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# Striking the right 'price' for water: achieving harmony between basic human need, available resources and commercial viability.

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## Abstract

The acceptability of a price for water to its users is not related to the real 'value' of the water. Throughout the world there is a very strong traditional tendency to regard water as a free good and where water is plentiful the approach may be reasonable. In regions where water is scarce, however, the belief that unlimited supplies of water 'should' be available is very dangerous as it reinforces already very economically and ecologically unsound allocative and management practices. Markets for water in the Middle East and northern Africa are therefore undeveloped and even more problematical is the general absence of regulatory mechanisms to limit water use.

In a pure market with well developed institutions prices are useful allocative instruments since, if they closely relate to the real value of the resources entering trade, they force consumers, in the case of this discussion, users of water, to examine their utilisation of scarce resources and to cost inputs in relation to returns. It also causes them to consider substitutes for scarce resources, for example for water, in achieving a satisfactory economic and social outcome for water using activities. The paper will examine the possible role of establishing prices for water at the international, the national as well as at the local and farm levels. It will be shown that governments, officials and farmers operate without any awareness of the real cost of delivering water or of its value, yet at the same time massive adjustments, economic and political, have been made which are in accord with the real economy of water allocation and use. The scale of the adjustments augurs well for the region with respect to its inescapably constrained water resource future.

Key words: water allocation, water prices, Middle East, adjustment to water scarcity

'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 Egyptian governments between 1848 and 1892) in *al-Azhar*, Vol. 4, No 10, May 1891, pp 309-315

## Introduction

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 related matter of the costs of delivering it. The starting point as far as all users are concerned is that there is an entitlement to water and that the entitlement is to free water. When a scarce commodity is perceived as a free entitlement, and where measures to regulate use are poorly developed, there will be many difficulties attending its effective use economically and its sound use ecologically.

The countries of the Middle East and northern Africa are unique in the scale of their 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 position is disturbing. If Turkey is excluded the region has to import over sixty per cent of its food, and some of the oil economies import about ninety per cent of their food. That the states of the region have addressed very successfully their duty of providing the entitlement of their citizens to food is partly a tribute first to their political and economic skills, secondly to the availability of cheap food on the world market for the past decade or more and thirdly to the preparedness

of the United States to support the Egyptian economy particularly with respect to food and that of the Israeli economy more generally. The discussion will proceed on the basis that the water gap is represented by the food gap and the problem faced by Middle Eastern governments and their patrons is the provision of food in sufficient volumes and at affordable prices to meet the inevitable increased food demands of the coming decades. Economic stability, and consequently political stability, in the region depends substantially 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. (Allan, 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 can be achieved in that in some cases Middle Eastern and north African countries can substitute for water from their own resources while in others the substitution can only be achieved with significant political adjustment to the terms acceptable to an outside patron. The countries can be classified as follows:

**Table 2 A classification of the countries of the Middle East and North Africa with respect to water availability and pattern of trade.**

Country	Balance of trade \$bn	Food trade \$bn	Water deficit* Km3
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**Countries with strong trading positions, being major food importers and where the water deficit is not significant. For them 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 1990	+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	+4.0	-1.10	0.30

**Countries with weak trading positions, being major food importers and where the water deficit is significant or very significant (Jordan). For them the international political economy could be seriously affected by water.**

*Middle East*

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
Yemens	-1.0	-0.10	potential deficit

*North Africa*

Egypt	-6.0	-5.50	-10.00
Morocco	-1.0	0.00	potential deficit
Tunisia	-1.0	-0.20	-0.20

**Countries with weak trading positions, but being food exporters and where the water surplus should ensure future food self-sufficiency (provided Sudan can escape internal political disruption). For them the international political economy is not affected by water.**

*Middle East*

Turkey	-5.0	+1.50	+10.00
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### North Africa

The Sudan	-0.5	+0.10	+4.00
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(Sudan's position is so affected by the current internal problems that the renewable resource potential of the country cannot be realised. It is therefore difficult to categorise.)

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

- \* The notion of **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 like Jordan and Israel where adjustments are being made to reduce water use in agriculture the concept of a deficit is more difficult to define. Quantifying the deficit is less important than recognising the relevance of the deficits to the agricultural future of the region.

Table 1 demonstrates that only Turkey and the Sudan have futures which include, for a period at least, self-sufficiency in food. The others all endure significant food deficits and these deficits are rising. The measures taken by the government of Saudi Arabia to develop groundwater to produce food including food staples such as wheat have been remarkable, in that it is estimated that the agricultural sector contributed eight per cent of the Saudi GDP in 1990, an extraordinarily high level in an oil enriched economy. But these policies are neither economically nor ecologically sustainable. Water withdrawals are far beyond natural recharge and 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 the light of the military events in the Gulf in 1990 and 1991 when it was revealed that not only was Saudi Arabia's economic stability dependent on the will of the Western industrialised community, but territorial security was also dependent on the whim of the military will of the same industrialised countries. Chasing the fantasy of food self-sufficiency (Allan 1983) by Saudi Arabia is as irrelevant as pretending that it can be militarily secure. Misallocating funds to the achievement of either the agricultural or the military fantasy actually weakens the economic position of Saudi Arabia while strengthening the economies of the industrialised countries which supply agricultural equipment and infrastructures on the one hand and military equipment and defence infrastructures on the other.

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. All of these deficits are rising with the increased demand for water both from agriculture and the other sectors of the respective economies. Yet no country has renounced food self-sufficiency as a major feature of national policy except very briefly, Israel, in the first half of 1991. But this glimpse of the direction which all governments of the region will ultimately have to embrace was very brief indeed as the posture was uncomfortable for Israel internationally and was overtaken by the unexpected acceleration of the Peace Talks at which it was not possible for Israel to indicate that it could cut water consumption. The heavy rains of the winter of 1991-92 also had their political influence in that they enabled those managing national and local water to relax as they watched water storages, such as Lake Tiberias/Kinneret rise and the coastal aquifers recover. These had been at crisis level during the preceding three years of severe drought.

The historical, psychological and political backgrounds to the development of food policy and related water allocation are very important. Governments of almost all countries find that there is a natural political alliance between apparently responsible leaders and officials on the one hand and the rural community which produces food on the other. The former want to ensure national security including basic food needs. The rural community is the major element in the economy enabling food production and also therefore the major enabling element in the achievement of a country's potential security with respect to food. The natural alliance between those responsible for food security and those capable of providing it dominates policy making in the variously endowed economies of 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

tormenting discussions in the GATT conferences. But the EC and the Middle East while resembling each other in terms of area and the size of population are very different with respect to water resource endowment and economic competence. In the EC water is rarely a constraint while it is a constraint in all countries except Turkey, the Sudan and the Lebanon in the Middle East. Yet 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 lethally distorts the expectations of the farming community and also prevents officials at all levels from making rational judgements concerning the allocation and use of water as the real costs of water are not evaluated in the sectors that use it. If the real costs of water were taken into account, preferably in procedures of environmental accounting (Pearce et al 1990) where the future costs of current policies would also be counted, then water would be allocated to uses more beneficial to the economy as a whole in the long term. At present users of water have no incentive to use water efficiently and governments have no incentive to realise efficient returns to water as there are no institutions or mechanisms which effectively enable its value to be recognised in transactions of distribution and use by either individuals or by the state.

### **Classification of Middle Eastern countries by population, water resources and the competence to import food.**

Population data for 1990

Country	Population '000	% of total regional population	%
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#### **Countries self-sufficient in water or able to purchase food**

##### **Water surplus countries**

Turkey	56277	17.1
Sudan	25191	7.7
Lebanon	3000	0.9
<b>Total</b>	<b>84468</b>	<b>25.7</b>

##### **Major food importers competent to purchase food**

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>

##### **Oil economies which are major food importers, with serious water constraints and limited purchasing power**

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

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Total of water or economic surplus countries

64.3

### Countries with food & water deficits and food purchasing problems

#### Major economy with water constraints and purchasing constraints

Egypt	52061	15.9	
Total	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	
Total	65221	19.9	

Total of water or economic deficit countries

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Overall total	328323	100.0	100.0
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Source: World Bank

### Countries self-sufficient in water or able to substitute for it by purchasing food on the international market

- 1 **Turkey and the Sudan** may have economic problems but they cannot be attributed to their water resource endowment. **The Lebanon** does not have serious water problems but does of course have serious political problems which make investment and institutional development difficult.

**c85 million people, c26 per cent of the region**

- 2 The relatively low population **oil rich countries - Iraq, Saudi Arabia, Libya, Kuwait, UAE, Oman, Bahrain and Qatar** have no real water resource problems; they only arise if they decide to allocate water to agriculture. They will for the foreseeable future be able to acquire food from the world market. They should certainly not be using scarce water to raise food at a period in economic history when food is being traded cheaply. Iraq has temporary problems.

**c45 million people, c14 per cent of the region**

- 3 The relatively large population countries with oil, **Iran and Algeria**, have serious agricultural problems and Iran has political and international relations circumstances which means that it does not fall into the same categories as the other oil rich countries or into the protected category of Egypt. Iran will need to address both its traditional sector farming and its modern sector pursuing policies and practice based on the five guiding principles and goals shown in the table in Annex 1.

**Algeria** has 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 successfully its scarce agricultural resources and it will require particularly effective policy formulation and implementation if it is to create a viable rural economy on the basis of its scarce water.

**c82 million people, c25 per cent of the region**

*The above countries comprise 64 per cent of the total population of the Middle eastern and North African region.*

#### **Countries with food and water deficits and economic problems which make food purchases difficult**

- 4 The large population country with only modest oil resources **Egypt** is such a special case that its problems have for the moment been solved by politically motivated external funding. The US Government has apparently assumed responsibility for the serious and deteriorating water gap of Egypt by providing grants and loans which almost exactly match the food/water deficit reflected in the progressively increasing food import bill of Egypt.

**c52 million people, c16 per cent of the region.**

- 5 **Morocco, Syria, Yemen, Tunisia, Israel and Jordan** are countries with significant water resource constraints and with the exception of Israel they have limited ability to mobilise investment to improve water management systems. They will in future have to address their food deficit problems by generating foreign exchange in other sectors with which to purchase food and thereby reduce pressure on their scarce water resources. Israel and Jordan are already, if unwillingly, well down this road.

**c65 million people, c20 per cent of the region**

*These food deficit countries which have food purchasing difficulties comprise only 36 per cent of the population of Middle Eastern countries.*

The above analysis suggests that the first three categories of countries do not face serious water resource problems if water could be effectively allocated and managed. They either have sufficient water or they do not need it since they can substitute oil revenues to purchase food which cannot be produced at home because of water shortages. Two oil economies, Iran and Algeria, currently have balance of payments and political difficulties which are impairing their capacity to develop but will still be able to underwrite their food deficits with their limited oil revenues. The fourth category, Egypt, cannot substitute for water on an economic basis but it has been very successfully substituting for water through the acceptance of political support from the United States since the mid-1970s. While this is not a satisfactory long term solution, and is even one which the United States probably cannot afford to sustain, it is also very likely that other sources of funding would be available from other OECD countries if the United States signified that it could not continue to fill Egypt's water gap. There is, however, a much clearer message concerning how Egypt itself will substitute for water in future. It will be through the strengthening of its economy in the industrial and service sectors so that they generate the foreign exchange with which to purchase the food needed to feed the country's rising population. This is the normal pattern of economic activity for economies as they develop. OECD investments will be directed to accelerate this process and thereby gradually ensure that Egypt become a self-sufficient economy despite its inability to be food self-sufficient. The demographic position of Egypt will continue to deteriorate but there will be a reduction in the rate of increase in population as the economy improves.

The 36 per cent of population of the Middle East and North Africa in the remaining categories is currently exposed to difficult water resource circumstances and these will for

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the foreseeable future continue. These countries will face the greatest challenges in substituting for water in the short term at least. Two of the countries, Jordan and Israel, are close to recognising the impossibility of allocating the 70-80 per cent of water of the national water budget to agriculture, although there will be many years of tormented Peace Talks negotiations before the policies are put in place. Since agriculture contributes less than three per cent to the Israeli economy and about seven per cent of the Jordanian economy the real consequences of reallocating water will not be great, although the internal political reactions may be considerable. Syria, Morocco and Tunisia will have in due course to adopt the same reallocative policies through an evolving ability to substitute industrial sector revenues for the deficient water but the move will only come after their existing water resources have been more effectively reorganised. The problems of Yemen are unique in that the water allocation and management institutions require considerable development.

### Available water resources

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

- Precipitation falling within the national boundaries
- Surface water deriving from within the national boundaries
- Groundwater deriving from within the national boundaries
- The water content of imports, especially that in food imports

- Surface water imported from outside the national boundaries - less that exported
- Groundwater deriving from outside the national boundaries - less that exported

Less the water exported in products, especially in agricultural exports.

None of the water listed above enters international trade, and therefore has 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 the 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 no competence to do so. Although in times when there is no pressure on the resource as for example in the 1970s in the case of the signatories to the 1959 Nile Waters Agreement, between Egypt and the Sudan, the legal undertakings appeared to be significant.

International water does not at the moment 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-à-vis the two national entities, although not with respect to the communities of the southern Sudan who ultimately took action to veto the project. But at no point has there been an attempt to identify the economic cost of the water or its value. That Egypt was prepared to invest in the scheme implies that Egypt valued the envisaged new water but there has been no attempt to analyse the anticipated new water in terms of its value in alternative uses in the two investing countries. We shall see later that it 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.

### The value of water

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 as straightforwardly



commercial and which serve other interests than those of producers, marketing agents and consumers. Many markets have to bear significant intrusions for example by government institutions which extract taxes without impeding the movement of commodities and there are many customs levies which significantly affect the prices charged to consumers. The substantial taxes placed on oil and tobacco and oil products at one or more points in the commercial cycle are examples of how governments as well as producers and traders can benefit from the marketing of a commodity. Thus the price which a consumer is prepared to pay is not necessarily related to the cost of producing and marketing a commodity and there are many individuals and institutions which would be prepared to take advantage of circumstances where there is a substantial difference between the cost of production and the price which consumers are prepared to pay.

But oil and tobacco are not good analogies for water. Water does not anywhere in the Middle East and northern Africa command a price which is substantially higher than the costs of making it available to users except in the small but valuable sector of bottled water provision. And because there are very few recognised markets for water in the Middle East at the international or at lower levels in the economies of the region it is not possible to identify price elasticities for water. There is certainly a large and unsatisfied demand for free water but there is no way of testing what the demand would be for water charged at say 25 US cents per cubic metre in the agricultural sectors of Middle Eastern countries. It is meanwhile an economic fact that there are many regions in the world where water is much more abundant than in the Middle East and the comparative advantage of such overseas users of water, at least in mobilising water in the bulk required for agriculture, are very considerable.

One way of gaining an 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 the ground there are costs associated with the delivery of the water to the farm or to an industrial or domestic user. In some cases quantification is easy. For example the delivery of water from the Great Man-Made River scheme in Libya is estimated to be about one US dollar per cubic metre. Delivering water at the rate of at least 10000 cubic meters per hectare to farms in Egypt must be at least 25 US cents per cubic metre if all the costs of engineering, administering the water together with the energy costs of lifting it up to the fields, either by animal power in the past or by fossil fuel energy now, were to be taken into account. In the United Arab Emirates with its remarkable and lavishly landscaped cities of Abu Dhabi and El Ayn and other green amenities, as well as a number of agricultural projects, about half the water budget is provided by desalinated water and the rest from over-pumped groundwater, the cost of water must be multiples of US dollars per cubic metre.

The cost of water in other parts of the world is not politically relevant to Middle East governments but it is relevant in this discussion to point out that in most European countries the price of water is already two US dollars per cubic metre delivered to domestic users and the trend is to adopt such prices.

Another way of trying to gain 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 in that some countries enjoy significant rainfall, while others have as yet undeveloped water resources which is in sharp contrast to the majority which do not. Also the perceived value of water differs from sector to sector. Domestic users could readily afford and might find it economically reasonable to pay US\$25 per year per head for the 100 cubic metres of water per person for annual needs for water priced at 25 US cents per cubic metre, but farmers would not be able to contemplate the use of water costing between US\$ 2500 and US\$ 4000 per hectare per year which would be the cost of their annual water requirements so priced.

A very crude indicator of the value of water could also be derived from the **cost of substituting for it in imported food**. Egypt imports annually grain valued at over US\$ 3 bn per year and there is additional food aid. (World Resources 1992-93) To have grown the volume of grain imported at the level of the early 1990s at home would have required annually about thirty cubic kilometres (30 bn cubic metres) of water. Assuming the real cost of Egyptian water to be about one third of the cost of such imported production if the grain could have been produced in Egypt then it can be further assumed very approximately that the imported water could be valued at about substantially less than 10

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cents per cubic metre. In other words a very keen price for water indeed for an arid country facing severe water constraints. There is no way that water could actually be delivered to Egyptian fields at 10 US cents per metre. Egypt is currently gaining access to the equivalent of 30 cubic kilometres of water annually for about \$US one billion. The calculations could change significantly of course if Egypt's grain yields were to improve or world food prices were to change.

We do not yet have the means to determine accurate costs or values for Middle Eastern water and there are no markets to help those interested in throwing light on the capacity of users to pay for priced water, but it would seem that importing water integral to imported commodities is the best way to gain access to new water for the categories (categories 4 and 5 in Table 2 above) of country facing current or imminent water shortages. Egypt, Jordan and Israel, have few, or no, other options to gaining access to new water unless there are radical shifts, in the case of Egypt, to its approach to the international management of Nile waters.

In summary the cost of delivering water other than rainfall in Middle Eastern and north African countries is likely to be between 10 US cents and US\$ 2 per cubic metre. 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 metre. 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 metre in the non-oil countries and a much higher figure in the oil rich states.

### The need for water

The governments of Middle Eastern countries have been successful in ensuring that their citizens have access to a basic entitlement for food. (Sen 1981) The propensity to consume at levels far beyond the basic entitlement have been demonstrated numerous times in the region as the various oil-rich countries brought their oil to the world markets and gained access to unprecedented purchasing power. The value of food imports rise at upwards of 15 per cent per year in the early phase of the expansion of an oil economy and none of the oil rich Middle Eastern and northern African oil producers has had the water resources to underwrite such expansion in food consumption. But it is not just the oil-rich countries which have maintained entitlements to food. Egypt has been particularly successful despite the challenge of its demography and resource endowment.

The issue of food entitlement may seem irrelevant since the governments of the region have apparently successfully addressed this key economic and social challenge. If it had not been addressed the political consequences for the governments of the region and the region's general stability would have been dire. The success of Middle Eastern governments and their patrons in handling the sensitive social and political issue of food entitlement can be contrasted with that of the governments of similarly poorly endowed countries south of the Sahara. Here the inability of governments to address the food entitlement issue and the unwillingness of the international community to assist at an equivalent level to that achieved in key Middle East countries, has had dreadful consequences for the peace, stability and economic development of Africa south of the Sahara.

It is argued above that the food gaps, expressed crudely by food imports, in the individual countries of the Middle East and northern Africa represent their water gaps. 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 especially of water. All the countries of the region have versions of food self-sufficiency policies which are quite inconsistent with the capacity of their natural resources. (Allan 1983) As a result 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, or misallocated in the case of Egypt, Israel and Jordan.

Despite the rhetoric of food self-sufficiency proclaimed by the political leaderships of the regions, and echoed loudly by its farming communities which understandably want to ensure their present and future livelihood by meeting the national needs as well as by the communities of engineers and officials which see a similar coincidence of altruistic and self-interested goals, the decision making of governments facing real water shortages in the

Middle East and northern Africa, Egypt, Israel and Jordan, have all solved the major element of their food staple deficiency by importing water in food. The rhetoric of self-sufficiency is socially and politically inspired and is therefore very powerfully driven but is economically and ecologically unsound. That governments are following an economically and ecologically sound policies, namely of importing food, while proclaiming an economically and ecologically unsound one is because water is perceived as a free or nearly free good. If economic principles were deployed the allocation of water would be re-examined as well as the capacity to be self-sufficient. If principles of environmental economics (Lutz and Munasinghe, 1991, Pearce et al 1989 & 1990) were to be deployed the ecological impacts of water misuse would be taken into account as well as the interests of future generations of the region's peoples. Donors and descendants don't have political influence on contemporary attitudes.

The need for water in the region is palpable. The sources of new water are limited and while there is scope for the 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 supplies of food. The major uncertainty is not so much can the countries of the Middle East and northern Africa gain access to more new water. Rather it is can the Middle East as the major food importing region of the world, and with no indigenous solution to its water problem count on the global market to supply food in sufficient quantities and at affordable prices in the decades ahead? In other words is there another constraint on the ability to provide food entitlements than the Middle East's water resource endowment? This is such a large subject that it cannot be discussed here. Suffice it for the moment to say that officials and scientists from the region should be studying with great care the issue of future global food supplies and the likely future prices of food staples.

#### **The costs of gaining access to 'new' water**

It has been argued above that there is very little 'new' water feasibly available in the Middle East and northern Africa and the cost of delivering existing water varies greatly. Meanwhile the costs of over one US dollar per cubic metre for delivering new water by means of technologies such as desalination and the development of remote groundwater are prohibitively expensive to more than two thirds of the governments and peoples of the region.

It behoves those responsible for ensuring supplies of water in the countries of the region to examine all possible solutions to the particular water supply predicament which confronts them. 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 kilometres of water annually. On some assumptions, namely the use of a volume of water which would enable complete self-sufficiency in food insofar as other climatic, soil and economic circumstances would reasonably permit, it needs an additional thirty cubic kilometres of water to meet even current agricultural water needs.

Taking a radical view, although not an unfamiliar one in terms of the century long debate over Nile management, (Hurst 1952, Hurst and Simaika 1965) the water which evaporates from Lake Nasser/Nubia, could be used more productively if the storage of that water were to be sited elsewhere. Such a change in policy is not on the current agenda, however, since it appears, on the basis of Egypt's interpretations of the predicted behaviour of upstream riparians, to contradict Egypt's economic security as well as reducing the capacity of the existing economy to produce hydropower. It is not yet publicly recognised that the worst assumptions concerning the behaviour of upstream riparians, from Egypt's point of view, could obtain whether the storage capacity at Aswan is available or not. In other words the operation of the storage system at Aswan would become impossible if the flow of the Nile was to be reduced by upstream withdrawals.

Meanwhile the power generation capacity of the hydropower station at Aswan has become a minor element in the national power budget at under ten per cent and falling. Circumstances are very different from those which obtained when the sets were commissioned in 1970 - the dam was officially opened in May 1971. There are, therefore, alternatives to the energy generated by the Aswan power station. These would be less eco-friendly than hydropower and less economic but they would be more conveniently sited.

## The right 'price' for water?

The as yet unlikely option of storing Ethiopian water in upland Ethiopia where annual evaporation from open water is about a third of that at Aswan is nevertheless worth serious consideration. If water could be obtained at 50 US cents per cubic metre the future economy of Egypt might be able to absorb this cost. At the point at which water was being supplied at such a cost it would be possible to argue that this marginal cost of Egyptian water would make the use of water in agriculture non-economic and it would be more economically effective to use the water currently being used in agriculture in activities which could support the 50 US cents per cubic metre cost. National, nor even domestic economies, rarely accord with such rational economic principles, however, and the notion of enabling a flow of water takes precedent over the rational economic use of such water.

Without going into the wide range of options which could be available in managing the water at Aswan, from the status quo to storing various proportions of existing average storage - even as far as storing no water in the structure and using the silt deposits of the past two decades at the bottom of Lake Nasser/Nubia for agricultural production, it is possible to identify and evaluate some approximate scenarios which would permit additional water to flow into Egypt. If for example Egypt were to contribute to the construction of storage structures in Ethiopia and pay an annual sum to Ethiopia covering the capital costs and a notional sum per cubic metre of 'new water', it would be possible to realise a volume of water of say five cubic kilometres annually, for a cost of say \$US 2.5 billions annually, subject to the agreement of the Sudanese Government and to the capacity of the Sudan's water management institutions to regulate the import and export of water. Smaller, and larger volumes of water could be realised for proportionate rates of investment plus water charges. Similar principles it should be pointed out have already been adopted at least with respect to investment in the 1959 Nile Waters Agreement between Egypt and the Sudan. To date the water losses at Aswan have appeared to be a reasonable price to pay for the security of supply, but the system is entering a new phase with the development of water using activities in Ethiopia and in addition with the Sudan approaching the limit of the allocation agreed with Egypt. The security of existing flow to Lake Nasser/Nubia can no longer be politically assured never mind that of 'new' water. Meanwhile the nature and extent of the economic and social torments of reduced flow have already been demonstrated in the 1980s when the reasons for recurring levels of reduced flow were natural rather than political.

In the case of Egypt for the moment there is no question that it is much more economically effective to import water in food than to mobilise new water which would entail the uncertain and very difficult task of sharing the responsibility of constructing new structures in upland Ethiopia. Constructing the High Dam at Aswan was a very difficult financial and logistical task in partnership with a not very economically competent partner the former Soviet Union. A partnership with an entity with the economic problems of Ethiopia is not in any sense attractive.

It has been suggested that Egypt's water, currently treated as a free good in the Egyptian economy, could be valued at under 10 US cents per cubic metre, being the cost of importing water in food, and 50 US cents per cubic metre or more being the cost of mobilising 'new' water in cooperation with upstream riparians. Another option recognised as a real possibility by those who consider that the perceived strategic value of water would move governments to go to war to secure their water supplies is the military option. Little regard is given by such analysts to the cost of military operations with respect to the value of the resource being protected. Modern technological wars can cost one billion US dollars per day and even campaigns of more modest military scope would cost multiples of billions of US dollars over a short period and any protracted and geographically remote campaign would be beyond the economic competence of any Nile riparian or of any other Middle Eastern state. 'New' water gained by military means would be prohibitively costly. Which does not mean to say that military initiatives will not be taken. The recent Gulf War proves very well the matter of the costliness of war both to winners and losers, and for the latter the dangers of disrupting access to the world economy for both imports and exports. That political leaders are unwilling to anticipate the real costs of military conflict is of much greater significance than any potential conflict over water.

### **The social value of water: and the political implications**

Politicians in the Middle East have to struggle with the dilemma that water is almost everywhere treated as a free good, and especially in the demanding agricultural sectors in individual countries where economic returns to water are poor. It is proper, however, to examine what the social returns to water are and to estimate the political significance of such returns.

Water is job creating and enables livelihoods for families and communities. In economies such as those of Egypt and Jordan it creates many jobs per 1000 cubic metres in industry but possibly only 25 per cent of the livelihood of a single family if the water were to be used in irrigated farming. There are examples of intensive irrigated crop production throughout the region in horticulture where more livelihoods are enabled but such production is not by any means the norm.

Those who have derived their livelihoods from irrigated farming and the professionals who maintain the irrigation structures and systems have argued very powerfully that there should be no change in the system of water provision and with such success that there has been no example of reductions in irrigated farming activity except through the loss of farmland to the construction of dwellings as for example in Egypt or through the salinisation of land in a number of the catchments. The use of water on 'new lands' has brought significant social returns in Egypt and Jordan and of course in Turkey and in the Maghreb countries. But in the oil-enriched countries the social returns are difficult to evaluate in terms of the nationals of the individual countries. There have been significant returns to immigrant labour in all the Gulf countries either in agriculture or in the very significant water using activity of the provision of green amenity. The amenity return is particularly difficult to quantify, however..

There have been no cases in the region, in the Arab countries at least, where political leaderships, considered to be authoritarian and even secure, have 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, presumably the most succinct statement of 'sustainability' yet coined, this particular injunction is not part of the policies of states, government sectors involved in water use or even by individual farmers. Only Israel has for a few weeks apparently stated that it intended to pursue such a policy during the drought crisis of the spring and early summer of 1991, before the acceleration of Peace Talks meetings made the policy strategically untenable, at least until secure deals on water could be agreed with neighbouring riparians.

### **Conclusion**

The dominant perception in the Middle East and northern Africa of the basic justice of the right of access to free water drives water allocation policies and practice in the region. That it is widely recognised that there are theoretical as well as practical limitations to legal regimes promoting economic efficiency (Sandbach, 1980, p 43) is not yet an idea in currency in the region. It is realistic, therefore, for the moment to assume that Middle Eastern Governments will not confront their farming and professional constituencies with calls to reduce water allocations to agriculture. 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 had the option to substitute for water by importing food and especially staples which have been available at historically low prices, as during the past two decades, there has been no necessity 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, therefore, been consistently ignored because it has been possible to gain access to relatively cheap water in the form of the water content of imported food. The natural resource endowment of the region dictates that this outside source of water can only become more significant and it is urgent that all the Middle Eastern economies, and not just the oil-rich economies, gain the capacity to trade for food in the global market. In addition 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 whether the environment of the Middle East and northern Africa will be affected by global climate change or not.

### References

- Allan, J A, 1992, Fortunately there are substitutes for water, otherwise our hydropolitical futures would be impossible, in ODA, *Water resources*, ODA, London. pp ....
- Hurst, H E, 1952, *The Nile*, Constable, London.
- Hurst, H E and Simaika, Y M, 1965, *Long-term storage: an experimental study*, Constable, London.
- Lutz, E and Munasinghe, M, 1991, Accounting for the environment, *Finance and Development*, World Bank, Washington DC, pp 19-21.
- Pearce, D, Markhandya, A and Barbier, EW B, 1989, *Blueprint for a green economy*, Earthscan Publications, London.
- Paerce, FD, and Turner, K T, 1990, *Economics of natural resources and the environment*, Harvester Wheatsheaf, New York and Hemel Hempstead.
- Sandbach, F, 1980, *Environment, ideology and policy*, Basil Blackwell, Oxford.
- Sen, A, 1981, *Poverty and famines: an essay on entitlement and deprivation*, Oxford University Press, Oxford.
- Waterbury, J, 1980, *The hydro politics of the Nile*, Syracuse University Press, Syracuse.
- World Bank, 1992, *World development Report 1992: Development and the environment*, The World Bank, Washington DC.
- World Resources Institute, 1992, *World Resources 1992-93*, World Resources Institute, New York and OUP, Oxford.

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### The Author

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