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Briefing Paper (4/2002)

Approaches to overcoming regional water poverty

Political will and adjusted management strategies are the factors that will decide on the future availability of water resources

- *If attitudes toward water do not change fundamentally, two thirds of the world's population will be affected by water poverty as early as the year 2025. Today, the by far greatest share of water consumed worldwide is used for agricultural irrigation, and population growth and increasingly water-intensive lifestyles are raising the demand for water. Measures aimed at increasing water supply (supply management) are, however, at the same time running up against growing financial and technical limits.*
- *In regional terms, water resources are distributed very unevenly, and the countries of the Middle East and North Africa are those most hard hit by water poverty. Since trade in grain is able to compensate only for a limited share of regional water deficits, it is essential to focus on increasingly the efficiency of the irrigation sector and to fully exploit the potential of rainfed farming if the world's population is to have access to sufficient food resources in the future.*
- *Even though concepts and strategies of efficient irrigation have long been available, water continues to be wasted in nearly all of the countries of the world. The reason for the problem is not a lack of suitable methods, it is the fact that these methods are not put to proper use; and the reason for this in turn is that the political stage has not yet been set and the institutional groundwork has yet to be laid. And thus groundwater reserves continue to be overexploited, wastewater is still discharged directly into rivers, and rainwater continues to run off unused, even though for decades a wealth of information has been available on the recharging of groundwater resources, water-recycling, collection of rainwater, and erosion control.*
- *In recent years international water conferences have reached important consensuses on necessary reforms, though binding decisions are still made at the national level and local levels (decentrally). The reforms urgently called for include reduction of water price subsidies, differentiated water tariffs that reflect water qualities, and promotion of more flexible forms of cooperation. Creation of appropriate land and water rights that set incentives for a sustainable use of water are also of crucial importance. Reforms of this kind are the sine qua non for the success of many technical measures at the local level.*
- *In principle, both the private and the public sector can contribute to raising the efficiency of water use. The extent to which private actors and water-user associations take sufficient account of the ecological and social aspects involved is largely a matter of what concrete forms of cooperation are found between public and private actors and whether appropriate political action frameworks are set and adhered to. Development cooperation (DC) can provide important support here, above all in the field of capacity-building.*

It is imperative to close the gap between progress in the water discourse achieved at international conferences and concrete measures aimed at solving water problems

In global terms, available water resources are sufficient to supply a growing world population, though in regional terms these resources are distributed highly unevenly. In the Middle East, in North Africa, in the Sahel, in southern Africa, but also in many regions of East and Central Asia, there are growing bottlenecks which in some cases even pose a risk to the security of drinking-water supplies.

Speakers at the International Conference on Freshwater, convened in Bonn in 2001 as a preparatory step on freshwater issues for the World Summit on Sustainable Development (WSSD) in Johannesburg, pointed, once again, to the urgent need for water-saving measures and outlined some important approaches for a problem-oriented water policy. The participants underlined that water policy should be poverty-oriented and decentral in outlook and that good governance is the sine qua non for any successful water management. While declarations adopted at international conferences do serve to accelerate the formation of public opinion among the groups of actors concerned and advance processes of standard-setting, political commitment and action remain the concern of national governments. Since international debates are necessarily a highly aggregate in character, they often fail to forge concrete links between standards and basic approaches geared to alleviating water poverty on the one hand and concrete local contexts on the other. Focusing on such links, the present paper aims to provide a contribution to bridging theses gaps.

As a sector, irrigated agriculture is by far the greatest consumer, and waster, of water resources

Worldwide, some 70 % of the freshwater consumed goes into agricultural irrigation, i.e. food production, and the figures for arid countries may go as high as 90 %. This means that only 10 – 30 % of the world's freshwater resources are consumed by households and industry taken together. The irrigation sector not only has the greatest need for water, it also offers the greatest potentials for saving water, provided that efficient management systems are introduced.

Water use rises at a rate directly proportional to per capita incomes. We find marked differentials both between rich and poor countries and between urban and rural populations. This is mainly due to differences in nutritional factors. A meat-rich diet requires up to 100 times as much water to produce one kilogram of food as a vegetarian diet. While high-yielding rains and luxury vegetables usually require irrigation, local varieties and field vegetables can often be grown without it. Beside population growth, it is thus the demanding lifestyle of well-to-do population groups that ensures that irrigated farming will continue to proliferate.

Can "virtual water" help to make up for regional deficits

Looked at in global terms, one obvious approach to compensating for the water deficits of water-poor countries would be to import food (*virtual water*) from water-rich countries. Since 1000 liters of water are needed to produce one kilogram of wheat, grain imports would appear, both economically and ecologically, more reasonable than importing water directly, e.g. by building transnational pipelines. Under the given framework conditions, however, imports of virtual water offer no more than a limited potential. As model calculations of the International Food Policy Research Institute (IFPRI) show, urbanization rates and population growth are far outstripping the buffer potential that might be provided by imports of virtual water. It is precisely poorer countries that would be unable to profit from this buffer function, since it would presuppose the financial capacity to finance imports with the aid of surplus income from nonagricultural sources of employment.

Under the given terms of trade, imports of virtual water are furthermore problematic in terms of development-policy objectives. Grain imports stem chiefly from the US and the EU, both of which subsidize their prices, a practice which is needed to make imports possible in the first place. Some advocates of trade in virtual water are therefore calling for continuing agricultural subsidies. However, such subsidies have counterproductive impacts on other countries that export agricultural goods. This practice weakens the competitiveness of African countries in particular, since the latter are themselves unable to produce at comparably low prices. This puts them under pressure to subsidize their own agricultural production (e.g. indirectly, via low water prices). Appropriate water tariffs, however, are a core element of any efficient irrigation. Trade in virtual water thus makes sense in development terms only if grain prices are not distorted. Seen in terms of South-South trade, this strategy could then even generate new impulses for African exporting countries. For the reason just named, but also from a national perspective, i.e. with a view to preserving the economic structure in rural regions and countering rural-urban migration, arid countries must also undertake efforts aimed at sustainable agriculture and irrigation within their own borders.

Due to the growing scarcity of water resources, however, any such irrigation strategies must be geared to the following principles:

- It is imperative to ensure the ecological and financial sustainability of irrigation systems by pursuing appropriate demand-management policies and water-saving irrigation strategies (demand management).
- Irrigation should pursue an integrated, cross-sectoral water-management approach, i.e. water should be used and recycled along the water quality gradient, the aim being to close cycles and save water and energy (integrated water resources management).
- Parallel to water management, it is essential to fully harness the potentials offered by rainfed agriculture. Locations ecologically suited to the purpose should fully exploit both rainwater and soil-bound water (among other methods, rainwater-harvesting) for food production as an indirect means of saving irrigation water.

How these principles are implemented in concrete cases depends on specific problem areas encountered in given locations. The following section illustrates three such problems on the basis of concrete examples and points to some options for resolving them.

Problem area 1: Making better and more sustainable use of groundwater resources

Worldwide, a sizable share of irrigation systems are fed through groundwater resources. These systems are unsustainable if the amount of water extracted per unit of time exceeds recharge rates. Examples from Saudi Arabia and the US indicate that such overexploitation is widespread not only in developing countries but in technologically advanced countries as well. By 1985 the US, for instance, had extracted roughly half of its Ogallala groundwater resources to irrigate the grain fields of a few thousand big farmers. Even today, Saudi Arabia is still engaged in this type of groundwater exploitation. 90 % of the water extracted comes from fossil reserves, and these will be exhausted by the year 2007 if the country does not rethink its water policy.

In Asia the groundwater problem is no less precarious, though of a different character. Here, the livelihoods of many million small farmers depend on groundwater; these farmers own the wells on their land and therefore, under current land and water laws and arrangements, have free access to the groundwater below. Although, in China for instance, the depletion of groundwater levels has been documented for years, political decision-makers have thus far not undertaken any recognizable efforts to solve the problem. If this practice is allowed to continue in China, within a few years many aquifers will be threatened with depletion, collapse, or salinization, a development that would jeopardize the economic survival of many millions of farmers.

Options for sustainable groundwater use: Thanks to its financial capacities, the US has in recent years not been forced to gear its water strategy solely to water-saving measures and has, in parallel, resorted to supply management strategies aimed at conserving the water supply, even though this is a very costly approach. The US has, for instance, built numerous dams to replenish groundwater resources and erected costly barriers to prevent the incursion of seawater. But tax incentives have also been used to encourage water savings and directly manage demand. By setting up new institutions in charge of the tasks of management, control, and training for experts and water users as well as by forming users associations, the US has finally managed at least to prevent some of the lowest groundwater levels from declining any further.

In Asia, e.g. in India and China, implementation of packages of measures of this kind appears illusory, and not only for reasons of cost: institutional solutions have thus far also been blocked for political reasons. Besides, the solutions outlined above cannot simply be transferred to Asia, because here the number of affected farmers per unit of land is higher by a factor of roughly 100 than in the US, the reason being that in Asia there are far greater disparities in farm size, and institutions in poorer countries tend to be restricted in their capacity to act. Measures that presuppose self-responsible organization of and cooperation among farmers or measures that call for regular administrative controls are for these reasons less practicable in Asia. What is called for here are strategies that are less costly and can be implemented at the individual, farm level and yet hold promise of generating broadly effective impacts. Practicable action might include measures that, for instance, intensify natural groundwater recharge mechanisms. By planting special grasses, for instance, it is possible to retard the runoff of rainwater and sustainably increase groundwater recharge rates. Pilot projects in China and India have shown that traditional rainwater tanks can be used successfully to supplement groundwater resources. Other methods of collecting rainwater are already being used by many farmers in India and elsewhere. But what is called for to promote a rapid and sustainable dissemination of such methods is higher-level political support, e.g. economic incentives or conditionalities or support in the form of information campaigns and extension services.

Problem area 2: Competition for water in urbanized societies can be eased by implementing cross-sectoral use concepts

In the Middle East many water problems are bound up with the pollution and distribution of water. One characteristic problem here is competing water claims raised by countries in the region; these claims, an important aspect of the Middle East conflict, appear to be accessible to resolution only on the basis of a peace process with more broad political objectives. But even at the national level the water picture is clouded by competition, e.g. between the urban water sector and the irrigation sector. High urbanization rates mean rapidly rising quantities of wastewater, most of which, either not treated at all or insufficiently purified, is discharged into the sea or the environment, polluting them. What is highly problematic in this development is not only the environmental burden it poses, it is also the scarcity of clean drinking water it entails, a situation which, in Jordan and Algeria for instance, is already becoming manifest in chronic bottlenecks in the basic supply of water.

Options offered by integrated water management: Competing claims to water raised by different sectors can be met through cross-sectoral planning and by recycling water along a chain of diminishing quality needs. This would make it possible to avoid overburdening water with nutrients and pollutants from the very start, or to use marginal water e.g. in agriculture, while the drinking water sector could be given priority for higher-grade water. While wastewater has always been used by farms for irrigation purposes, individual or unsystematic use practices involve substantial risks which could be eliminated by defining an institutional framework for such methods. Beside a legal framework aimed at regulating risks, such approaches call for high levels of transparency in data on water use and water quality, treatment plants adapted to agricultural needs, and quality-graded water tariffs. This would make it possible to achieve a win-win situation for all sectors, one that would at the same time sharply increase the efficiency of water use.

All the same, thus far only a few countries have begun to promote water-recycling systems. One positive example it Tunisia: as early as 1975 the Tunisian government set up a wastewater authority and, with the aid of German development cooperation, has achieved connection rates to treatment plants of roughly 80 % of urban households. A substantial share of treated wastewater is used systematically for irrigation. Even though further improvements would be conceivable here, the Tunisian case does show that it is possible to restructure existing systems of water management if there is a political will do so.

Problem area 3: In rural societies it is land-use systems that decide on the water issue

Water problems are no less pressing in the Sahel countries, where the majority of the population are subsistence farmers who work without irrigation. Due to overuse, global climate change, growing competition between different population groups, and unfavorable land-rights arrangements, the soils and grazing land in the Sahel are faced with a situation of growing desertification. Crusted soils prevent rainwater from infiltrating the ground, and rainwater runs off, causing additional erosion damage. The consequences are losses of soil water, declining water tables, crop failures, hunger, and rural depopulation.

Options for a more efficient use of soil water: Community-level soil-conservations measures are a good strategy that has traditionally been used effectively in Africa. Construction of stone walls to prevent runoff, accompanied by appropriate agroforestry measures, permits rainwater to infiltrate the soil, improving yields and replenishing groundwater stocks. Such measures can, however, prove broadly effective only if the transportation costs for the stones needed to build such walls are assumed by outside sources, i.e. by governments or international donors, since these costs are far beyond the means of African farmers.

Such measures are also in need of institutional flanking if they are to be broadly effective. First and foremost, the planning for these activities must be participatory and include all the communities of a region concerned. Land-use planning of this kind must include controls, organizational planning, and a certain measure of external protection, e.g. to prevent any overexploitation of wood resources by town dwellers. Another essential condition is a clearly defined legal framework that sets incentives aimed at a sustainable use of land and water resources, since otherwise it would be illusory to expect the population show the necessary commitment to implementing such measures.

It is only structural reforms as well as new forms of cooperation, including water-users associations, that can ensure the success and effectiveness of concrete, technical measures

As is shown by the options addressed above, the factor obstructing a broad implementation is not a lack of suitable water-saving methods as such but the fact that they are not conceptually embedded in a program of water policy and the financial incentives and rules needed to implement them have yet to be put in place. The most important actors here are political decision-makers and institutions at the national and local levels. True, at the national level water reforms are for the most part quite difficult to set in motion, since they are seldom initiated on a case-by-case basis and tend more to be launched in connection with more comprehensive, cross-sectoral reforms. Unpopular measures are often tackled only shortly after a change of government or on the heels of a major national crises, a case that could be observed recently in Pakistan. There, it was a financial crisis that led to water reform, since continuing on with the old subsidy policy was simply no longer an option. In poorer countries water institutions are often cumbersome, intransparent, overstaffed bureaucracies with little capacity to act. Thanks to its cascading breakdown into a large number of subbureaucracies, the water sector is especially susceptible to rent-seeking activities. As was emphasized at the Freshwater Conference in Bonn, corruption is therefore one of the greatest obstacles to the implementation of water reforms. Decentralization, new forms of cooperation, including private-public partnerships, and the formation of water-users associations therefore offer better avenues to innovation, since such approaches encourage broad and more diverse interests to become active, in this way reducing incentives for corruption. The best approach is therefore a combination of "top-down" and "bottom-up" reforms.

Can private-sector actors and water-users association solve water problems?

A greater role for the private sector is more and more coming to be seen as the high road to any efficient water management. Only in this way is it possible to finance the investments needed e.g. to modernize derelict irrigation systems. However, private sector actors will make investments only under the condition that they pay, i.e. provided that cost-covering water tariffs are levied and the number of customers involved makes investment attractive.

While there are numerous approaches to privatizing the drinking-water sector, the conditions mentioned tend to be different for the irrigation sector. Here efforts must focus on the formation of water-users associations that organize and largely finance their own irrigation systems, acquiring decision-making right in exchange. A further point under discussion is the creation of water markets in which water is traded without regard to land ownership, an approach which can make water more broadly available. While market conditions may be expected to discernibly enhance the efficiency of water use, they do not, of course, ensure ecological sustainability and social equity. Furthermore, not every kind of cooperation is compatible with a given region's sociocultural context. An appropriate action framework that allows for decisions made on a case-by-case basis is crucial to the success or failure of new forms of organization and cooperation involving private-sector actors.

The role of development cooperation

While development-cooperation measures can be used to support locally initiated processes, DC will as a rule itself be unable to set such processes in motion. In the water sector it is largely the realization of reforms that decides on the effectiveness of concrete – e.g. technical – DC measures. To enhance the chances of success of such reforms from the very start, development cooperation should first of all focus on providing advisory support for the reform process.

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