed to irrigate less than 6 percent of the cultivable land in the West Bank because of Israeli control over their water resources. Afforestation is forbidden in most of the Occupied Territories by Israeli military regulations. However, the uprooting of trees by the occupying army continues. Many olive, fruit and nut trees have been destroyed either under the pretext of security or to facilitate settlements. Since the beginning of the peace negotiations in Madrid, 39,120 dunams of land have been confiscated and 13,108 trees were uprooted by the Israeli occupation authorities. Overgrazing is another factor that contributes to desertification. Since the beginning of the occupation in 1967, Israeli authorities have systematically confiscated and/or closed large tracts of land in the Occupied Territories. Grazing areas, which in 1967 totaled 55 percent of the West Bank and Gaza, now constitute only 15 percent.

A warm climate combined with an economy highly dependent upon agriculture has contributed to widespread agrochemical use. Moreover, the lack of mechanisms, institutions and laws which control and monitor the sale and proper application of agrochemicals have left such use in the Occupied Territories virtually unregulated. Particularly problematic is the lack of

extension services. This has left farmers vulnerable to unscrupulous pesticide merchants and middlemen who pose as experts and too often sell what they have on hand rather than what the farmer actually needs. Accounts of fraud, dilution and the sale of wrongly labeled chemicals and banned pesticides are rife. In addition, agrochemicals imported from Israel are labeled only in Hebrew, which most farmers cannot read.

Water drainage is a serious problem in Palestine. Inadequate drainage systems promote the spread of disease and the pollution of water supplies. More than 60 percent of the households in Gaza and 45 percent of those in the West Bank lack well controlled and organised sewer networks. Unregulated pesticide and fertilizer use also pollutes the environment and impedes the recycling or treatment of water.

The Arab-Israeli conflict has caused major population displacement among Palestinians. The refugee camps in the West Bank, Gaza, Jordan, Lebanon and Syria have held hostages for 45 years who are denied the right to return. Refugee camp life is characterised by poor living and unhygienic conditions, a polluted environment with open sewage and a scarcity of clean water due to poor piping systems. These are direct by-products of occupation. The subsequent slow down in Israeli economic growth, along with the lure of lucrative Gulf employment opportunities, were among factors responsible for the sharp increase in Palestinian migration in the mid-1970's. Population estimates in May, 1967 just before the occupation, placed the population of the West Bank at 895,000 and the Gaza Strip population at 389,000. The total migration during the 1967 occupation until late 1968 totaled a reported 312,000. Economic migration took many forms. Labourers migrated daily to Israel or permanently to the Gulf and other Arab countries in search of economic opportunities. The influx of cheap Palestinian labour helps the Israeli economy to produce at lower costs, enhancing the development of the Israeli economy at the expense of the Palestinians. The most compelling and environmentally damaging migration, was the overflow of refugees escaping occupation. Estimates in 1985, placed the West Bank population at 813,400 of whom 15 percent lived in refugee camps. In the Gaza Strip, 60 percent of the population lives in camps. It is one of the most densely populated areas in the world.

Realistically, there are limitations to what can be accomplished in the Occupied Territories prior to arriving at a genuine resolution of the long-standing political impasse. Nevertheless, there is plenty to do in preparing for the next stage. In the interim, emphasis should be placed upon institution

building, public awareness and future planning. The international community is urged to assume responsibility in support of Palestinian national institutions that will be capable of rehabilitating their environment in preparation for the future. Support at the international level becomes even more essential as the Occupied Territories have been isolated and beyond reach of environmental assistance. For example, the UNEP and other international agencies have so far declined invitations for involvement in the Occupied Territories. It is hoped that neutrality and isolation will be replaced with commitment to participate in the exciting task of securing the sustainable development of the Occupied Territories.

Israel has denied the Palestinians the right to build their own environmental institutions and infrastructures that may assist them in efforts to conserve their environment. For instance, Israel abolished the research component in all Palestinian experimental stations and converted them to commercial activities, reducing the budget for applied agricultural research for the West Bank to \$1,400 US per year. The number of governmental extension workers has also fallen to one third of what it once was. Similar trends occur in the area of public health. Without regard for population growth, the number of hospital beds in the Occupied Palestinian Territories has been reduced from 1127 in 1968 to 1001 in 1992. At least eleven hospitals and medical centers have been closed by Israel since the beginning of the military occupation in 1967. During the 1980's, health expenditures fell from \$30 to \$22 US per person while in Israel it increased from \$350 to \$500 US over the same time. Despite constraints and oppressive measures caused by the prolonged Israeli occupation, Palestinians have diligently been working to promote the sustainability of their environment. They have established their own agricultural grass root organisations and institutions to compensate for the deficient research extension services provided by the Israeli-controlled public sector. Likewise, they have established grass root health care organisations and underground teaching facilities in their homes to compensate for the deteriorating educational system. Already, there is a noticeable increase in environmental consciousness among Palestinians. Initiatives have been taken in the Education for Environmental Awareness programme launched by a group of private schools in the West Bank. Palestinians must make the protection and care of the environment a national priority. Publications, media programming, newspaper columns, educational curricula and the formation of national institutions can all operate as forums for expanding awareness. An environmental ethic must be cultivated and adopted in which resources such as clean air, land and water are viewed as precious assets to be protected, managed and allocated with care.



The occupation has brought about and exacerbated additional environmental problems in Palestine. For example, the regular sonic booms as a result of military aircraft overflights are a constant menace in the West Bank and Gaza. Military training exercises in the highlands lead to irreversible damage to Palestine's rich topsoil. Palestinians are concerned about the build-up of nuclear and other non-conventional weapons in Israel as well as in the surrounding countries in the region.

Palestine is a unique place, deserving of our most dedicated efforts towards her preservation. The rich diversity of her ecology mirrors the religious and cultural variety which converges within a compact area. What becomes obvious is that only a sound and healthy ecological environment can adequately host this rich gathering of ethnic variation and that this will only occur if the human component in the ecological web plays a role commensurate to its status. This is a worthwhile challenge. The question then is, how to proceed. Vital to a responsibly planned future is the thoughtful formation of an underlying philosophy which will provide guiding direction to conceptions of policy and priority on the national level. Indeed, any future edifice will surely reflect the foundations that are being laid now. The transition from the present to the future must be informed, taking into account the mistakes and successes made in the past. Today's decisions must, to every extent possible, be made with the future in mind. Effective environmental management must involve the coordinated cooperation of many. Science and agriculture require creative, ecologically sound alternatives such as biological control methods and resistant varieties. They must not only stay abreast of developments in the field, but contribute to them. Environmental consciousness must be made attractive to industry and commerce. Cooperation must also extend across national borders.

In the case of Israel-Palestine, a developed industrial power occupies a developing country and harvests the fruit of that relationship - land, water, cheap labour and an open market. In 25 years, Israel's military administration has demonstrated little appreciable interest in the Palestinian environment. On the contrary, it has pursued and implemented policies which include over-exploited water resources, confiscated land, deforested and overgrazed land, polluted water resources, free-flowing water and thousands of refugees sustained only by the dream of an eventual return. Unless the occupation ceases, environmental degradation is likely to reach even more damaging levels.

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*From left to right in the first row:*

*Mr. M. S. Rabbani, Chairman of the Lutfia Rabbani Foundation; Mr. L. J. Brinkhorst, Director General of the Commission of European Communities for Environment, Nuclear Safety and Civil Protection; and Mrs. Anisa Rabbani*

# THE ROLE OF CONSULTING IN ENVIRONMENTAL MANAGEMENT

***DR. IR. P.J. HUISWAARD, Partner/Director BKH Consulting Engineers***

Environmental pollution is a problem experienced all over the world, ranging from local pollution in, for example, soil or groundwater, to global pollution such as emissions to the air which lead to the 'greenhouse' effect. We all want sufficient fresh water and a clean environment, for ourselves and especially for our children.

The UN Committee Brundtland in their report, 'Our Common Future', introduced the notion of sustainable development. As well, the recent Rio Conference was a major effort in establishing measures for reaching this goal. There is however, still a long way to go.

Independent consultants can play a role in this process. Particularly those consultants who are affiliated with FIDIC worldwide and with EFCA throughout Europe. The Netherlands Association of Consulting Engineers, ONRI, is a member of both FIDIC and EFCA and deals actively with environmental problems. They act according to the ecological code of conduct which stipulates that projects may not be accepted if they lead to harm to the environment.

ONRI is composed of 200 consulting firms with 10,000 professionals operating worldwide. They carry out studies and projects in fields such as irrigation, water supply, urban drainage, flood control, waste water treatment and sanitation, prevention and abatement of soil and air pollution, desalination, re-use of waste water and recycling of waste. Problems are no longer dealt with on a purely technical basis. Much emphasis is applied to integrated environmental management. Solutions must be a part of an overall environmental management plan. Environmental impact assessments are an essential part of this planning. The major issues with which consultants have experience in include:

- development of technology
- transfer of clean technology
- on the job training abroad and at home
- institutional aspects (alternative solutions)
- feasibility studies and financial analysis

A broad and multidisciplinary approach to the problem is necessary. Two

major aspects of cooperation include that every project should be within the framework of the cultural environment of the country concerned and in cooperation with local consultancy and expertise.

## REQUIRED WATER POLICIES

***DR. ANIS MOUASHER, Chairman of the Mouasher Cousins Company representing the Arab Thought Forum and former Minister of Finance of Jordan***

There is no doubt that water is and will increasingly be the most scarce and valuable commodity in the Arab world in the years to come. The differences over water rights and its use among the countries of the region are old and complex. They have created conflicts and triggered wars and are likely to do so again unless they are effectively addressed. The water resources in the Arab world are limited and scarce. Annually, the available water per capita for some of the countries in the region is below 250 cubic meters while the minimum requirement, according to international standards, is 1000 cubic meters. Over 70 percent of the water used by each of the Arab States and Israel originates from outside their respective borders which makes it difficult for these countries to control the water flow and limit the possibility of upstream pollution. Water rights in the area are neither well-defined nor respected. According to the 'Johnston Plan', accepted by both Jordan and Israel, Jordan's share of water from the Yarmouk and Jordan Rivers is 477 mcm annually and Israel's share is 400 mcm. Presently, Jordan is getting only 100 mcm whereas Israel has access to 750 mcm.

In the Arab world, the consumption of water for urban and industrial use is still low. The demand is expected to increase substantially in order to meet the requirements of social and economic development, to cope with the high rate of population growth (3.6 percent in Jordan), to deal with the decreasing demand for water for agricultural purposes and to meet the increase in annual water consumption per capita.

While the overall demand for water is increasing, the water resources are decreasing due to the depletion of non-renewable basins and the overexploitation of renewable basins. Jordan, Palestine (the West Bank, Gaza) and Israel are presently overexploiting their water resources by 15 percent, 20 percent and 10 percent respectively. An increase of salinity in the water basin as well as chemical and organic pollution are also factors in the reduction of water resources. The expected increase in the rate of evaporation due to global warming is also of concern. Despite its complexity, the water issue in the Middle East needs to be addressed before it is too late.

Suggested measures are as follows:

- prevent overexploitation and stay within the sustainable capacity of water basins
- improve the water distribution systems for improved efficiency through good management
- build water treatment and water recycling plants to prevent pollution and replenish resources
- research more effective procedures for desalinating the brackish water which is available in large quantities in most Arab countries
- consider the desalination of sea water as a potential water resource
- identify water priorities. The issue of subsidising water must be reconsidered, especially in cases where large amounts of fossil water are being used for the production of subsidised wheat
- intensify efforts to reach agreement between the states sharing water supplies, to define and protect water rights and prevent pollution

As the stability of the Middle East is in the interest of the European Community, and in view of the historical relations that exist between Europe and the Arab countries, Europe should play a major role in assisting the Arab countries in solving their water problems. Providing technical assistance and management skills for the implementation of the above mentioned measures, especially in the area of desalination and recycling, is crucial. Europe can play an important role by providing experience and the necessary mediation efforts to assist in reaching agreement among parties sharing the same source of water for its effective use.

The Nile, the Jordan and its tributaries the Tigris and the Euphrates are currently sharing water resources. An example of the possibility of providing assistance to the Arab countries is through the implementation of the Red Sea-Dead Sea Canal project to reestablish the water balance, generate electricity and desalinate sea water. It is important to mention that a solution for the problem will become much easier if a peaceful settlement is reached in the Middle East between the Arabs and the Israelis.

## WATER AND ENVIRONMENT: PERSPECTIVE ON COOPERATION BETWEEN EUROPE AND THE MIDDLE EAST

**MR. S.M. OSMAN**, *Assistant Executive Director, Policy Development and Inter-Agency Affairs of the United Nations Environment Programme, the UNEP*

Water, like air, is no longer a 'free good' in large parts of the world today. Population growth produces excessive pressures on limited water availability and urban growth results in ever increasing point demands. Decreasing use of organic fertilizer and bad land use practices have reduced soil permeability and water holding capacity, and consequently, created drought like conditions in many areas. Water shortages in many parts of the world require solutions that are often costly, technically difficult, and very often politically sensitive. This is particularly true in the Middle East. The World Resources Institute (1) assesses that in the Middle East and north Africa, water shortages could reach crisis proportions in the present decade. Jordan, Israel, Algeria, Egypt, Tunisia, Libya and the countries of the Arabian Peninsula have reached the point where nearly all available supplies are being used.

The water issue is particularly difficult in this region because so many countries share common water resources. For example, Egypt relies on the Nile for 96 percent of its domestic consumption; yet most of this river's waters originate in eight upstream countries. Israel, the West Bank and Gaza, and the Jordan are facing a combined water deficit of at least 300 million cubic meters per year.

Water has many political implications in the region. For example, the Yarkon/Taninim aquifer, which provides 25 - 40 percent of Israel's water, lies beneath both pre-1967 Israel and the West Bank and is thus a strategic concern for Israel in negotiations over the future of the West Bank. Efforts to develop the Jordan and Yarmouk River basins have been halted by Arab-Israeli or Syrian-Jordanian tensions.

Turkey, Iraq, and Syria have frequently been at odds over the management of the Tigris and Euphrates river basins. Egypt has constructively started a consultative group of the Nile countries and has proposed a long term scheme for the development of the Nile.

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Footnote 1: *World Resources 1992-1993*, New York and Oxford, Oxford University Press, 1992.



Areas with water shortages, especially in high income countries, turn increasingly to desalination plants to supplement water resources. Countries like Saudi Arabia and Kuwait can afford the relatively high costs of desalination. Measured by percentage of global capacity, Saudi Arabia is in fact the world leader with 27 percent, followed by the United States with 12 percent, Kuwait with 11 percent, and the United Arab Emirates with 10 percent.

About 65 percent of all desalination plants are treating sea water and 27 percent are treating brackish water. Desalination plants are increasingly being used for applications other than removing salt, such as the treatment of effluent waters, of river water to obtain water for boilers, of groundwater that has been polluted by nitrates and pesticides, and for municipal water to make ultra pure water for the electronics industry.

At present, desalination is still three to four times more expensive than conventional sources of fresh water. As the technology improves, however, and the cost of conventional fresh water increases, desalination plants are likely to become more popular and the costs are likely to continue to decline.

There is a meaningful scope for international transfer of technology in this area. UNEP, at this moment, is exploring the possibility of establishing Centres of Excellence, in developed and developing countries, to promote the transfer of technology. A first such Environmental Technology Centre was established in Japan in October, 1992.

It is my view that experience with regard to desalination acquired in the Middle East can and should be made available first to the less developed countries in the region, and further to other less developed countries in Africa and worldwide.

Pollution of freshwater can have different causes; deficiencies in sewage infrastructure; excessive irrigation and other agricultural practices; dumping of domestic and industrial waste; air borne emissions. These are not hypothetical dangers. There is, for example, the pollution due to excessive irrigation. In Egypt, 4 million hectares of land are under irrigation, and a million more hectares are planned for irrigation. In Sudan, 1.5 million hectares are currently under irrigation with an additional 1.5 million hectares planned.

Experience has shown that diversion of water for irrigation can severely affect water quality, through increased salination and other factors. It is also our experience that freshwater, polluted by metals and industrial or agricultural chemicals, requires expensive, technologically advanced

treatment. Preventing pollutants from entering groundwater or surface waters can reduce treatment costs and downstream damage. If however, pollution originates in upstream countries and its effects are borne by downstream countries, international agreement is needed on how to share the ensuing costs and benefits of prevention and/or treatment.

Since the United Conference on Human Environment in Stockholm in 1973, global concern about the availability and quality of water has been expressed time and time again. The issue was fully highlighted at the United Nations Water Conference held in Mar Del Plata, Argentina in 1977. The implementation of the Mar del Plata Action Plan has been rather slow, however, recently the United Nations embarked on the formulation of a global strategy to implement the Plan in the 1990's.

Water issues and the environment have come to public attention as matters of priority for mutual consultation and common initiative between Europe and the Arab world. The European Community plays an active role with regard to water pollution and in tackling other environmental problems in the Mediterranean region. The EC and the Arab League played an important part in the Conference on Euro-Mediterranean Cooperation on Environment in the Mediterranean Basin held in Cairo in April, 1992.

Given the importance of the water issue in the region, it is quite appropriate that the current Middle East negotiations include a multilateral committee on Water and Environment. In January of 1992, the International Conference on Water and the Environment was held in Dublin. The Dublin Statement is action oriented and emphasises the need for implementation mechanisms at international, national and local levels. Finally, water and the environment received due attention at the Earth Summit in Rio in June, 1992.

Still greater efforts are needed to formulate a common approach to water and environment issues, including allocation of European and Arab funds, as well as environmental protection arrangements and development plans. Funds will be essential. The gap between available resources and escalating needs is widening continuously. The financial challenges are great.

There is clearly a need for new strategies that provide for a balance between short term acute needs and long term perspectives. In the short term, we should aim to find solutions for energy and food needs to arrest the degradation of the resource base. Our long term strategy should be based on an approach of integrated and sustainable development and management of land and water within a river basin context, taking into consideration upstream/downstream linkages as well as linkages between water dependent and water impacting land use.

The international community has an important role to play in bridging the difficulties arising from differences in terms of access to information and trained manpower. This is to make it easier for less developed basin countries to benefit from joint definition and approach of problems of equitable use and upstream/downstream dependence.

Water management was one of the initial main activities of UNEP. During the last two decades, a series of UNEP water activities, initially in the form of independent projects, were implemented. They deal with specific elements of environmental impact assessment of water management systems and environmentally sound management of the water resources. Other activities of UNEP, such as the Global Environment Monitoring System (GEMS), action against desertification, soils, health, and human settlements also have important water components. The water projects of UNEP have been implemented in many different parts of the world. Since UNEP is not an executing agency, they were implemented by and in close cooperation with the UN Regional Commissions, UN-DTCD, UNESCO, WHO, FAO, UNICEF, WMO and others. The results of these activities have been translated into governmental decisions, various guidelines and publications, and have generally improved the expertise of water specialists. Furthermore, they have contributed to integrate environmental assessment and impact studies in the planning and decision making processes for water projects.

In 1986 UNEP launched the Environmentally Sound Management of Inland Water (EMINWA) programme. This is a comprehensive approach to water management to enhance socio-economic and environmental development, especially in international basins (whether rivers, lakes, or groundwater aquifers). The programme is designed to assist governments to integrate environmental considerations into the management and development of inland water resources. This with a view to reconciling conflicting interests and ensuring the regional development of water resources in harmony with the water related environment through entire water systems.

Within the framework of EMINWA, the Zambezi Action Plan for the environmentally sound management of the common Zambazi river system was adopted in 1987. Eight countries are participating in the ZACPLAN. A master plan for the development and environmentally sound management of the natural resources of the conventional Lake Chad basin area was completed in 1991. Five countries were involved in this project. Presently, the management of the Nile river basin is one of the ongoing activities. UNEP is willing to use the experience gained over the years, especially through the EMINWA programme, in backing Euro-Arab initiatives in the crucial area of water and environment.

## CLOSING STATEMENT

**PROF. DR. U. VERMEULEN, CATHOLIC UNIVERSITY OF  
LEUVEN AND UNIVERSITY OF GHENT, BELGIUM**

This fifth Euro-Arab Dialogue Forum has been dedicated to Water and the Environment. We have heard several distinguished persons addressing this theme with authority based on extensive knowledge. The water problem is of vital importance for a peaceful solution to the tensions prevailing in the Middle East. It was enlightening to hear the different approaches presented by each of the speakers. The panel discussion familiarised us with the main technical and political issues. Rather than repeating in summary fashion what has been said so convincingly, I propose to add a few comments intended to throw some more light on the cultural aspect of this subject.

We must realise that the water problem in the Middle East is quite ancient. Very likely, human civilisation revolved around the control over such rivers as the Nile, the Euphrates and the Tigris. It is superfluous to expound on Mesopotamian myths, the history and world view of the ancient peoples with regard to the role of water. The laws of Hammurabi show that irrigation on both sides of the Mesopotamian rivers was highly developed. Water has always played a purifying role, as is demonstrated by baptism in Christianity and ablution in Islam.

No one will deny that the regulations concerning water use, the upkeep of water courses, the distribution of water, irrigation works and the problems related to drinking water take a prominent position in classical Islamic law. It is impossible to imagine the Islamic range of thought without the exalted position of water. Sura 21, verse 30 states: "And We have made from water every living thing".

Al-Bukhari mentions a tradition which states that giving water in charity, as a gift or by way of a testament is permissible, whether it be divided or not. There are further traditions concerning the use and abuse of the dams in rivers and of canals, a topical issue not just in the Middle East. On the authority of 'Abd Allah ibn az Zubayr and 'Urwa it is said that:

*When a man from the Ansar quarrelled with Az-Zubair, the Prophet said, "O Zubair! Irrigate (your land) first and then let the water flow (to the land of the others). On that the Ansari said, (to the Prophet) "It is because he is your aunt's son". On that the Prophet said, O Zubair! Irrigate till the water reaches the walls between the*

*pits around the trees and then stop i.e. (let the water go to the other's land)".*

Yet another tradition may be mentioned in this context. Abu Huraira narrated that the Prophet said "There are three types of people whom Allah will neither talk to or look at on the Day of Resurrection. They are:

*A man who takes an oath falsely that he has been offered for his goods so much more than what he is given;*

*A man who takes a false oath after the 'Asr prayer in order to grab a Moslem's property;*

*A man who withholds his superfluous water. Allah will say to him "Today I will withhold my grace from you as you withheld the superfluity of what you have not created".*

Whenever the states in the Middle East consider the rivers flowing onto their property as their own without taking into account that neighbouring countries also have a right to access the water, dangerous regional conflict generally emerge. Let us hope that the words of Secretary General Boutros Boutros Ghali were not unduly pessimistic when he stated that the next war in the Middle East would come as a result of water disputes and not politics. For instance, Syria and Iraq have grown dependent on the benevolence of Turkey with respect to access to the Euphrates. Who can guess what may happen to the Litani river when the State of Israel runs low on water over the next decades. The Jordan and Yarmouk also present a concern. We must have faith in the wisdom of those responsible for the welfare of these peoples and hope that they will achieve a just and legitimate use of all natural resources including water. To conclude, we may ponder on the meaning of the tradition which states: "Do not withhold the superfluous water for that will prevent people from grazing their cattle".

## LIST OF CONTRIBUTORS

**Dr. Mahmoud Abu-Zeid**, born in Egypt, obtained a Ph.D. at the Groundwater Hydrology University of California. Since 1979, he has served as the Senior Under-Secretary of State and Chairman of the Water Resources Center within the Ministry of Public Works & Water Resources in Cairo. His experience includes the rehabilitation and design of modern field irrigation systems as well as the design of drainage systems. He serves as the President of the International Water Resources Association and contributes to supervising M.Sc. and Ph.D. candidates. In addition to having authored seven books, Dr. Abu-Zeid has published extensively in journals and presented technical papers in national and international conferences.

**Professor Tony Allan** was educated at the University of Durham and obtained a Doctorate at the University of London. He specialises in studies of the renewable natural resources of the Middle East and northern Africa and in the institutions which allocate and manage them. He publishes extensively on these topics including books on Libya, Syria, Japanese Middle Eastern relations, The Sahara, Deserts and over 150 articles on related topics. He also provides advice to governments in the region and to international agencies. He is very interested in techniques of Earth observation in the monitoring of the land and water resources of arid and semi-arid regions. He is Co-ordinator of Remote Sensing in the University of London and is past Chairman of the Middle East Centre at SOAS, past Chairman of the Society for Libyan Studies, past Vice-President of the Remote Sensing Society and is currently Dean of Continuing Education at SOAS where he contributes to teaching and supervision at all levels.

**Mr. L.J. Brinkhorst** studied at Leiden University and completed his Master's Degree in Public Law and Government at Columbia University in New York. Between 1967 and 1973 he was Professor of European Law at Groningen University in The Netherlands. He then served as State Secretary for Foreign Affairs from 1973 to 1977 and as a Member of Dutch Parliament between 1977 and 1982. In 1983 he became Head of the Delegation of the Commission of the European Communities in Japan and in 1989 he assumed his current position as Director-General for Environment, Nuclear Safety and Civil Protection with the Commission of the European Communities. He has published several books and numerous articles on European Integration and European Community Law.

**Dr. Ir. P.J. Huiswaard** studied Civil Engineering at Delft University of Technology and obtained a Ph.D. from The Northwestern University of Evanston in Illinois. Mr. Huiswaard joined BKH Consulting Engineers as Partner and Director in 1971. His special expertise includes the direction of hydraulic and sanitary engineering projects as well as providing advice on the establishment and management of water authorities and water pollution control organisations. Mr. Huiswaard's professional experience includes project advice on water supply, sewerage, sanitation and wastewater treatment (domestic and industrial), urban infrastructure development as well as integrated environmental impact assessments in Asia and Africa. He serves as a project advisor for wastewater treatment plants for large urban centers in The Netherlands, Eastern Europe and Asia.

**Dr. Jad Isaac** received his Ph.D. in Biology from the University of East Anglia in the United Kingdom in 1978. Prior to assuming his current position as Director of the Applied Research Institute in Jerusalem in 1990, he was the Dean of the Faculty of Science at Bethlehem University between 1982 and 1987 as well as an Associate Professor in the Department of Life Sciences at Bethlehem University from 1983 to 1990. He has numerous publications, translations, position papers and feasibility studies to his credit. He serves the public interest as a member of numerous community service organisations including Head of the Palestine Delegation to the working group on environment, multilateral negotiations for the Middle East peace process. In 1986 he was awarded the 'Abdul-Hamid Shuman' award for Arab Biologist of the Year and received the 'Professor Abdul-Salam' award for Palestinian biologist of the year in 1990.

**Mr. Samir Kavar** obtained his M.Sc. in Agricultural Machinery Engineering from Kansas State University in 1961. He has extensive private and public experience as the founder of various corporations specialising in industrial, agricultural, banking, insurance, investment and real estate. He is a Member of Parliament, Balqa Governorate and currently holds the position of Minister of Water and Irrigation.

**Drs. N. Kroes** obtained a Doctorate degree of Science in Economics from the University of Hull in the United Kingdom. She was the Minister of Transport and Public Works of The Netherlands and served as an adviser to the European Transport Commissioner in Brussels. She is currently the

President of Nijenrode University in The Netherlands and holds a number of Board positions including President of the Board of Directors of The National Investment Bank Ltd in The Netherlands. She has been honoured with several Dutch and foreign decorations.

**Dr. Anis Mouasher**, born in Jordan, completed his studies in Pharmacy & Chemistry at the American University of Beirut. He has held a number of civil posts including Minister of Finance & Transport and Chairman & Member of the Economic Committee Jordan National Consultative Council. He is active as Chairman of the Board of Directors of a number of companies and serves as a Member for several voluntary organisations including President of the Royal Society for the Conservation of Nature. His awards and honours include the 'Al-Kawkab Decoration - 1st Degree' from the King of Jordan, 'Knight of the Holy Sepulchre' from his Holiness, the Pope and the 'Royal Swedish Order of the Polar Star' from the King of Sweden.

**Dr. Adnan Omran** holds degrees in both law and history from the Syrian University as well as a diploma in diplomatic studies and international law from Columbia University in New York. He served as the Ambassador of the Syrian Arab Republic to the United Kingdom and Sweden between 1974 and 1980 prior to being elected to his present post as Assistant Secretary-General for International Political Affairs at the League of Nations. He has represented the League of Arab States in many International Conferences and UN Committees.

**Mr. Salih Osman**, born in Sudan, received his Masters in Economics from the American University of Beirut and did further graduate work in Economics at New York University and St. John's University in New York. Mr. Osman formerly served as the Consul of Sudan in Lebanon and as Deputy Consul General at the Sudan Consulate General in Bonn as well as the Consul General of Sudan in New York and the senior representative of Sudan to the Economic and Social intergovernmental bodies of the United Nations in 1970. Since 1971, Mr. Osman has been in the service of the United Nations and was one of the first to join the United Nations Environment Programme Secretariat in 1973, in which he served in varying senior capacities in Nairobi. Prior to his present position as Assistant Executive Director responsible for Policy Development, he served as Director and regional representative in West Asia for seven and a half years



in Bahrain. He was closely involved in a number of significant environmental initiatives in the Arab region and played a pivotal role in the establishment of the Council of Arab Ministers responsible for the environment in the context of the League of Arab States.

**Mr. Mahmoud S. Rabbani**, born in Haifa, came to The Netherlands to study at the University of Technology in Delft. In 1959, he founded the trade company 'Meper Export' (Middle East Bureau for the Promotion of Economic Relations). He is also the Managing Director of RTC Rabbani Trading and Consulting B.V. In these capacities, he advises many Dutch and international companies in establishing business relations with the Arab world. In 1967 he was appointed Honorary Consul of Kuwait in The Netherlands. For his endeavours in securing good relations between the Arab world and Europe, particularly The Netherlands, he was awarded the Second Order of the State of Kuwait by His Highness the Emir. In 1984, he was admitted as Honorary Consul General of Jordan in The Netherlands. Her Majesty Queen Beatrix awarded him the rank of Officer in the Orange Nassau Order in 1985. He regularly gives public speeches and interviews through radio, television and newspapers on European, primarily Dutch, economic relations with the Arab world as well as addressing the Palestinian question.

**Mr. Afif Safieh**, born in Jerusalem, completed his studies at the Catholic University of Louvain in Belgium. Between 1985 and 1987 he joined the Centre for International Affairs, Harvard University, as a visiting scholar. In 1987 he became the PLO representative to The Netherlands and in September 1990 he was nominated to his current position as Head of the PLO Delegation to the United Kingdom. In addition to having served as a diplomatic correspondent in Boston for the Jerusalem-based Palestinian English weekly, Al-Fajr, compilations of his articles have appeared in two books.

**Prof. Dr. U. Vermeulen** received a Ph.D. in Arts. Prior to assuming his current position as Professor in Islamic Studies and Classical Arabic at the Catholic University of Leuven and the State University of Ghent respectively, he served as Chief Assistant in the State Archives in Ghent and as Researcher for the National Fund of Scientific Research. His publications include the medieval Arab novel 'Sirat 'Antar'. He is active on various Committees and Boards and makes regular contributions to the media regarding developments in the Islamic world.

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