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Water Scarcity in Developing Countries?

Due to population growth, water is reported to be becoming increasingly scarce throughout the world. Some 1.3 billion people are without access to clean water, and in some regions "water wars" are already threatening. These reports are well known - but are they also true? The present paper will argue that it is not global water scarcity but policy failure and misallocation of resources that are responsible for the inadequate access to drinking water:

- *Many countries are aiming for national self-sufficiency in staple foods. Some countries in arid areas are subsidizing the expansion of irrigated agriculture, which accounts for roughly 70 % of the world's water consumption.*
- *In the cities a good share of water is lost from the water-supply network, and supply failures often occur because public water utilities, which are often poorly managed, are at the end of their financial tether.*
- *Many residents of urban slums are not connected to the water-supply network and are thus forced to pay prices to water vendors that are far higher than the subsidized drinking-water tariffs.*
- *"Water wars" are for the most part not genuine conflicts over scarce water but a symptom of deeply rooted historical and political conflicts, while water scarcity presents the occasion, or at best a catalyst, for additional tensions.*

Population growth and increasing living standards are doubtless causing water, the number one natural resource, to become more and more scarce. The reports on an impending extreme water scarcity are, however, often exaggerated.

Even arid countries have more than enough water to cover urban and industrial water consumption

Worldwide 70 % of water consumption is accounted for by irrigated agriculture, 20 % by industry, and only about 10 % by households. In developing countries with an arid climate the share demanded by irrigated agriculture is up to 90 % and more. Disregarding irrigated agriculture, we find that even the countries of the world poorest in terms of water resources have sufficient water. Prosperous countries in arid regions that provide incentives to save water consume not more than 100 m^3 of water per capita and year (households and industry together). Leaving the needs of irrigated agriculture out of consideration, the water available even in the driest countries is sufficient to supply a rapidly growing population with water. For instance, Jordan, one of the world's five most arid countries, has an annual average of some 800 million m^3 of renewable water resources for four million people, i.e. 200 m^3 per capita and year and thus twice as much as is needed for industrial and municipal uses.

In arid regions agricultural policy has a major influence on water consumption

In arid regions agricultural policy has a pronounced influence on water demand: a country with an arid climate aiming for a high level of self-sufficiency in food production may expand irrigated agriculture. But typically some 1,000 m^3 of water per capita and year are needed for self-sufficiency, ten times more than needed for municipal and industrial use. Often the incentives provided to expand irrigated agriculture include subsidized water supplies or import barriers (tariffs, quotas, or import bans). In developing countries low water prices and agricultural protectionism are encountered side by side. In Saudi-Arabia, for instance, the government long paid five times the world-market price for wheat. Desert cultivation devoured 2,000 liters of nonrenewable groundwater per kg of wheat produced. Subsidized irrigation tariffs are widespread throughout the world and can be encountered in industrialized countries like the US as well as in Southern Europe.

The world food trade is already providing a crucial contribution to diminishing regional water scarcity

The Middle East is today one of the world's biggest wheat importers. If the amount of wheat presently imported into the region were cultivated there, the additional water required would be roughly equivalent to the amount of water borne by the entire Nile. Since this quantity of water is just not available, without world trade the Middle East would decades ago already have experienced an unprecedented water crisis and famine.

Yet most countries of the world cling to the goal of national self-sufficiency in staple foods

They cover their food needs largely from what they themselves produce. The world trade in grain accounts for only 5 % of world grain production. Various arguments are cited to justify the goal of self-sufficiency. In the long run many countries fear that they will not have access to staple foods in the world market at today's prices, anticipating instead grain prices rising over the long term, even though current model calculations today indicate falling prices. Moreover, some countries do not rule out the possibility that, under altered political conditions, an embargo might be imposed against them, not unlike the current embargo against Iraq. Even if grain imports were allowed on humanitarian grounds, the countries concerned fear

that an embargo would deprive them of the possibility to earn the foreign exchange needed to import grain. Many countries are for these reasons not prepared to abandon the goal of national self-sufficiency in staple foods. It must hence realistically be assumed that in the future world trade in grain - and its potential for easing regional water scarcity - will remain limited.

Renewable water resources* in millions of m^3 per capita and year in selected countries (1995)	
Kuwait	103
Jordan	200
Singapore	211
Israel	382
Egypt	923
South Africa	1,206
United Kingdom	1,219
Germany	2,096
India	2,228
China	2,292
Nigeria	2,506
USA	9,413
Indonesia	12,804
Brazil	42,957
Canada	98,462
Global median	*7,176*

* Renewable water resources do not include direct precipitation, fossil groundwater, or desalinated sea water. Rain-fed farming (as opposed to irrigation) covers its water needs from direct precipitation, which is *not* included in the figures cited above. The substantial and highly significant fluctuations between individual regions within countries are also not considered. The above figures should be interpreted taken these caveats into account.

Source: World Resources Institute, World Resources 1996-97, Washington 1997

Still, in many arid regions there is hardly any alternative to higher food imports. In many cases expanding irrigation can be achieved only by overstraining groundwater reserves (as e.g. in Libya and Saudi-Arabia), by gradually draining wetlands (as in the Nile Delta and in the Shat el-Arab), or at the expense of downstream riparians (as in the case of Turkey vis-à-vis Syria and Iraq).

Today many large dams in developing countries are being built without any donor participation

Despite extreme water scarcity some countries have, at least in part of their territory, sufficient water resources to expand irrigated agriculture. This often requires the construction of long-distance water conduits or dams with an eye to closing the substantial gap between the spatial and temporal availability of water in these countries.

Large dams are complex projects that entail a variety of positive and negative impacts. In the North they are often seen as symbols of a failed development path banking on growth and rapid industrialization by means of large-scale projects. Today information on the detrimental effects of large dams on the environment as well as the resettlement necessitated by them are common knowledge. There is hardly a critical observer who, in discussing the Aswan dam project, fails to deplore the loss of the allegedly so fertile Nile silt and the spread of bilharziosis. In fact, Nile silt has a limited nutrient value, and the yield achieved is much lower than from soils where mineral fertilizer is applied; in recent years bilharziosis has declined thanks to improved hygiene and control of the vector responsible for its spread.

In some developing countries non-governmental organizations (NGOs) are voicing severe criticism of large dams, though independent scientists and government officials more often offer a positive assessment: in Egypt it is above all flood protection and the additional employment of millions of persons in agriculture that are underscored, together with power generation. Thanks to these benefits the Aswan Dam, completed in 1970, has, it is claimed, paid its own way many times over. Occasionally developing countries note critically that countries like the US built large dams in the first half of the present century, but are now seeking to deny the same right to the up-and-coming developing countries. China, India, and Turkey are today financing large dams without the support of international donors. The differences of opinion involved were so great as to obstruct the emergence of a consensus. Now these projects are being implemented without sufficient accompanying social and ecological measures or technical adjustments, and in particular without sufficient consideration of the interests of persons to be resettled, than would likely have been the case had international donors been involved.

Mechanisms for finding consensus on large dams have been developed

The main challenge is to find a consensus over future large dams, one that does justice to all parties concerned. The World Commission on Dams, which was founded in 1997 and provides a forum for cooperation between governments, international donors, the private sector, and NGOs, offers a useful framework for such consensus-building. Many projects - such as the large-scale dams on the Mekong River that have been planned since the 1950s - may in this way be discarded once and for all. Reasonable dam projects, on the other hand, may – with adequate compensation for unavoidable negative impacts - be built in the public interest and once again enjoy the support of Western donors.

A small reduction of irrigation would release substantial amounts of water for other purposes

Due to rising urban water needs, many regions are considering restricting water used for irrigated agriculture in favour of the urban centers. This can be accomplished by increasing irrigation efficiency, raising irrigation tariffs or buying water rights from farmers. In many cases irrigated land is located in the vicinity of rapidly growing urban centers. Abandoning one single hectare of irrigated land, which, in developing countries, typically feeds one family, makes enough water available to supply roughly 200 city dwellers. As an alternative it would be possible to introduce water-saving irrigation techniques, without impairing either production or employment in agriculture. Surveys show that urban water consumers, who suffer frequent supply failures or are not even connected to the supply network, are willing to pay higher prices for a better water supply. Farmers can be compensated adequately for their

water rights, as has been demonstrated in the arid regions of Chile and the US. In most developing countries, however, political resistance and the lack of a legal framework present obstacles to the emergence of such water markets.

High potential for savings in the use of water in agriculture, industry, and households is not fully utilized

Apart from the influence of agricultural policy on water consumption, new technologies offer the prospect of substantial technology-related water savings in irrigated agriculture. By introducing drip irrigation, for example, it is possible to save up to half of the water otherwise used. In industry modern processes can reduce the amount of water needed for cooling, cleaning, or production processes by as much as 90 %. Households, too, offer substantial savings potentials. This is true above all for toilets, showers, and washing machines, which presently, even in the cities of many developing countries, account for a considerable share of water consumption. Furthermore, losses due to leaks in the distribution network could be reduced considerably.

In these cases water is, in economic terms, replaced by capital or energy. The fact that this substitution seldom takes place is, among other things, due to low and subsidized water tariffs that are the norm throughout the developing world. Raising water charges would constitute an effective incentive to save water and release it for other purposes. This could be used to meet a good part of the drinking-water needs of a growing population and work indirectly toward the goal of defusing water conflicts.

The urban poor often pay high prices to water vendors

Most of the poor in developing countries have no access to piped water. In rural areas these people for the most part spend considerable time and effort carrying water from wells and rivers or collecting rainwater. But it is also estimated that every fourth city dweller in developing countries is not connected to the water supply and is thus forced to rely on standpipes taps or water vendors. Water vendors, who transport their precious ware on trucks or donkey-carts, often demand ten or indeed a hundred times the price of urban water tariffs. And for the most part they do not even make high profits in doing so, since they themselves are faced with high costs for transporting clean water over large distances. In some cases there may also be a water price charged at the "source" by private well owners. The urban poor not infrequently pay out over a tenth of their income to water vendors. The households connected to the water supply often pay the same amount, but they receive a great deal more water for their money and their water bill accounts for a smaller share of their income.

Urban water utilities in developing countries are for the most part financially exhausted

Water utilities in developing countries are at present often financially exhausted because of low water tariffs. On the average water charges cover less than a third of the real costs of processing and distributing water and disposing of waste water. The water utilities seldom impose a charge for water abstraction, even when water is extremely scarce and excessive abstraction is detrimental to the environment. Necessary maintenance work is not carried out, the result being frequent supply failures. If the water utilities are to expand their supply networks, they are dependent on government subsidies and loans, which, however, as a rule prove inadequate. Higher water charges could help here: in this way it would be possible to improve maintenance and reduce network losses. Furthermore, a higher self-financing ratio would make it possible to mobilize more external funds for a rapid expansion of the supply network.

Higher water charges can be equitable

Poor households can be helped by means of progressive water tariffs, which are widespread in developing countries: When consumption is high, the price per cubic meter usually comes close to covering costs, while basic consumption remains subsidized. For poor extended families it could prove possible to grant targeted income supports or small loans to help pay for the often high connection fees. It would also be possible to exempt the standpipes that are used mainly by the poor from progressive water tariffs. Bearing these aspects in mind, it is possible to design water tariffs in an equitable manner. Progressive rates are tantamount to cross-subsidization: big users pay higher charges, while small consumers pay lower fees. Since better-off families as a rule consume more water, they in this way subsidize the supply to poorer households with their lower consumption levels. An approach of this sort usually makes more sense than any attempt to implement across-the-board subsidies in the form of low linear charges entailing one rate per cubic meter no matter how much water is in fact consumed, an approach that disregards the poor who are not connected to the water supply.

Private-sector involvement in the supply of drinking water makes sense...

At the same time as water tariffs are raised it is imperative to increase the efficiency of public water utilities, which are often poorly equipped and staffed by poorly paid personnel that are usually not particularly motivated, insufficiently qualified and inadequately trained. It is here that the private sector can provide a substantial contribution if it is offered sufficient incentives to invest. Examples of privately operated urban water utilities in developing countries - such as Abidjan and Buenos Aires - show that these utilities have lower distribution losses, higher billing efficiency, and higher levels of customer satisfaction than their public-sector counterparts.

...and need not necessarily mean reduced government intervention potentials

In these cases the state has not at all disappeared from the picture. It continues to monitor the charges and the quality of service delivery. Once a stipulated period of time has elapsed, the government can transfer the concession to another firm or it can take over operations again. Thus far, however, this case has not occurred. The problem is instead that the interest of the private sector in investing in the water sector in developing countries tends to be limited compared to the energy sector or telecommunications. Among the reasons for this are that returns on capital are typically lower and capital is tied up for long periods, as well as the problem of low water charges and the risk of government intervention. In the framework of develop-

ment cooperation it would be possible to encourage private-sector willingness to invest in urban water utilities by providing partial guarantees and low-interest loans. If this proved successful, a limited amount of public funds could be used to provide a broadly effective and sustainable contribution to meeting basic needs and reducing poverty.

Wars over water are unlikely in the foreseeable future

On the whole it is evident that there are considerable possibilities available to make more efficient use of the scarce good water, and hence the question is whether water scarcity will in fact lead to "water wars".

Certainly water played a part in some wars fought in the past. The best-known example is the conflict over the diversion of the sources of the Jordan River in the period preceding the Six-Day War of 1967. Other possible theaters of future water wars are seen along the Jordan, the Tigris and Euphrates, and the Indus rivers. The fact is, though, that these examples are all regions with historically deep-seated conflicts that emerged independently of water conflicts and continue to exist. In the 1950s, there were sharp clashes between Pakistan and India over the waters of the Indus; today, in spite of distinctly higher demand for water, this issue plays no more than a subordinate role. Tensions between Turkey and Syria were kindled by Syria's support for the Kurdish Workers' Party, PKK; despite higher water consumption the water issue, on which earlier conflicts centered, is no longer an acute one between these two countries. Egyptian President Sadat threatened in the 1970s to bomb any dam construction sites on the Blue Nile in Ethiopia; today, in an effort supported by the United Nations Development Program and the World Bank, the two sides are talking together and with the eight other Nile riparians about exploring projects based on sharing the Nile for their mutual benefit. It can of course not be ruled out that the water issue will again become a source of conflict. It should, however, not be forgotten here that water scarcity is invariably only one facet, and not the actual cause, of conflicts.

There are numerous examples of successful cooperation on transboundary rivers

Transboundary rivers can be managed to the mutual benefit of the parties concerned when there is a political will to do so. Dams on the upper course of a river can benefit countries on the lower course by preventing flooding and storing water for the dry season. In the most favourable case downstream riparians are involved in dam management on the upper course by participating in joint commissions. Should this not be feasible, it is possible to stipulate water shares in international agreements, as was the case, for instance, in the 1959 agreement between Egypt and Sudan. Despite persistent conflicts including threats of war between the two countries, as last occurred in 1995, this agreement has always been respected. Another possibility is to assign individual rivers wholly to one country, as in the case of the Indo-Pakistani Indus accord of 1960. The International Convention on the Non-navigational Use of International Watercourses, which was adopted by the United Nations in 1997 and is presently awaiting ratification, offers an international legal framework for such agreements.

It would, however, be far more important for any cooperation in using transboundary rivers to defuse regional political conflicts - such, for instance, as the Kurdish question in the area of the Tigris and Euphrates - and to create mutual interdependencies in other areas such as power supplies or regional trade. When a conflict over water threatens to damage good relations in other areas, the likelihood of an escalation of the conflict is far lower than when the countries concerned are linked by nothing other than the geographic coincidence of the course of a river.

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