Simonis, U. (2007): Water related conflicts – And the need for a global water strategy. In: Lozán, J. L., H. Grassl, P. Hupfer, L. Menzel & C.-D. Schönwiese. Global Change: Enough water for all? Wissenschaftliche Auswertungen, Hamburg. 384 S. Online: www.klima-warnsignale.uni-hamburg.de

4.13 Water related conflicts – And the need for a global water strategy

UDO E. SIMONIS

SUMMARY: *Both scarcity of water and water pollution are expected to increase further in the future. These trends will intensify existing conflicts over water and may produce additional conflicts of various kinds. Therefore, the need grows for a concerted international effort – a strategy – to prevent or to mitigate such conflicts. In this paper, the basic elements of a pro-active water strategy are being outlined and elaborated on. They include improved information, demand side management, additional supply side activities, and institutional reform of water policies.*

Conflict scenario – Strategy exigency

In the coming years, the global water crisis will reach unforeseen dimensions. With continuing population growth, environmental pollution, and climate change water scarcity will get worse in many countries of the world. Such was the conclusion of the first world water development report (»Water for People – Water for Life«), submitted in March, 2003, on the occasion of the World Water Forum held in Kyoto. This report, organised by UNESCO in collaboration with 22 other UN-institutions provides a comprehensive analysis of the availability of water world-wide, and discusses ways and means of a better use and management of water. How then is the conflict potential to be described, and how could serious conflicts over water be avoided?

According to recent projections by the United Nations, world population may rise up to 9.3 billion in the year 2050. But even today, with a population of 6.5 billion, water is already scarce in various parts of the world, and water in may cases is heavily polluted. As the World Summit on Sustainable Development in Johannesburg has stated, more than 1.2 billion people have no access to clear drinking water, and about 2.4 billion have no access to functioning sanitation devices. As a consequence, 3 billion people are suffering from some kind of water related diseases. Reasons enough then to think of an international conflict preventing and mitigating water strategy.

Such a strategy would not only have to consider restrictions posed by the natural hydrological cycle (a traditional field in the natural sciences). Also and particularly so restrictions would have to be discussed that derive from further demand by households, industry and agriculture, from the increasing loss and degradation of soils, from further chemical pollution, from floods and droughts and, last not least, from contradicting interests over transboundary water bodies (a field for both natural and social scientists).

Conflicting global trends and potential conflicts had led the World Commission on Environment and Development (WCED) in 1987 to strongly ask for sustainable development as a general policy guideline. Applying this guideline to water, sustainable development could be defined in the sense:

- that ways and means must be found to provide clean water and safe sanitation for all people;
- to secure sufficient water for industry and agriculture;
- to provide effective water management, particularly measures for water conservation, water efficiency and water safety;
- to improve international co-operation on water, particularly to allocate sufficient financial and organisational resources for a global water strategy.

How could such a strategy be designed and conceptualised? First, a differentiation seems to be appropriate: Basically, the water problematique can be reduced to two fundamental problems, i.e. water scarcity and water pollution.

Water scarcity

Basically, water scarcity is the result of two phenomena, (a) limits imposed by the availability of raw freshwater resources, and (b) limits generated by the development of land and water resources. Four different types of water scarcity then may be distinguished. Two of them are natural – aridity (1) and (intermittent) droughts (2). The other two are induced by man – landscape desiccation (3) which reduces accessibility to water, and water stress (4) which results from high levels of competing demand for water.

The availability of freshwater resources *per capita* varies widely from place to place and region to region. In Asia, water supply *per capita* is less than half the global average and the continent's run-off is the least stable of all the major land masses. In Africa, the situation is primarily one of under-development of water resources relative to needs and potentials, and uneven distribution of water resources.

In North and South America and the former Soviet Union, water resources appear to be abundant in relation to demand, but wide disparities exist from place to place. Europe has a substantially greater share of the world's population than its supplies of freshwater; but the larger part of the continent is endowed with a generally temperate

simonis@wz-berlin.de

climate with regular rainfall. In other parts of the world – like Northern Africa, Arabian peninsula etc. – rainfall variability is devastatingly high and droughts are a recurrent feature; in the Sahel rainfall is not only unreliable but unpredictable beyond a season.

Over the years and decades, these limits set to freshwater availability by nature, have been exacerbated by man: above all, by population growth, urbanisation, irrigation and industrial use of water. Water losses (leaks and pipe bursts) are another reason. In developed countries approx. 25% of the water put into the supply system never reach the consumer; in developing countries such losses may reach 50% in some cases.

Other factors also are important. Population pressure on the land in some parts of the world has led to reckless deforestation of upland watersheds which has caused soil erosion and both droughts and floods. An estimated 6 million hectares of dry land turn into deserts each year. In the Amazon basin, the massive deforestation occurring, is expected to generate large-scale and probably world-wide perturbations in hydrological conditions, such as reduced evapotranspiration and reduced precipitation.

Irrigation, with 60–70% the world major water user, is heavily contributing to water scarcity. Water used for irrigation, whether coming from aquifers or rivers, is partly transferred to the atmosphere, and that part is large, when less efficient techniques are used. Irretrievable losses occur to the water cycle with the falling water table of major seas and water bodies, due to excessive irrigation. Moreover, in various regions where surface water is scarce, irrigation has been based on groundwater mining , leading to unrecharged and degraded aquifers.

Interim conclusion: Under given (and deteriorating) conditions of usage and with an expected further population growth, it is for certain that freshwater availability *per capita* will decrease more or less drastically in the future. Adding the negative effects of climate change, this may lead to a crisis point in various parts of the world.

Already in 1975, 19 developing countries had to cope with natural water supplies of less than 500 cubic metres per person per year. This would translate into some 200 cubic metres or less of actual availability, taking into account losses incurred in the process of tapping and harnessing the supplies for particular uses. By the year 2000, an additional 10 countries were in a similar situation, and for the year 2025 a further 8 might have to be added to that list. In addition to these, another 16 countries would have less than 1,000 cubic metres supply, and could thus be regarded as approaching a situation of severe scarcity. It seems clear that in all these cases, industrial and household demands for water will strongly compete with the agricultural sector for the limited quantities of water available, thus making food-sufficiency difficult or even elusive.

Water quality

Concern about water relates not only to its quantity but also, and increasingly so, to its quality. Water bodies throughout the world have become subject to a variety of pollution loads, with sometimes irreversible consequences. The degradation of water resources is attributable to such factors as expansion of irrigation, over-use or misuse of fertilisers, insecticides and pesticides, discharge of industrial wastes, untreated sewage, domestic waste, toxic chemical dumps, and air pollutants. Pollutants again are of various types, such as organic compounds, inorganic salts, metals, nutrients, particulates, gases, radio-nuclides, heat, micro-organisms, etc. Pollution derives from point and mobile sources. Point sources are discrete end-of pipe discharges, industrial waste-water effluent or waste from the municipal sewage system. Mobile sources have an impact over a diffuse area and are less amenable to control, as with acid rain that pollutes surface waters.

Mismanagement of irrigation has caused widespread water quality problems, such as salinisation, alkalisation and waterlogging in a large number of countries. It is estimated that waterlogging and salinisation are sterilising 1 to 1.5 million hectares of fertile soils annually. One particular problem is caused by the increasing infusion of nitrates into drinking water, leading to threats to human health, particularly for babies. This problem was widespread in areas of intensive farming in Europe, the US and Russia.. Increasing use of fertilisers in developing countries would imply that similar problems can be expected there.

The fouling of water courses and lakes by untreated discharge of industrial waste and sewage has proceeded apace in the last decades. Despite heavy investments in costly municipal water treatment plants, for a long time lakes and rivers in the industrial regions were still undergoing increasing eutrophication, as pollution by the run-off of pesticides, herbicides and fertilisers from agricultural lands was not stopped. Not only the capacity but also the functionality of many municipal sewage water treatment plants in developing countries is insufficient, thus creating a permanent threat to water quality and human health.

Pollution of inland water bodies thus is not restricted to industrial countries but is a growing problem throughout the developing world where pollution control is either non-existent or unable to keep pace with the increasing impacts of production and consumption. Agricultural expansion has caused adverse impacts on water quality, urbanisation and industrialisation have caused more damage. While in the industrial countries an implementation deficit can be detected regarding the guarantee of water quality, in many developing countries even basic legal requirements do not exist, not to speak of an effective water quality management.

Fields of action

In view of the significance of water for life, for economic and social development, increasing water scarcity and decreasing water quality are central challenges of the future. Decreasing the number of people without access to clean drinking water, and decreasing the number of people without access to decent sanitation meanwhile have been made part of the Millennium goals by the United Nations.

In order to ensure that the finite amount of freshwater that is provided through the hydrological cycle is adequate to meet the (still growing) demand for water in the word, it is absolutely necessary to reverse the past trends of water consumption, to find innovative ways of conserving water, and to develop new water supplies. Both the development of water resources and the usage of water, i.e. the supply side and the demand side, need to take into account likely adverse impacts on the environment. This means striving for a »three pillars strategy«, – a strategy that puts the augmentation of water supply, the management of demand, and the safety of the environment on the political agenda.

Demand management

Regarding the demand side, the immediate and short-term course of action must centre on water conservation (or water efficiency), through rational utilisation of water resources, technical and social innovations. Only a few examples can be given here (see also *Chapters 4.3, 4.4, 4.5* and *4.6*).

To start with, in most industries, the water used for cooling and other processes does not need to be of drinking quality. Quantitatively, a large proportion of the water initially withdrawn can be recycled (many times) or be circulated in a fully integrated system. In the iron and steel industry such cycling since long is economically feasible. The paper and pulp industry , which for long had the reputation for being one of the largest consumers and polluters of water, has made successful efforts to recycle water after use. For the manufacturing industry, the cost of water on average is less than 3% of total costs. Incentives for industry, to use water more efficiently can come from strict water allocations, stringent pollution control or through water pricing. In the industrial countries, great attention is being paid to re-using treated waste water, but for cost reasons this is not yet world standard. Developing countries in many cases may have a comparative advantage because installing highly efficient water technologies into new plants should be cheaper than retrofitting old ones. Some of the available technologies may reduce water consumption and waste water flows in industry by up to 90%. Information on these best-practice-examples, however, need to be disseminated globally.

The need for raising the efficiency of irrigation is even more compelling, since irrigation claims the bulk of many nations' water supplies. Saving even a small proportion of water in irrigation will free a large absolute amount of water for other, competing needs. (Using the concept of »virtual water« on what is at stake, may be very helpful). Several methods are applicable here, drip irrigation is technically very efficient.

Compared to industrial use and irrigation, household and other municipal use of water is relatively (!) low. Still, storing, treating and distributing this water as well as collecting and treating the resulting waste water is costly. Therefore, conserving water and increasing the efficiency of household and municipal use will ease the financial burdens and scale down the need for new plants, water mains, sewer pipes, energy and other costs associated with municipal water supplies. The efficiency of use can particularly be increased through improved household fictures and appliances, toilets, dishwashers, washing machines, shower heads, and by installing water metering systems.

To be effective, the incentive for conserving water and increasing water efficiency, must be strong enough. In many countries and municipalities, the price for water and waste water treatment is not in accordance with the full-cost principle. Water may even be treated as a free good, or (highly subsidised) as a quasi-free good. When in such cases, a price solution for water conservation and water efficiency is not accepted or not acceptable for whatever (good) reason , the only real alternative is rationing, i.e. allocating water in fixed quantity for specific purposes. Of course, also a »smart regulation« may seem feasible, in the form of a mix of price and quantity solution.

Augmenting water supply

Demand side management is one of the basic and ecologically desirable options to address both problems of water scarcity and water pollution. Trying to augment water supply is another. Again here, many points of departure come into view (see also *Chapters 4.2, 4.6, 4.7* and *4.8*).

The first step should be to reduce the current losses in the existing supply systems, which in cases reach great dimensions. This reaches from the renewal of existing water infrastructure to cutting the losses through evaporation by building underground storage tanks.

To increase freshwater supplies, conventional and non-conventional methods can be applied, depending on technical feasibility and economic viability. Of the non-conventional ways discussed in the literature like seeding clouds to induce precipitation, towing icebergs, desalting sea and brackish water, transporting water by trucks and tankers, only the latter two seem to hold short-term potential. Several desalination techniques such as distillation, electrodialysis, reverse osmosis, have been developed . So far, however, only a few rich countries and

regions could afford their use. Yet this may change over time with the installation of renewable energies, e.g. the use of more efficient and repowered windmills. Long distance transport of water by trucks or tankers has become more frequent recently, but only under high environmental costs.

Besides augmenting water supplies indirectly by conservation and by direct means, as discussed above, another field of action is stricter pollution control. Pollution control most often goes hand in hand with water conservation in industry, agriculture and municipal water management. However, additional measures are needed, particularly to avoid eutrophication of surface and groundwater through careless use of fertilisers and other chemicals, and to prevent pollution of water through long-range, transboundary air pollution. Avoiding all kinds of water pollution through hazardous substances, increases the potential use of water both quantitatively and qualitatively. If, instead, the pollution level of water bodies, both surface and underground, surpasses certain levels, the quantitative use of such waters gets restricted. Reversing such trends will increase the respective options.

Management of natural hazards

Another field of action lies in the management of natural hazards, particularly floods and droughts. The occurrence of droughts has become more frequent, causing breakdowns of agricultural and pastoral systems, widespread dislocation of people and communities (»environmental refugees«), and substantial losses of human lives and animal livestock in many parts of the world. There is, therefore, an obvious need for drought management using the accumulated experience of countries that in the past have successfully managaged that phenomenon, and the financial help of the better off countries.

Where there is too little water here, there may be too much of it. Flood control is yet another area that calls for effective action, particularly in developing countries, where crippling damage caused by floods frustrate efforts to break the »vicious circle« of poverty.Where the incidence of floods is particularly severe, such as in Asia, Latin America and the Caribbean, in addition to short-term damage control measures, long-term structural measures such as the construction of new dams and the inclusion of storage capacity may be needed. Taken together, a demand for disaster management has arisen, both in the sense of preventing as well as adjusting to such extreme events.

Water policies

Despite some preliminary steps made, it is still not possible to speak of a global water policy – a policy in the sense of a comprehensively formulated and structurally organised field of objectives, measures, and institutions. Some observers even doubt whether such an approach were necessary at all. Still, there is a demand, and that demand becomes manifest and urgent when looking at past failures and future requirements.

To be sure, the objectives of water policies would vary from country to country, and region to region. But the main objectives are universal. There is demand for conservation of water resources, for more efficient uses of water, for preventing water pollution and for satisfying present needs without undermining future needs – to rephrase the sustainability concept of the World Commission on Environment and Development

While in the developed countries it is mainly the quality aspect of water that remains a burden, in the developing countries additional provision of safe drinking water and safe sanitation remain top priority. At the same time, however, there is strong competition from other sectors, mainly agriculture and industry. To meet overall demand, both water conservation and the augmentation of additional supplies seem necessary. This will, inter alia, require an improved administrative and institutional capacity for assessing national water availability and projecting future sectoral demands. Achieving optimal allocation asks for establishing priorities and more effective allocation mechanisms, particularly water pricing and/ or water rationing via quota.

Competitive demand pressure is also growing among different regions, particularly between the urban and the rural areas. That conflict has existed all along in most developing countries. So, a change of policy seems to be needed to achieve a better and more equitable allocation between these areas.

Furthermore, there is the possible conflict between large-scale and small-scale project development. Here, the established sectoral and regional interests are crucial. The decision of the World Commission on Dams not to support huge dam construction was a strong signal in favour of smaller water projects in general.

Also, the scarcity of public finances seems to require that policies be better geared towards greater community participation in water resources management, and also towards full cost or at least partial cost recovery.

Cost recovery through some smart form of water pricing could help achieve several goals simultaneously, such as more efficient allocation of water, water conservation and pollution prevention.

A number of options are available to preserve the ecological balance in rivers and lakes and to prevent further land degradation. Preventive action and anticipatory strategies against water scarcity and water pollution are generally to be preferred to costly pollution clean-ups and curative measures.

Regarding adequate instruments of pro-active water policies, the major question is on the use of economic and/or regulatory instruments. Generally speaking, the range of economic instruments was rather limited in past activities. Especially in developed countries, active water pricing could help solving various problems at the same time. Full-cost pricing for water uses, sensitive waste water levies, and strict liability in cases of water pollution, these are here the relevant topics. Poverty and special equity issues may prevent the full use of such instruments in developing countries, where the major task seems to be defining smart combinations of adequate instruments.

Still, regulatory instruments need also to be scrutinised. For instance, what makes up a good standard of water quality for long was not really debated. With the ongoing chemical loads on the environment, however, it may not be so clear what a good quality of water really is. Defining water quality thus could become a major issue again, particularly so as cleaning up poisoned water is a costly undertaking, and in part even impossible.

Returning to the issue of institution-building, a better handling of water issues requires awareness, knowledge, and financial means. These factors are unequally distributed around the world. Thus, knowledge transfers, technology transfers, and financial transfers become preconditions for a globally oriented water strategy. These transfers should be the better the more people get qualified to responsibly address problems of water uses. That's why in bi-lateral and muli-lateral aid arrangements capacity building on water issues should get higher priority.

There also is a special need for improved international co-operation. More than 40% of the world population live in transboundary water catchment areas. This leads to complex and sometimes controversial questions of access to water, quantitative water allocation, and quality control that can successfully be addressed only when common interests can be formulated (more on this in *Chapter 3.2.6, 3.2.7* and *4.12*).

More than 30 countries get more than 30% of their water from abroad. Turkey has been building dams and irrigation projects along Tigris and Euphrates, in this way affecting Syria and Iraq, countries with high population growth. There are more examples of this, all full of potential conflicts when water demand increases. To solve these conflicts or prevent them from getting worse, a strengthened and improved international co-operation is needed. In some cases, the related tasks may be beyond administrative and political capabilities of nation states, making international involvement necessary, particularly mediation activity by the United Nations.

At the global level, so far only a rudimentary system of exchange exists that needs to be further improved towards a true global policy on water (more on this in Chapter 4.12). There is the Global Water Partnership that needs to be strengthened; there is the Water Dialogue that needs to be continued; there are the water related Millennium Development Goals that have to be achieved; there is the World Water Forum with valuable consultations and meetings; there was the World Water Development Report , an assessment that should be updated. In addition to all that, there is the idea to develop an international water charta, or to negotiate a global water convention. In 2005, the International Decade for Action with the brand name »Water for Life« was started which could be the umbrella for these and other activities towards international water policies.

In addition to these initiatives, the existing bi-lateral and multi-lateral institutions should also focus on the water issue, including the World Bank, the regional development banks, the Global Environment Facility, and check their project priorities accordingly – in this way preventing future conflicts over water or at least decreasing the respective conflict potential ♦