Globalization of Water

Sharing the Planet's Freshwater Resources

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Chapter 11

Efficient, Sustainable, and Equitable Water Use in a Globalized World

Globalization of freshwater brings both opportunities and risks. The most obvious opportunity of reduced trade barriers is that virtual water can be regarded as a possibly cheap alternative source of water in areas where freshwater is relatively scarce. Virtual-water import can be used by national governments as a tool to release the pressure on their domestic water resources. In an open world economy, according to international trade theory, the people of a nation will seek profit by trading products that are produced with resources that are (relatively) abundant within the country for products that need resources that are (relatively) scarce. People in countries where water is a very scarce resource could thus aim to import products that require a lot of water (water-intensive products) and export products or services that require less water (water-extensive products). This import of virtual water (as opposed to real water, which is generally too expensive) will relieve the pressure on the nation's own water resources. For water-abundant countries an argument can be made for export of virtual water. Trade can physically save water if products are traded from countries with high to countries with low water productivity. For example, Mexico imports wheat, maize, and sorghum from the USA, which requires 7.1 billion m^3 of water per year in the USA. If Mexico were to produce the imported crops domestically, it would require 15.6 billion m^3 of water per year. Thus, from a global perspective, the trade in cereals from the USA to Mexico saves 8.5 billion m^3/yr. Although there are also examples

where water-intensive commodities flow in the opposite direction, from countries with low to countries with high water productivity, various studies indicate that the resultant of all international trade flows works in a positive direction (De Fraiture et al., 2004; Oki and Kanae, 2004; Chapagain et al., 2006a; Yang et al., 2006). In Chapter 4 we showed that international trade in agricultural commodities reduces global water use in agriculture by 5%. Liberalization of trade seems to offer new opportunities to contribute to a further increase of efficiency in the use of the world's water resources.

A serious drawback of trade is that the indirect effects of consumption are externalized to other countries. While water in agriculture is still priced far below its real cost in most countries, an increasing volume of water is used for processing export products. The costs associated with water use in the exporting country are not included in the price of the products consumed in the importing country. Consumers are generally not aware of – and do not pay for – the water problems in the overseas countries where their goods are being produced. According to economic theory, a precondition for trade to be efficient and fair is that consumers bear the full cost of production and impacts.

Another downside of intensive international virtual-water transfers is that many countries increasingly depend on the import of water-intensive commodities from other countries. As we saw in Chapter 10, Jordan annually imports a virtual-water volume that is five times its own annual renewable water resources. Other countries in the Middle East, but also various European countries, have a similar high water import dependency. The increasing lack of self-sufficiency has made various individual countries, but also larger regions, very vulnerable. If for whatever reason food supplies cease – be it due to war or a natural disaster in an important export region – the importing regions will suffer severely. A key question is to what extent nations are willing to take this risk. The risk can be avoided only by promoting national self-sufficiency in water and food supply (as Egypt and China do). The risk can be reduced by importing food from a wide range of trade partners. The current worldwide trend, however, facilitated by the World Trade Organization, is toward reducing trade barriers and encouraging free international trade, and decreasing interference by national governments.

Fairness and Sustainability of Large Water Footprints

Two other issues in the context of globalization are the equitable and sustainable use of the world's natural resources. Some people around the world have comparatively large water footprints, while others have small ones. This raises the question of whether this is fair and sustainable. Under current production conditions it would be impossible for all world citizens to develop a water footprint the same size as the present water footprint of the average US citizen. People in the USA have, on average, the largest water footprint per capita in the world, namely 2,480 m^3/yr. China has an average water footprint of 700 m^3/yr per capita, while the world average is 1,240 m^3/yr (see Chapter 5). The issues of fairness and sustainability become very obvious in this imaginary growth scenario, but both are already relevant today.

Currently, more than 1 billion people do not have access to clean drinking water (UNESCO, 2006), while others water their gardens, wash their cars, fill their swimming pools, and enjoy the availability of water for many other luxury purposes. In addition, many people consume a large amount of meat, which significantly increases their water footprint. The average meat consumption in the USA for instance is 120 kg/yr, more than three times the world-average. The water used to produce the feed for the animals that provide the meat for the rich cannot be used for other purposes, for example to fulfill more basic needs of people who however cannot afford to pay. The question of whether the current distribution of water footprints is fair is a political one. Redistribution of welfare among individuals is normally done within the borders of the nation state, but since the distribution of water and water-intensive products is very uneven across the globe, the redistributive issue becomes a global matter as well. The normative question at global level is whether wealthy water-rich nations should play a role in supporting developing water-poor nations, for instance by helping them to efficiently and sustainably use their scarce water resources.

What is a "sustainable water footprint," given the 6 billion inhabitants on earth and the fact that the total water availability in the world is limited? The current global water footprint is 7,450 billion m^3/yr, which in many places obviously leads to unsustainable conditions, as witnessed by the many reported cases of water depletion and pollution (UNESCO, 2003, 2006). Although the annual volume

of precipitation over land is roughly known, it is very difficult to give a global figure for the maximum "sustainable water footprint" as an upper limit to global water use. There are various reasons for this. One is that not all precipitation can be used productively, because its fall is unevenly spread in time and space, so that there are places and times when the water will inevitably flow to the oceans. According to Postel et al. (1996) about 20% of total runoff forms remote flows that cannot be appropriated and 50% forms uncaptured floodwater, so that only 30% of runoff remains for use. Although there has been some research in this direction, it is not yet clearly established what fraction of this remaining flow should remain untouched in order to fulfill the environmental flow requirements (Smakhtin et al., 2004). It has also not been established what fraction of the total evapotranspiration on land may be counted as potentially productive. Finally, what we would consider the maximum "sustainable water footprint" at global level depends on what assumptions are made with respect to the level of technology. One could take water productivities as they are in practice at present (which differ from location to location), or one could work with the potential water productivities based on existing technology. The latter would lead to a more optimistic figure than the former, but also a less realistic one. So far no estimates of the world's maximum "sustainable water footprint" have been made, but a general feeling exists that if it has not passed it already, the current global water footprint will not be far below the maximum sustainable value – witness the widely promoted need for water demand management and water use efficiency improvements (Postel et al., 1996; FAO, 2003c; UNESCO, 2003, 2006). This brings us back to the issue of fairness: Is it fair if some people use more than an equitable share of the maximum global volume of annually available water resources? The average person in North America and Southern Europe certainly does so.

Global Rules of the Game

In order to benefit from the opportunities and to avert the downsides of international trade, nations can develop their own strategies. Measures to redistribute wealth and promote sustainability can also be taken at national level. However, in the end, efficient and fair international trade, equitability among people, and sustainable use

of the world's water resources are true global issues that are likely to benefit from shared "rules of the game." In the remainder of this book we explore what sorts of rules ("institutional arrangements," in the jargon of policy science) could be employed in order to promote efficient, sustainable, and equitable use of water resources in the world. We will identify a few possible types of arrangements in an explorative manner. By "explorative" we mean that we do not intend to be exhaustive and that identification of possible types of arrangements will have priority over reviewing the political feasibility of the arrangements identified. In fact, at this stage we should not care too much about what seems feasible and what looks unlikely. We deal with issues that have not been addressed before, so the tools will not be the same as any seen previously. Our view is that some speculation on what would be required – and on some possible mechanisms – without the hindrance of day-to-day politics might be more productive than thinking within existing structures.

An International Protocol on Water Pricing

First of all, there is a need to arrive at a global agreement on water pricing structures that cover the full cost of water use, including investment costs, operational and maintenance costs, a water scarcity rent, and the cost of negative external impacts of water use. Without an international treaty on proper water pricing it is unlikely that a globally efficient pattern of water use will ever be achieved. The need to have full-cost pricing has been acknowledged since the Dublin Conference in 1992 (ICWE, 1992). A global ministerial forum to pursue agreements on this does exist in the regular World Water Forums (Morocco 1997, The Hague 2000, Japan 2003, Mexico 2006), but these forums have not been used to take up the challenge of making international agreements on the implementation of the principle that water should be considered as a scarce, economic good. It is not sufficient to leave the implementation of this principle to national governments without having some kind of international protocol on the implementation, because unilateral implementation can be expected to be at the cost of the countries moving ahead. The competitiveness of the producers of water-intensive products in a country that implements a stringent water pricing policy in isolation

will be affected, and this, together with the natural resistance of domestic consumers to higher prices of local products, will reduce the feasibility of a unilateral implementation of a rigorous water pricing strategy. An international protocol on full-cost water pricing would contribute to the sustainable use of the world's water resources, because water scarcity would be translated into a scarcity rent and thus affect consumer decisions, even if those consumers live at a great distance from the production site. Such a protocol would also contribute to fairness, by making producers and consumers pay for their contribution to the depletion and pollution of water. Finally, such a protocol would shed fresh light upon the economic feasibility of plans for large-scale inter-basin transfers, since it would force negative external impacts and opportunity costs to be taken into account. Full-cost water pricing should be combined with a minimum water right, in order to prevent poor people being unable to obtain their basic needs.

A Water Label for Water-Intensive Products

A second global arrangement could be a water label for water-intensive products, comparable to the FSC (Forest Stewardship Council) label for wood products. Such a label would make consumers aware of the actual, but so far hidden, link between a consumer product and the impacts on water systems that occur during production. A water label should give a guarantee to the consumer that the product was produced under some clearly defined conditions. The label could be introduced first for a few commodities that usually have great impacts on water systems, such as rice, cotton, paper, and cane sugar. Given the global character of the markets for these goods, international cooperation in setting the labeling criteria and in the practical application of the water label is a precondition. Consideration could be given to integrating the water label within a broader environmental label, but this would probably create new bottlenecks for implementation, so that a first step could be to agree on a separate water label.

Minimum Water Rights

Equitability and sustainability in water use require the establishment of both minimum water rights and maximum levels of water use. The

latter has received little attention from the international community and will be discussed further below. The issue of minimum water rights has had more consideration (Gleick, 1998; WHO, 2003; Salman and McInerney-Lankford, 2004). At international level efforts have been made to have access to clean drinking water accepted as a human right. The Universal Declaration of Human Rights from 1948 does not mention access to water as a human right, but the first paragraph of article 25 reads: "Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services... ." With a little good will, one could say that the right to a certain minimum of water is thereby implicitly established. A step toward the more explicit formulation of the right to water was made in 1976 with article 12 of the International Covenant on Economic, Social, and Cultural Rights, which acknowledges "the right of everyone to the enjoyment of the highest attainable standard of physical and mental health." In 2000 the Committee on Economic, Social, and Cultural Rights of the United Nations (in her General Comment No. 14) accepted a supplement to this covenant which states that "the right to health embraces a wide range of socio-economic factors that promote conditions in which people can lead a healthy life, and extends to the underlying determinants of health, such as food and nutrition, housing, access to safe and potable water and adequate sanitation, safe and healthy working conditions, and a healthy environment." In 2002 the same committee specified the right to water in her General Comment No. 15: "The human right to water entitles everyone to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses. An adequate amount of safe water is necessary to prevent death from dehydration, to reduce the risk of water-related disease and to provide for consumption, cooking, personal and domestic hygienic requirements."

With these statements the human right to water has been formally established, but there are no enforcement mechanisms. Besides, the right specifically refers to water for basic needs in domestic use, not to water for food. Food itself as a human right had already been established explicitly in article 25 of the Universal Declaration of Human Rights. Although one cannot deny that the right to food translates into a certain volume of water required to produce the food, the right

to food has never been translated into a "right to water for food." On the level of the individual this is also not useful, because it would wrongly presuppose that every individual produces his or her own food. However, the right to food implies that every individual has a sort of "claim" on a certain volume of the world's water resources that is required to produce the amount of food that he or she is entitled to according to the existing right to food. Given the uneven distribution of water across the world, an important question is: How do the existing human rights to water and food translate into a moral obligation of communities that have abundant water resources at their disposal toward communities with severely limited water resources? One of the concrete steps taken by the international community has been the formulation of the Millennium Development Goals during the UN Millennium Summit in New York in 2000. Definite targets include to reduce by half the proportion of people who suffer from hunger and also to reduce by half the proportion of people without sustainable access to safe drinking water (both targets referring to the period 1990–2015). The weak point of the Millennium Development Goals is that they lack a clear course of action and a mechanism for enforcement. As a result, there is no guarantee that the good intentions will be realized.

(Tradable) Water-Footprint Permits

The issues of fair water allocation and sustainable water use cannot be solved by minimum water rights alone, but also require arrangements about maximum levels of water use. The limited availability of freshwater in the world puts a maximum on the human global water footprint. The question for the global community is how this global maximum can be transferred to the national or even the individual level. Or in other words: What is each nation's and each individual's "reasonable" share of the globe's water resources? And what mechanisms could be established in order to ensure that people do not use more than their "reasonable" share? Even in the case of full-cost water pricing, there is no guarantee that the globe's water resources will be used in a sustainable manner. The reason is that proper marginal-cost pricing throughout the economy will lead to the so-called "economic optimum" (provided that some other basic presuppositions

of economic theory are met as well), but this economic optimum is not necessarily sustainable. Consumers, even if they pay full marginal costs, do not necessarily make choices that can be maintained in the long term. Economists in particular tend to forget this. Maximum levels of water use to guarantee sustainability could be formalized in the form of a water-footprint permit system. An international protocol on establishing water-footprint permits would be comparable to the Kyoto Protocol on the emission of greenhouse gases (drafted in 1997, effective since 2005). The Kyoto Protocol is based on the understanding that, to prevent human-induced climate change, there is a ceiling on the maximum volume of greenhouse gas emissions from human activities that can be accommodated by the global system. The fact that it is not known exactly what this ceiling is has apparently not held the international community back in setting political targets with respect to greenhouse gas emission reductions. The same would have to happen if the international community were willing to set targets with respect to maximum water footprints, because the precise ceiling on water use is subject to debate as well, as explained earlier. In the case of the Kyoto Protocol, the maximum allowable emission permits have been issued in the form of tradable emission permits. In the case of a protocol on water use, this could be done in the form of tradable water-footprint permits.

Global Arrangements versus the Subsidiarity Principle

The above arguments for coordination at global level seem to be at odds with the subsidiarity principle, nowadays widely accepted and promoted in the field of water governance. This principle means that water issues should be settled at the lowest community level possible. As has been argued in this book, however, some water issues have a truly global character and cannot be solved at a lower community level than that of the global community. Hence, strictly speaking, there is no conflict with the subsidiarity principle. However, it is a fact that global arrangements in the area of water governance will definitely subtract from the mandates at lower community levels. Finding a balance between formal arrangements at different levels of governance will indeed be a true challenge.

Globalization: Pro or Anti?

With increasing globalization of trade, there are opportunities to enhance global water use efficiency if nations make use of their comparative advantages. At the same time, however, national water dependencies and overseas external impacts are likely to increase. In addition, since freshwater is gradually becoming a global resource (demand and supply match at the global level rather than at the river basin level), equitable and sustainable water use are turning into global issues as well. We think that global arrangements based on ideas such as a global water pricing protocol, water labeling, minimum water rights, and a water-footprint permit system are necessary to promote water use efficiency and at the same time ensure sustainable water use and encourage equitable sharing of the limited water resources of the world. In the heated debate about globalization we take the stance of neither pro-globalist nor anti-globalist. What is really needed in our view is the establishment of proper arrangements at the global level where national arrangements are not sufficient.