4.4: Sharing Waters

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1 World Water Actions towards Sharing Waters

The role of water resources in stimulating conflict, and paradoxically, in stimulating cooperation, received high profile attention at the Second Water Forum. The Ministerial Declaration describes the challenge as: "to promote peaceful cooperation and develop synergies between different uses of water at all levels, whenever possible, within and, in the case of boundary and trans-boundary water resources, between states concerned, through sustainable river basin management or other appropriate approaches". (The Hague Ministerial Declaration, March 2000).

Among the approximately thousand recent or ongoing Water Actions identified and summarized to date in the Water Actions database, about a quarter have as one of their goals to enhance cooperation between users of a common water resource, and to find out methods for sharing water in a sustainable way. Does this mean we are heading towards better sharing water? The following discussion tries to answer to this question based on the Water Actions collected so far.

Sharing water means sharing water among uses and sharing water among users.

Water systems have many different uses and many different functions. Water is necessary to the life of all ecosystems. Water is necessary to human beings for drinking and for hygiene. Water is necessary to the production of food and to industry. Water provides energy and enables transport. Water is an element of our cultures and histories. It has aesthetic and religious values. Some of these functions might be conflicting.

The World Water Vision has pointed out how population growth and development are increasing the pressure on available water resources. Intensive human use of water has led to social and environmental damages that are not always reversible. We should make careful tradeoffs when allocating water between different uses at the level of a river basin or an aquifer. These tradeoffs will be made possible through involvement of all stakeholders in water management. Land use planning and involvement of all socio-economic sectors at the catchment level are necessary to preserve or improve water quality and quantity. For sustainable development, we should change the way we manage our water.

The Actions show that the world water community is working towards better sharing water through:

- taking into account the different functions of water in the planning stage;
- caring about long forgotten functions of water, namely the social, cultural and environmental functions;
- implementing river basin management and aquifer management;
- implementing mechanisms for sharing waters at the national level;
- increasing international cooperation.

2 Taking into Account the Different Functions of Water in the Planning Stage

2.1 Multi-purpose planning and Integrated Water Resources Management

Several hundred Actions recorded in the database are water management plans aiming at taking into account a wide range of objectives, and systematically including the impacts on the environment.

Many of these Actions refer to themselves as Integrated Water Resources Management (IWRM). The Global Water Partnership (GWP) has defined integrated water resources management as "a process which promotes the co-ordinated development and management of water, land and related resources to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems". The ToolBox being developed by GWP promotes Integrated Water Resources Management and gives recommendations on how it can be achieved.

Integrated Water Resources Management addresses the entire water and land system, as well as the human system. By considering the different functions of water and the different stakeholders, it can be considered as a means to reach a better sharing of water.

Boxes 1-3 give different examples of how water management aims at reconciling economic development and ecosystem protection while involving different stakeholders in the basin. Thereby the Actions show that principle of integrated water resources management is widely acknowledged today. Does that mean that we are able today to manage water resources in an integrated way and does this lead to a better sharing of water?

The question is difficult to answer, because integrated water resources management takes time, and the results can only be visible in the long run.

Successful examples of integrated water resources management can be found at the scale of smaller planning units, because concrete solutions for integrated water resource management are more easily and more rapidly found in smaller watersheds. The United Nations Development Programme's (UNDP) Small Grants Programme provides different examples of achieved as well as ongoing integrated water resources management plans (http://www.undp.org/sgp).

Box 4.4. 1 Pollution reduction and ecosystem restoration in lake George (Uganda)

This project gathers the private sector (Kasese Cobalt Company), the Elizabeth National Park, governmental administrations and Care International for a multi-dimension approach of the heavy metal pollution problem:

- mining activities optimization so as to throw away less pollutant solid waste;
- treatment of liquid waste;
- ecosystem recovery (revegetalization, biodiversity monitoring)
- public awareness;
- environmental training;
- ecotourism development involving local communities.

The integrated approach, both in terms of stakeholders and in terms of activities, is a characteristic of the program.

Box 4.4.2 Sustainable agriculture, eco-tourism, and regional development in Western Estonia

Väinamäri is a coastal area located in western Estonia, which ranges from the Matsalu Bay to the islands Dagö and Ormsö. The inland sea Väinamäri has been defined a marine reserve, and the coastal area by the Matsalu Bay is on the Ramsar Convention list for international valuable wetlands. The Swedish WWF and Estonian environmental NGOs have cooperated for several years. The project is developing sustainable agriculture and animal husbandry, eco-tourism and handicraft, to maintain the precious value of the nature and culture in the area and to achieve a sustainable regional development.

Box 4.4.3 Integrated Management of the Komadugu-Yobe River Basin in Nigeria

The main water management problems in the basin include uncoordinated development of infrastructure, such as the construction of dams and the progressive expansion of irrigation schemes, and uncoordinated operations of dams and an absence of proper hydrological monitoring.

As a result, wetlands are drained, channels silt up and become blocked by weeds. This all has progressively led to an inequitable distribution of water resources and major environmental degradation and social conflicts in the entire basin.

Current and future programme components and activities are based on the work by IUCN and partners over the last 12 years and on recommendations of the 1998 external project review by the European Commission. Working with Federal and State Ministries for Water Resources and Rural Development, the next project phase in 2001-2004 will tackle the following challenges: first and foremost, hydrological and water management issues at the basin level; second, a process of integrated ecosystem management in several protected and unprotected wetland, forest and arid land areas; and third, continue to build the capacity of floodplain communities (farmers, herders and fishermen) for sustainable use of natural resources.

It also appears that integrated water resources management is proving to be more and more successfully applied to cities and urban areas. We can speculate that the reasons for this success might include that the issues are clearly defined, the area well delimited, and the actors easily identified. Already, different Actions have been collected that combine such items as water demand management, water recycling, domestic and industrial sanitation, restoration or creation of natural areas, improvement of living standards, and flood risk reduction in urban areas (see for instance below).

Box 4.4.4 Brisbane City Plan

The Queensland's Integrated Planning Act 1997 required local government to review planning schemes to manage the effects of development on the environment and adopt an integrated approach. Brisbane City Council developed a new City Plan in 2000; the plan includes a Stormwater Management Code, Water Quality Objectives, and development of Water Sensitive Urban Design components. A variety of sustainable stormwater management practices have been developed. A multi stakeholder group, the Water Quality Technical Reference Group, has been set to discuss the impacts of policies.

2.2 Allocating water benefits

Efforts are underway to develop methods for the allocation of waters among different functions. Such methods can require valuing the different functions of water in order to maximise the benefit that can be obtained (see ‘Valuing Water’).

It is widely recognised now that we should allocate benefits from water instead of water itself (e.g. Wolf, 1999). The term "benefits" is used in a very broad sense. Benefits can be economical, socio-political, environmental. They can be positive benefits (to win something) or they can be a reduction of cost (to avoid losing something). Sadoff and Grey (2002) show how benefits can be thought of as benefits not only from water, but also to the water system, because of the water, and even beyond the water. Solutions to water disputes might even be found by exchanging water-related benefits against non-water-related benefits, e.g. on transport infrastructure or employment.

It is of course difficult to value the environmental, social or cultural functions of water. Therefore, the social and environmental functions are generally being considered as priority functions (see 'Valuing Water').

2.3 The human factor

Technical solutions can mostly be found to allocate water among competing uses – once the objectives are clearly defined. But the human factor remains the most important in reaching accepted solutions and applying them. Mostly, integrated water resources management requires both an agreement as to the performance criteria to be used to evaluate management goals (e.g. environmental sustainability, political viability, or economic efficiency), as well as a willingness to relinquish a degree of individual rights or group sovereignty to achieve those goals. There are very limited locations where both these decisive conditions exist. This aspect will be developed at the conclusion and recommendations stage.

3 Caring about long forgotten functions of water

3.1 Water for ecosystems

The Water Actions database shows that the needs of the ecosystems are now more and more being taken into account in water management. Environmental protection is often included as an objective at the planning stage. For instance, among the 22 projects for new dams recorded in the Actions database, environmental impact assessments are being performed in at least 9 cases (search the database on keyword 'dams'). More and more countries are adopting legislation that makes the environmental assessment of infrastructure projects compulsory (e.g. Nepal, see Action 'Hydropower development in Nepal'). Romania is developing environmentally sound management practices in hydropower projects (see Action 'Environmental management hydropower'). International organizations are also playing an important role by making their assistance contingent upon sound environmental practices. The challenge 'Valuing Water' also provides some examples in this field. International governmental organizations as well as non-governmental organizations play an important role as "the voice of nature".

Despite this awareness, concrete solutions for allocating water to the ecosystem are rarely observed in the Actions collected to date (see 'Protecting Ecosystems' challenge). Allowing a small quantity of water to return to the ecosystem when water is taken in for human uses is – technically speaking – a simple solution (see e.g. Action 'Najar barrage' in India concerning reserved flow to Chilika Lake). But examples in Western Europe show that this idea is still difficult to implement due to opposition from some stakeholders (*Actions not entered yet on Mesue, Rhone River and Aveyron*).

Monetary compensation for losses of biodiversity are also being observed, but it should be said that this alone does generally not allow restoration of the functioning of ecosystems (see Action 'Paying for Salmon' at Cardiff barrage in the United kingdom).

It has become clear now that caring for the ecosystem can simultaneously help achieve other water management challenges. The Actions Database contains different examples of such win-win solutions where the needs of humans are being satisfied at the same time as the ecosystem functioning is being preserved.

For example, actions aiming at restoring river-bound wetlands in order to mitigate downstream flooding can be found at the local scale as well as on large rivers such as the Huong River Basin in Thailand, the Tisza in Hungary, the Yangtze in China, and the Rhine over its entire course in Europe (see Actions: 'Establishing ecosystem management in the Huong River Basin', 'Tisza Floodplains: the Nagykörü Revitalisation Project', 'Nature Conservation and Flood Control in the Yangtze River Basin' and 'Rhine 2020').

Restoration of ecosystems can also go hand-in-hand with improving the recreational value of water-bound ecosystems. An example combining ecosystem restoration in Estonia has been given in Box 4.4.2 above.

Last but not least, restoring healthy ecosystems can increase the availability of clean water for human use. The "Everglades Restoration Pact" programme (see 'Protecting Ecosystems') and many smaller projects are examples of Actions in this sense.

3.2 Water for culture

People are getting more and more aware of the cultural, aesthetical and religious value of water through different events such as fairs and exhibitions. The Action on Lake Victoria in Australia shows an example of how the culture issues is being tackled in case of a reservoir.

Box 4.4.5 Lake Victoria (Australia) and Cultural Heritage

In 1994, operation of Victoria Lake as a water storage was restricted in response to concerns over damage to significant cultural heritage and Aboriginal burials exposed on the Lake's foreshores. The issue triggered a far-going debate. Today the Lake is once again operating as a critical storage facility within the Murray-Darling Basin system, although the objectives of management have changed. A Plan of Management is being developed; its objective is to set in place an appropriate management regime that minimises environmental impacts and conserves and manages cultural and natural heritage values. The Plan is being developed with significant community input. The Murray-Darling Basin Commission is responsible for its implementation. The Lake Victoria Advisory Committee provides advice to the Commission on the development of the Plan of Management and the Strategies and Actions arising from it.

3.3 Water for jobs

Social functions of water have been recognized in several Water Actions. In the Mitta Mitta case in Australia, farmers have been compensated for the estimated cost of irrigating pasture soils that had dried out because of the building of a dam (see Action: 'Mitta-mitta ex-gratia payments'). In Québec, the Cree tribes have been compensated for the installation of a hydropower dam with money and with more jobs in the Hydropower company (see Action 'Agreement between Hydro-Quebec and Cree tribes').

4 Implementing River Basin Management and Aquifer Management

The river basin scale can be an appropriate scale to solve water-related disputes and a movement is underway to address water management at this natural scale. However, this should be considered as the first step only towards sharing water at the catchment level.

4.1 River basin management

The first 1000 Actions in the database show that since 2000, 11 more countries have included the principle of water resources management at the basin level in their water legislation. New basin organizations have been created in 25 countries. Of these, many are pilot organizations. Basin organizations can be created within a state's institutional framework and/or they can arise ad hoc by local organizations within a basin. Brazil is an interesting action because both approaches match: Basin Committees and Water Agencies are being created to support already existing organizations of municipalities (see the 2 Actions on 'Piracicaba').

Box 4.4.6 Paranaiba River Basin Committee in Brazil

The creation of the Paranaiba River Basin Committee was approved by the 7th Extraordinary and Ordinary Meetings of the National Water Resources Council of Brazil on May 24.

Main issues in the basin are water scarcity, conflicting water uses, and pollution from gold mining, irrigation and wells dug near springs.

The Paranaíba River Basin encompasses an area of 222,000 square kilometers, with 1,160 Kilometers in extension, being, therefore, the third most extensive in Brazil. There are 196 municipalities in the basin: 136 are in the State of Goiás, 55 in the State of Minas Gerais and four in the State of Mato Grosso do Sul, besideds the Federal District, with a population of approximately 7 million people.

Local entities started to mobilize in 1997 and their action culminated in the creation of a Temporary Basin Committee – COBARIPA. Initial research was made with the aim of subsidizing the elaboration of a basin plan. Since 1997, forums, public hearings, seminaries and most recently, a Scientific Expedition in the Paranaíba River have been held, the latter gave rise to an effective, systematic and judicious analysis of the riverbed. It was found that various municipalities discharge their sewage and industrial effluents directly in the river, without treatment. It is important to remember that the Paranaíba River Basin is in a typically agricultural region with production poles such as the Southwest of Goiás, which is of the highest economic expression.

Box 4.4.7 Brong Ahafo Regional Coordinating Council in Ghana

Faced to a drying up of the Tano River, the Regional Coordinating Council of Brong Ahafo and traditional chiefs have elaborated a program to reverse degradation of the catchment:

- appoint a project coordinator
- create 100m buffer strips along the banks of Tano River and 30m along all tributaries
- start agro-forestry in the buffer strips
- ban farming close to the streams

- pay compensation to people whose lands would be affected
- raise public awareness through campaigns
- enforce bush burning prevention regulations

This local committee then worked to find funds and is now implementing its plan.

This initiative is considered by the National Water Resource Commission as a seed for future Tano River Basin Management.

It should be noted that many active Water Management Boards are found in urban basins, such as in Brazil (see Actions on 'Jiquiriça') and The Philippines (see the 2 Actions on 'Davao'). The greater water stress in urban basins can explain the urgency to find solutions for river basin management.

The Actions show that the process of creating basin organizations is advancing, but also that setting-up a basin organization is a lengthy process, simply because including many stakeholders takes time (see the advances on Paranaiba in Box 4.4.6). The principle of basin organizations is rather widely accepted, though not a priority in all countries. Many are still searching solutions to finance their operation.

4.2 Aquifer management

It is more difficult to organize aquifer management than river basin management. The difficulty may be explained by the following reasons: first, issues concerning groundwater might not be known because the groundwater is not seen. Second, the catchment or recharge area is hard to define; and third, it is, therefore, hard to find out who lives in the area and should be responsible for its management.

Despite these difficulties, the Actions show that some river basin organizations are also in charge of groundwater management. This might not be very appropriate in cases where several river basins are located over the same aquifer. Several examples of groundwater management at the aquifer level can be found in France (*Actions to be entered*). The 'Indus Delta Water Partnership' in Pakistan has a specific objective to manage shallow groundwater quantity and quality. In addition, water users associations for groundwater management are being created throughout the world.

Box 4.4.8 Management of the Nappe de Beauce Aquifer (France)

Description to be completed

4.3 Efficient Basin Management

The effectiveness of (River or Aquifer) Basin Management is difficult to evaluate from the actions we have. For the next draft of this text, we would like to be able to show successful solutions for sharing waters that were performed within the framework of a Basin Organization.

Box 4.4.9 Surma River Basin in Bangladesh

A basin-level water partnership was set up on 24/11/2001 to improve water management in the Surma River Basin, an area economically based on agriculture and fisheries where water issues have affected productivity and livelihood. This Basin Organization is seen as a pilot for future basin organizations in Bangladesh and works for public awareness and involvement through a Vision and Framework for Action process. Proposed projects include:

- improvement of water quality and sanitation
- river dredging
- plantation of flood tolerant trees to secure ecosystem
- introduction of minihydropower generation
- restoration of habitats for birds and wildlife

Though awareness is increasing on the need to manage water at the scale of the natural system, achieving integrated basin management remains difficult, because of the number and complexity of aspects to be treated and the number of stakeholders involved.

Knowledge of the basin is a prerequisite for efficient river basin management. (Geographic) data management systems and mathematical simulation models can be useful tools. Many Actions to improve knowledge are going on in the World and only those on the largest basins have been included in the database (see e.g. 'Oka Basin Water Management Unit'). In Belgium, basin knowledge was improved and participation stimulated simultaneously by letting riparians ensure detailed data collection in the catchments (see 'Contrats de Rivière' in Belgium).

Efforts are underway to develop methodologies and tools for river basin management. The European Union Water Framework Directive for instance promotes the use of an economic efficiency approach to design river basin management plans. Decision support systems are being developed for many catchments, simulating the possible impact of combined water management measures on a model of the river basin or aquifer (search on keyword 'water and information').

Mechanisms have to be implemented to finance the river basin management structure, as well as to allocate financial resources at the scale of the river basin. In general, actions will have to be taken upstream, but will benefit to downstream inhabitants. In Costa Rica and Peru, payments for environmental services are being implemented (*Actions to be entered in the database*). In Brazil, taxes collected in the basin for water use are redistributed through the catchment to finance the restoration of water quality (see Action 'PRODES' in Brazil).

Ensuring participation of all users in river basin or aquifer management is not an easy task. The existence of an issue that mobilizes people is a success factor for river basin management. Even if, initially, the issue is mono-sectoral, its existence may trigger the creation of a participatory process that in the end forms the basis for tackling wider issues and includes more users.

5 Sharing Water at the National Level

Decisions on water allocation sometimes have to be made at a scale that is larger than the scale of the natural water system. This is especially true when water is allocated among economic sectors by means of tariff incentives, or when large aquifers are concerned, since these are rarely managed at the scale of the natural unit.

5.1 Inter-basin transfers

Different countries are currently planning or implementing inter-basin water transfers. Examples can be found among others in China (Yellow River and North-South Water Diversion Projects), South Africa (Lesotho Highlands Water Project), Egypt (El-Salam Canal), Algeria (Taksebt Dam), Morocco (Oujda Water Supply), Syria (Damascus Water Supply), Spain (Spanish National Hydrological Plan). These infrastructure projects are often keys to a region's economic development but raise opposition from environmentalists because the water is necessarily diverted from a natural ecosystem.

5.2 Allocating water among sectors

Decisions can be made at the national level on allocation of water resources in times of drought. In Jordan, water primarily intended for irrigation can be diverted in dry periods to be used for urban water supply (*Action to be entered*). The farmers are compensated for the loss in production, this compensation being easily recovered through domestic water sales.

The *Valuing Water* challenge shows how pricing policies are a tool to share water among different economic sectors or different types of users. Actions involve subsidising water for the poorest, or allocating water to the sector with the highest economic return.

Implementing water markets, in which rights are allocated, is also a mean to allocate water among sectors.

Examples of Actions are:

- Transferable water entitlements in Sri Lanka;
- State-owned water-use rights trade in China;
- Water Trading in Western Australia;
- Application for Water Rights on Behalf of the River Basin in Texas (USA).

6 Increasing International Cooperation

Sustainable water management requires a catchment-level approach, which can only be achieved through international cooperation. Water today is recognized as being "cooperation potential" rather than a source of "potential conflict". An example can be found between North and South Korea (

Box 4.4.10 below). But there are still many disputes among countries related to water, and the likelihood of increased competition for water is probable.

Box 4.4.10 North Korea notifies South Korea of Plans

Responding to South Korea's concerns about possible cross-border flooding due to the Kumgangsan Dam, the North Korea Land and Environmental Ministry decided to take measures to draw water from the dam ahead of its regular exercising greater control and alleviating So. Korea's concerns. The communication was delivered by North Korea through its border village liaison office in Panmunjom to the So. Korea Unification Ministry in June 2002.

6.1 Transboundary rivers

Regarding international cooperation, based on a compilation of information from different sources[1], it is estimated that institutions for the management of specific transboundary water systems exist for approximately 40 transboundary river basins, lakes or aquifers. In addition, there exist around 20 bi- or multinational commissions on transboundary waters, not bound to specific rivers or aquifers. The International Joint Commission between Canada and the United States is an example of such a bi-national commission. Six bi- or tripartite commissions have been created within the South African Development Community (*creation date to be verified).*

New transboundary agreements or actions plans have been made since 2000 or are currently being made in 14 international basins.

Two or three Actions showing a move towards new transboundary organizations have been collected to date. Fourteen NGO's created the Tisza platform in order to tackle the pollution issue (Hungary-Romania, Action 'Tisza Platform'). A Management Board should soon be created for Lake Ohrid through a GEF programme (Albania-Macedonia, Action 'Lake Ohrid Management Board'). *A commission is being created on the Upper Narew valley (Poland-Belarus ? It might only be Poland) through twinning with a French Water Agency.* On the Irtysh river, a commission is being created between Russia and Kazakhstan, and efforts are being made to include China (Action 'Transboundary Management of the Irtysh River Basin').

Several international organizations are providing assistance to increase and enhance international cooperation on rivers. The Global Environmental Facility (GEF) programme supports at least 17 transboundary activities on major river basins and aquifers. IUCN, Green Cross International, the World Meteorological Organization, UNESCO and UNDP are also leading many programmes on major transboundary river basins. Such activities range from scientific cooperation to pollution reduction strategies, ecosystem protection, comprehensive water management plans, and institutional development.

In general, the Actions database in its current state tends to suggest that transboundary activities rarely come from the "ground level" and are triggered by official international institutions rather than by the countries themselves. Among the 1000 first Actions in the database, we find that international organizations are leading transboundary programmes on 31 basins (excluding HYCOS programmes*),* while needs-based activities with a local origin can only be found in 9 basins.

[1] Globwinet, International Office of Water, and World Actions Database

Could it be that, in transboundary basins where the need to cooperate is strong, cooperative activities have been undertaken long before 2000 ?

Still, many local Actions initiated by NGOs, scientific institutes, or public and private companies are not reported to the database yet. We would also like to point out the existence of advanced cooperation on smaller transboundary sub-catchments of a large international river basin. A good example can be found in the Meuse River basin in Europe, where joint river basin management plans are being developed for the Ton and Semois transboundary catchments, so that it can be said that cooperation in these subcatchments is more advanced than cooperation at the scale of the entire Meuse (see Actions 'Ton River Basin Management Plan' and 'Semoy-Semois River Basin Management Plan'). We hope that such initiatives can help in pushing the process of large-scale cooperation forward.

The role of international organizations in promoting and supporting cooperation on water management is very important, since they can offer a neutral stage for debates and important funding. Actions that seem of major importance are the ones on potential conflicting basins – Jordan, Okavango, Paraná, Volta, mediation on Yacyreta dam – as well as basins as the Danube and the Mekong, where transboundary cooperation activities have long been existing, but where involvement of all the countries remain difficult and potentially conflicting or hazardous situations still exist (dams, pollution, threats to ecosystems…).

Data sharing and scientific cooperation often are the first steps in transboundary cooperation. China, though not a member of the Mekong River Commission, has agreed to cooperate on data sharing with the 4 downstream countries (see 'Data sharing in the Mekong River'). The first initiatives on La Plata basin in South America (see 'a Multidisciplinary Scientific Initiative for the Plata basin'), as well as on the major world's transboundary aquifers (see Actions on 'ISARM'), are examples of scientific cooperation activities.

Examples of long established, very active transboundary river basin organizations are the Rhine, the OMVS (Organisation de Mise en Valeur du Fleuve Sénégal) and the Nile (different Actions, search on river name, see Box 4.4.11 for the Nile).

Box 4.4.11 Nile basin: sharing benefits

Description to be completed

6.2 Transboundary aquifers

Few actions can be found on management of transboundary aquifers. The groundwater management programme for the SADC (Southern African Development Community) region is the most advanced. This programme includes ten national-level projects to support sound development of groundwater resources in member countries through assessments, capacity building, and planning exercises, and to intensify links between national and regional levels of activities within a general framework of regional economical integration (see Action 'Groundwater Management Programme for the SADC Region'). Scientific cooperation is starting on other aquifers through the collaborative International Sharing of Aquifer Resource Management (ISARM) programme. In addition, different initiatives are underway on the Guarani aquifer (Box 4.4.12 below).

Box 4.4.12 Environmental Protection and Sustainable Development of the Guarani Aquifer

The Guarani Aquifer is located Argentine, Uruguay, Paraguay and Brazil. The initial short-term goal of the Project is to support the 4 states in jointly developing and implementing a common institutional framework for managing and preserving the Aquifer for current and future generations. This Project is supported by the OAS, GEF, World Bank, and 4 universities one in each of the states.

6.3 International governance and principles for sharing waters

Internationally accepted principles on water management are not very helpful yet in solving water-related disputes in practice. Discussion is going in the World on about the need for international governance on water. This aspect is being discussed in 'Governing Water Wisely'.

6.4 Virtual water trade

Concerning the worldwide water resource, some researchers advocate that water could better be shared among countries if water-scarce countries did produce crops that require less water and import water-expensive crops. This issue is being treated in 'Securing the Food Supply' at the beginning of this chapter.

7 Improving Participation, Dialogue and Negotiation at All Levels

As observed in the paragraph on river basin management, the implementation of institutions alone is not a guarantee for improving the way we share our water. The capacity of stakeholders to participate and negotiate should be improved, be it at the national or international level.

Training can be offered to those in charge of negotiating. UNESCO's 'from Potential Conflict to Cooperation Potential' programme includes training aspects. Box 4.4.13 gives another example. Tools such as Role Games and Decision Support Systems are helpful in planning and allocating water resources. Gaming allows stakeholders to play the part of another user in the basin and help them in understanding opposite views; decision support systems are virtual replications of the real river basin, on which the effect of decisions can be experimented, also allowing to gain insight in the point of view of different users.

Box 4.4.13 River 21 – a test platform for River Basin Management

Five universities from France, Belgium and the Netherlands have set up an annual three weeks workshop on integrated water management in the Scheldt basin in 2000. Twenty-five MSc or PhD students gather information on the Scheldt basin, meet stakeholders and develop a long term vision or a range of scenarios for the Scheldt river basin in which ideas for sustainable development are displayed. Staff Members propose the methodology, secure the consistency of each scenario or policy proposal and moderate debates.

The project is an non-official platform, a laboratory for the realworld, where students or professionals can put ideas forward. Data, maps, diagrams and proposals are made by the students. An interesting result of the project is that it has triggered the interest of many official stakeholders in the basin.

8 Subjects for discussion

The following statements are open for discussion. More Actions are needed to support/reject them. Other points can be added to the list.

- International governmental organizations as well as non-governmental organizations play an important role as “the voice of nature”.

- Though awareness of integrated water management principles is well extended, and though more and more river basin management institutions are being created, we lack examples of how concrete solutions are reached for sharing waters.

- Human factors are more determining than pre-defined water allocation rules in finding solutions for water management. Therefore, the tremendous importance of negotiation in water management leads to recommend to improve negotiation capacity among stakeholders.

- For international cooperation: are States the only one allowed to sit at the negotiation table?

- There is no single model for implementing successful river basin management, but guidelines could be useful.

- Agreements on sharing water should be designed so that they can evolve with time if the conditions change.

- Some tax policies are a hidden way to allocate the right to pollute surface water or groundwater to this or that economic sector. The European Union is planning to publish a Directive on Environmental Liability regarding soil pollution, which also applies to groundwater pollution.

- Education about groundwater should improve.

- Groundwater quality should be preserved at all times.