BOTH ENDS WORKING PAPER SERIES October 2007

Water Markets and Market Mechanisms

Both ENDS
Environment and Development Service
Vitae Civilis
Desenvolvimento, Meio Ambiente e Paz

BOTH ENDS WORKING PAPER SERIES OCTOBER 2007

Water Markets and Market Mechanisms

Published by Both ENDS

The Both ENDS Working Paper Series presents preliminary and unpolished results of analysis that are circulated to encourage discussion and comment. Quotation and other uses of a Both ENDS Working Paper should take account of its draft character. The series provides a fast-turn-around outlet for work in progress and research carried out by Both ENDS staff, often in cooperation with partner organisations. The findings, interpretations, and conclusions expressed in this paper are entirely those of the author(s) and should not be attributed in any manner to partners and/or donors or its affiliated organisations.

For free copies, please contact:

Both ENDS
Nieuwe Keizersgracht 45
1018 VC Amsterdam
The Netherlands
Telephone: +31 20 623 0823
Fax: +31 20 620 8049
E-mail: info@bothends.org

First published:	October 2007
Contributions:	Nathalie van Haren (editor), Alejandra Aguilar, Rubens Born, Annelieke Douma, Danielle Hirsch, ATM Zakir Hossain, Simone Jardim, Raúl López, Reynaldo Guedes Neto, Cristina Orphêo, Jorge Mora Portuguez, Sergio Tallochi,
English translation:	Mark Lutes, Arlita McNamee (Português), Maria Candela Conforti - MCC translations (Spanish)
Photos:	ATM Zakir Hossain

Both ENDS Working Paper Series
Water Markets and Market Mechanisms

This working paper is a first attempt to analyse the threats and potential of water markets in combination with private sector involvement in water resources use and management. It studies current and expected social and environmental impacts of water markets given different institutional, socio-economic and legal contexts. Simultaneously, the paper sets out to identify if market mechanisms could contribute to increased sustainability by helping to assure that negative economic, social and ecological impacts of the use of natural resources will have financial and economic consequences and thus will be included in production, investment and consumption decisions.

For more information on this Working Paper please contact:

Both ENDS
Nieuwe Keizersgracht 45
1018 VC Amsterdam
The Netherlands
Telephone: +31 20 623 0823
Fax: +31 20 620 8049
E-mail: info@bothends.org
Website: www.bothends.org

This activity has been made possible thanks to the financial support of the Dutch Ministry of Foreign Affairs and the European Union.

Table of Contents

List of abbreviations

ACCVC	Dirección del Área de Conservación de la Cordillera Volcánica Central (Costa Rica)
ADB	Asian Development Bank
AFSC	Alliance of Food Sovereignty Campaigns (Bangladesh)
ANVISA	Agência Nacional de Vigilância Sanitária (Brazil) National Health Surveillance Agency
ARESEP	Autoridad Reguladora de los Servicios Públicos (Costa Rica)
BA	Bahia (Brazil)
BADC	Bangladesh Agricultural Development Corporation (Bangladesh)
BDT	Bangladesh Taka (Bangladesh)
BRL	Brasil Real (Brazil)
BSTI	Bangladesh Standard Testing Institute (Bangladesh)
CAS	Country Assistance Strategy
CFEM	Compensação Financeira pela Exploração de Recursos Minerais (Brazil) Financial Compensation for Mineral Exploitation
CNRH	Conselho Nacional de Recursos Hídricos (Brazil) National Water Resources Council
CSO	Civil Society Organisation
CTAS	Câmara Técnica de Águas Subterrâneas (Brazil) Underground Waters Technical Committee
CTPOAR	Câmara Técnica de Integração de Procedimentos, Ações de Outorga e Ações Reguladoras (Brazil) Technical Committee on Integration of Procedures, Licensing Activities and Regulatory Activities
CUP	Coalition for the Urban Poor (Bangladesh)
DNPM	Departamento Nacional de Produção Mineral (Brazil) National Department of Mineral Production
DPHE	Department of Public Health Engineering (Bangladesh)
DSK	Dushtha Shasthya Kendra (Bangladesh)
ESPH S.A.	Empresa de Servicios Públicos de Heredia Sociedad Anónima (Costa Rica)
FAN-CA	Freshwater Action Network Central America (Costa Rica)
FNDCT	Fundo Nacional de Desenvolvimento Científico e Tecnológico (Brazil) National Scientific and Technological Development Fund
FONAFIFO	Fondo Nacional de Financiamiento Forestal (Costa Rica)
FUDEU	Fundación para el Desarrollo Urbano (Costa Rica)
GATS	General Agreement on Trade in Services
HYV	High Yielding Variety
ICMS	Imposto sobre Circulação de Mercadorias e Serviços (Brazil) Tax on the Circulation of Goods and Services
IMF	International Monetary Fund
JJS	Jagrata Juba Shangha (Bangladesh)
MA	Maranhão (Brazil)
MES	Markets for Environmental Services
MG	Minas Gerais (Brazil)
MINAE	Ministerio de Ambiente y Energía (Costa Rica)
MME	Ministério de Minas e Energia (Brazil) Ministry of Mines and Energy
NGO	Non-Governmental Organisation
PE	Pernambuco (Brazil)
PES	Payment for Environmental Services
PNRH	Política Nacional de Recursos Hídricos (Brazil) National Water Resources Policy
PR	Paraná (Brazil)
PROCUENCAS	Programa para la protección y recuperación de las microcuencas (Costa Rica)
PSA	Pago por Servicios Ambientales (Costa Rica)
RJ	Rio de Janeiro (Brazil)
RS	Rio Grande do Sul (Brazil)
SAH	Servicio Ambiental Hídrico (Costa Rica)
SINAC	Sistema Nacional de Áreas de Conservación (Costa Rica)
SINGREH	Sistema Nacional de Gerenciamento de Recursos Hídricos (Brazil) National Water Resources Management System
SP	São Paulo (Brazil)
TNC	Trans National Corporation
UN	United Nations
USD	US dollar

VC	Valor de conservación de ecosistemas (Costa Rica)
VR	Valor de restauración de ecosistemas (Costa Rica)
WASA	Water & Sewerage Authority (Bangladesh)
WTO	World Trade Organisation
ZC	Zona de Contribuição (Brazil) Zone of contribution
ZI	Zona de Influência (Brazil) Zone of influence
ZT	Zona de Transporte (Brazil) Zone of transport

Summary

A major risk for all water markets is the inequity they can create or exacerbate due to the inequitable allocation of water rights and thus water access and to inadequate monitoring and control mechanisms. In terms of environmental sustainability, a serious problem is the lack of regulation in these markets to assure sufficient recharge and protection of water resources in order to avoid depletion, pollution and environmental degradation. Under the circumstances, existing and emerging water markets tend to increase inequalities and pose a serious threat to sustainable livelihoods.

The potential impact on gender equity of these markets is significant. Although women are important water users –as producers as well as the primary providers and users of water for domestic use-, their stake and role in water markets or other water management systems are sometimes invisible and often marginal. Water markets will exacerbate these inequities, unless conscious efforts are made to redress existing inequities and avoid new causes of inequities, such as lack of access to information, financial resources and the physical or institutional market place.

Market mechanisms identified in this working paper have a potential to contribute to more sustainable management of water resources and water-related ecosystem, *if* from the early start of their development social considerations and stakeholders are included and public institutions can guarantee regulation and control over those markets.

In any market-based system, the allocation of water rights should be fair and transparent. Moreover, participatory mechanisms should be in place to prevent rich and powerful players to monopolise or dominate these markets. From the start of allocation, provisions should be made to assure participation of women and access by poor people and marginalised groups. Institutional arrangement should guarantee monitoring and control, as well as compliance with existing rules and regulations.

Introduction

International political and business forums, international institutions such as the World Bank and IMF and bilateral and donor organisations often promote markets as a means of stimulating sustainable growth. Unfortunately, their analyses and arguments tend to pay insufficient attention to the establishment of necessary countervailing forces in the form of clear market regulations to assure that markets lead to increased economic efficiencies as well as enhanced social equity and environmental sustainability.

The increasing trust in markets as the main allocation mechanism for sustainable development is causing many States to withdraw from the active provision of basic services. Command and control mechanisms to assure ecological sustainability, as well as public allocation mechanisms to assure equity and protect the interests of large, marginalised groups of society, have been weakened. In the dominant model of markets, as it is developing, the role of the State is restricted to a regulatory function. As such, the process of market introduction as it is now evolving in the water sector, is a clear follow-up of IMF Structural Adjustment Programmes, which prompted a decreasing role of the State.

The emphasis on economic instruments and private sector involvement in water resources management in countries with a weak institutional and legal framework brings with it tremendous risks. It can exacerbate existing inequities, it may generate new ones and may very well cause stress on ecosystems such as river basins, coastal and inland wetlands and groundwater resources.

Whereas badly regulated markets and the creation of markets in situations where rights are inequitably distributed will lead to negative social and environmental outcomes, fair and transparent market mechanisms may help in increasing sustainable land and water use. In fact, Principle 16 of the Rio Declarations says: 'National authorities should endeavour to promote the internalisation of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment.'

Water as an economic good?

Water is fundamental to life and therefore seen as a basic human right. In November 2002, the United Nations Committee on Economic, Social and Cultural Rights officially declared water as a human right.

Water is a social good whose availability will serve the greater benefit of society as a whole - and has as many possible values as there are perspectives on what is 'right' for society.

Water resources are becoming increasingly scarce due to growing demands and unsustainable use. These shortages have led to competition and conflict over water resources. As a valuable, limited resource, water is considered an *economic good*. Recognising water as an economic good implies that the door is open for recognition of the economic value of water. It does not call necessarily for the private ownership of and control over the resource.

Ultimately, the challenge is to treat water sustainably, as an economic *and* environmental *and* social good. It is to assure access to and use of water for all people while respecting the limits imposed by ecosystems.

Civil Society Organisations (CSOs) from the South and the North call for policies and instruments that will contribute to the sustainable management of water resources. They stress that, in order to achieve sustainable water management, any market mechanism and regulatory framework should:

- Respect and contribute to the fulfilment of water as a human right by setting the basic human need as a principal objective;
- Incorporate the value[1] of environmental services and goods, which are fundamental to ecological processes and sustainable livelihoods;
- Respect the (qualitative and quantitative) integrity of the resource and of associated ecosystems and ecological processes;
- Follow transparent decision-making and implementation processes, in which institutional responsibilities and accountability mechanisms are clearly defined.

This working paper is a first attempt to analyse the threats and potentials of water markets. It studies current and expected, positive and negative social and environmental impacts of water markets given different institutional, socio-economic and legal contexts. Simultaneously, the paper sets out to identify market mechanisms that could contribute to increased sustainability by helping to assure that negative social and ecological impacts of the use of water will have financial and economic consequences and will be included in production, investment and consumption decisions.

In order to assess sustainability of existing markets and market mechanisms, the analysis focuses on:

- *Social equity:* Does a mechanism bring about a socio-political scarcity of water? Does the mechanism lead to an expansion of the gap between those who already have access to water and those who still lack access to the water resource and water services and facilities? Is that gap unduly favouring economically and politically stronger groups, making water even less accessible to marginalised groups in society?
- *Environmental sustainability*: Does the market or market mechanism assure that existing ecosystems are maintained? Do markets take into account the ecosystem limits? Are market mechanisms able to assure the respect of environmental demands?

The working paper separates the analyses of markets and market mechanisms.

Four different existing water markets have been identified:

- Markets for groundwater and surface water;
- Trade in bottled water;
- Trade in bulk water;
- Markets for water-related environmental services.

[1] Value or cost? Cost is the value of inputs that have been to produce something, and hence are not available for use anymore. Value of something is how much a product or service is worth to someone relative to other things. Costs refer, more than value, to monetary prices.

The working paper identifies the following market mechanisms[2]:

- Tradable water rights;
- Privatisation of water services;
- Economic instruments;
- International and regional trade agreements.

In order to spice up the theory, three water cases give in-depth and real-time insight.

1. Economic instruments: MES & tariffs in Costa Rica;
2. Bottled water: Mineral water resorts in Brazil;
3. Privatisation: Mini pumps in Bangladesh.

[2] The concept of *virtual water trade* is not touched in this working paper. Today, little is known about the actual volumes of virtual water flows between countries and the virtual water contents in products. However, virtual water is a potentially underestimated approach that may contribute to finding more sustainable water management policies that reduce the pressure on limited water resources. The concept implies that importing food grains is cheaper than investing in large-scale water transfers or reservoirs. In other words, grow food where water is abundant and transport food to regions that are water scarce. Or better, for water-scarce countries: import products or services that require a lot of water and export products or services that require less, which results in net import of virtual water. Reversibly, water-rich countries can profit from their abundance of water resources by producing water-intensive products. Implementation of the concept calls for behavioural changes, can affect export industries and will increase countries' mutual dependency. Implementation of the concept of virtual water will force policy makers to make a choice between prioritising promising export activities and environmental, economic and social considerations.

1. Water markets

Water markets are not a new phenomenon. All over the world, different types of water markets have existed for centuries. These markets are local and are characterised differently, depending on water availability and accessibility in each particular area.

Through water markets, commodification of water takes place. Water is converted from a good or a service subject to many non-market social rules, into one that is primarily subject to market rules. Even today, most water markets exist on a localised scale. Inherent characteristics of water make it not an ordinary commodity but a public good with economic values and uses.

1.1 Markets for groundwater and surface water

Trade in groundwater and surface water occurs mainly between farmers. It is emerging in areas where public irrigation sources and private irrigation sources provide inadequate and uncertain supply.

Groundwater and surface water markets are usually based on personal relations and therefore imperfectly competitive markets. Because of high transport costs and transmission losses, water sales are generally limited to neighbours. Lined or piped infrastructure makes it possible to transmit water over longer distances.

Markets for groundwater and surface water have the potential to increase the number of people with access to water resources. For example, groundwater markets can improve the equity of access by making water available to those who cannot install their own wells.

Water markets can motivate irrigating farmers to reduce consumption through more efficient irrigation techniques and modified planting patterns. Groundwater and surface water markets can improve the equity of access to irrigation water and increase income or production. However, trade should be limited by the available recharge of groundwater resources to avoid environmental degradation. Another major risk of these markets is the unequal opportunities for women, poor farmers and landless compared to powerful (often male) landowners, through the false assumption that the allocation of *water* rights should be linked with the traditional distribution of *land* rights.

1.2 Markets for bottled water

Bottled water is one of the fastest growing industries in the world. 59% of the bottled water is purified water; the remaining 41 % is spring or mineral water. The average world consumption grows by 7% each year. Simultaneously, soft drinks, which consist for a large part of water, are becoming increasingly popular.

Apart from big international players in the bottled water industry, many national and local vendors provide bottled water on local markets.

Bottled water can be an alternative for tap water, reaching people without access to water. At the same time, the availability of bottled water can reduce the pressure on the government to provide clean and safe water for their citizens. Especially in big cities in the South, private vendors of bottled water are often the only providers of drinking water. Compared to the price of tap water, the price of

bottled water is extremely high. Most poor people can hardly afford it and continue to depend on low quality, unreliable water sources.

Soft drink and bottled water companies are buying up land and implicitly acquiring water rights. Since sound regulatory frameworks on water extraction are often lacking, excessive withdrawals occur that jeopardise other water dependent activities in the area of influence of the source. Due to lack of regulation or control, bottled water producers are often not paying a fair price, which should include the cost of externalities for the exploitation or pollution of natural resources. Furthermore, the quality of bottled water often is not monitored.

It is often unclear whether international players and national and local players have the same opportunities in the market for bottled water and how local communities can benefit from these market developments. It is not transparent how concessions to exploit water sources are being tendered.

1.3 Trade in bulk water

In the past, most large-scale transfers of water occurred within national and political borders. Agreements were also common among nations that share a river basin, such as the Colorado between the USA and Mexico, the Nile between Sudan and Egypt. Now, however, proposals for bulk water transfers are being made at international and even global levels between parties that do not share a river basin.

Profitable large-scale, long-term bulk exports of water across international borders may seem unlikely for many reasons, especially the high economic cost of moving water and transportation problems. However, several companies are already developing technology whereby large quantities of fresh water can be loaded into huge sealed bags and towed across the ocean for sale. These technological developments and the continuous ideas and proposals to transport bulk water show that many see this as a very profitable market.

International surface water transfers form a new option for water scarce and water abundant countries to deal with increasing global water demands. Extensive negative environmental effects can be expected from large-scale water withdrawal from its natural surroundings. Opportunities and chances are not equal for poor, rich, water abundant and water scarce countries. Water transfers will have important power implications.

1.4 Markets for water related environmental services

Water resources fulfil a wider range of functions than only irrigation water, drinking waters and sanitation. Water provides leisure opportunities, functions as sinks for industrial and agricultural polluters and domestic sewage, and serves as a basis for the generation of hydropower. The environmental services of water include flood protection, sedimentation reduction or land creation, disaster prevention, capacity to dilute pollution and biodiversity conservation.
Often, all these services are provided 'free of costs' as no appropriate market or command and control mechanisms exist. Free use of water often leads to degradation of the resource and loss of environmental functions.

Environmental functions provided by natural ecosystems are often taken for granted and are therefore undervalued in decision-making. They lack protection against overexploitation, and the resources – human and financial - for sufficient conservation.

In different places all over the world, *Markets for Environmental Services (MES)* are emerging. Market based approaches to conservation aim at internalising the externalities into market decision by providing financial incentives to users to conserve ecosystems. Examples of such markets are forest based carbon storage sink (Clean Development Mechanisms CDM under the Kyoto Protocol), payments for river basin and forest conservation, debt-for-nature swaps, entrance fees to nature areas (eco-tourism) and eco-labelling. Another example is *Payment for Environmental Services (PES)* where downstream users are charged to compensate people who provide environmental services, such as upstream land users or managers of protected areas.

A review of numerous case studies of environmental services approaches suggests some broad rules of the thumb to ensure social equity and environment sustainability:

- Identify the services being provided and the main stakeholders (beneficiaries, service providers etc.);
- Understand and document the links between ecosystems and services provided;
- Create a transparent and accountable institutional structure, preferably closely linked to the local socio-economic environment;
- Assure a monitoring and evaluation system from the start of implementation;
- Design flexible allocation, distribution and payment mechanisms;
- Ensure that poor and marginalised groups participate in the design, decision-making and implementation processes;
- Make payment schemes appropriate;
- Assure accessibility to key environmental goods and services.

Environmental services systems are context specific and require good governance (monitoring and control, as well as conflict management). If such institutional development can be achieved, these systems contribute to sustainable water use.

The implementation of systems of environmental services can cause a shift in institutional powers. Challenge is to safeguard or increase equity. One aspect to take into account is the impact on rural landless and marginalised people, who may not be able to participate in a market-based system, for example because services are based on land rights. Likewise, the urban poor may end up paying more for basic services when public payments for environmental services are included proportionally in tariff structures.

2. Market mechanisms

Water management, as well as production, investment and consumption decisions should incorporate negative effects on the environment. Several market mechanisms allow for this type of incorporation.

Challenges to establishing sustainable market mechanisms in the water sector include the need to measure the negative effects of certain actions on the environment and to estimate the value of specific ecosystem services (e.g. environmental and recreational value) in economic terms. In addition, a major challenge is to guarantee transparent and accountable public control and compliance mechanisms.

2.1 Tradable water rights

A lack of well-defined and secure water rights systems increases the vulnerability of poorer, politically and economically weaker water users. Clarifying and strengthening rights can play an important role in improving water allocation equity and efficiency. Good defined water rights and allocation practices can raise water productivity, enhance livelihoods and improve benefits from existing and new investments in the sector.

Tradable water rights are rights to use water that can be transferred, all or in part, separately from the transfer of land. While tradable water rights should be permanent, or very long-term, to ensure the security of the right, the transfer of water rights need not be permanent: water rights can be leased for a season, a year, or many years.

Instead of trying to meet the increasing demand for water by granting new, additional water rights until available water supplies are over-extracted, the introduction of tradable water rights seems to be sensible. It allows for a shift of focus from supply to demand management: Tradable water rights could lead to considerable water efficiency gains.

One of the major causes of inequity may be the moment of allocating water rights. If allocation is based on existing use, existing power differences and gender inequities between different water users will be affirmed. On the other hand, if new allocation rules are defined, political powers may influence the process and can create new inequities. By creating markets through the allocation of tradable water rights, at least two issues arise in relation to gender equity:

- Allocation can be biased, e.g. when it is based on land rights that pass between the male heads of households and that do not necessarily reflect the real users of the water. This means that women have less access to tradable water rights from the initial stage of the market and will therefore be in a disadvantaged position;
- Women may not have access either to financial means or to trade itself. Thus, they will not be able to obtain the right to use water for domestic, subsistence or productive activities.

There is general agreement that without an adequate institutional framework, a market and thus tradable water rights systems cannot function effectively. First, an equitable system of water rights needs to be introduced. These rights should be independent from land use, ownership and gender, and be based on identified social, economic and environmental priorities.

In order for an efficient *and* equitable market, stakeholders must participate in the allocation of tradable water rights. Stakeholders have legal rights. Often, a 'no injury' requirement exist (any person can take legal action irrespective of actual harm), giving all stakeholders legal standing in the approval process of the transfer.

It is also important to protect in-stream flows in a river basin and to implement policies for its maintenance. Attempts to guarantee minimum flows thus always mean a restriction in the quantity of water rights to be allocated and in the transferability of a water right.

Opinions on the success of tradable water rights to reach water efficiency and increase productivity vary. No empirical evidence so far has really shown that this mechanism does function as expected. Especially in the South, adequate institutional frameworks are often lacking. The design of a system of tradable water rights can jeopardise the flow to water-related ecosystems and should guarantee sufficient water for these ecosystems.

Introducing tradable water rights may contribute to more efficient rural water use and to the reallocation of water between rural and urban areas. It may also be an incentive to develop innovative technologies that reduce the demand for water.

However, the (re)allocation of water rights can endanger the stability of local communities. Local water rules and rights, their dynamics and the way they are linked to power and gender relations, to local identities and to the local legal situation need to be taken carefully into consideration.

Apart from the fact that there are different systems of allocating water, which each have specific merits and weaknesses, the option of a tradable water rights as an allocation mechanisms should always be compared to other such mechanisms.

2.2 Privatisation of water services

In the water services sector, privatisation, including a shift of management and provision responsibilities from the public to the private sector, is a major discussion. The key issue is to what extent privatisation actually contributes to the improvement of the situation of numerous people without access to safe *drinking water* services.

The strong international focus on privatisation of drinking water services as a solution to current crises excludes other viable sustainable alternatives. Privatisation is only one of the alternatives of the much wider spectrum of private sector involvement in water provision.

The only basic water services that can be privatised from a *commercial* point of view are urban drinking water services in fairly well developed urban centres, i.e. an estimated 5% of all drinking water. The bulk of all water provision is public or community managed and most probably will remain public. Without simplifying the debate on privatisation of drinking water services, most people *without* access to safe drinking water live in rural areas, where large-scale operations are unthinkable and density of demand is too widely spread and low to make the areas interesting for private operators.

In the discussion about privatisation of drinking water services, there are many concerns about the ability of consumers to pay, exclusion of rural populations, lack of access of poor people and sustainable resource management. In addition,

the increasing commodification of drinking water is considered a threat to the right to water, especially for the poor who will not be able to pay for these services.

There is a wide range of approaches, other than privatisation, for involving the private sector in public water supply both in the implementation as in the operation and maintenance phase. In all options, the private partner should be closely regulated and monitored on issues such as price, quality and delivery to ensure public needs are met. Any agreement with private actors should include an explicit pro-poor chapter, which indicates how access to the poor will be increased and assured over the long run.
Indeed, given the reality of 95% public water provision and the need for a strong public sector in order to achieve any form of successful privatisation, it is an anomaly to see how much time and effort is put into this one option to improve access to and sustainability of water services provision. This tunnel vision is neglecting the potential of small-scale, low-tech provision in rural areas and the reality of community-based water management.[3]

Meanwhile, as the international privatisation debate tends to focus on *drinking water services*, there are several other forms of privatisation going on, as *transfer of control* over water from the public to the private sector, privatisation of *irrigation services* and even the *privatisation of entire rivers*. Little is know about the institutional implications of these other forms of involvement, nor of the quality, equity and sustainability of other forms of private sector involvement. This is a cause for major concern.

With or without privatisation, the public sector remains primarily responsible for providing these drinking water and sanitation services. Thus, privatisation calls for strong public sector that is able to exercise its functions in the areas of constant negotiation, control and regulation. In general, such strong institutional capacities are lacking in the South.

2.3 Economic instruments

Economic instruments are market-based instruments that are introduced by the public sector to influence market behaviour in order to internalise environmental and social costs in production and investment decisions.

The incorporation of environmental costs in consumption, production and investment decisions can be done through the implementation of:

- Environmental responsibility: the responsibility of all members of society to act responsible, where natural resources are concerned. This principle translates into command and control instruments that impose significant sanctions when major damages to ecosystems occur or are risked;
- The Polluter Pays Principle: those causing pollution should meet the costs to which it gives rise. This principle translates into tariffs or taxes that force polluters to incorporate pollution costs into their investment and production decisions.

Combined environmental, economic and legal instruments set out to harmonise environmental and productive considerations within a framework of sustainable development. These combined instruments focus on damage prevention, environmental protection and on the inclusion of all (social, environmental and economic) values of an ecosystem in user decisions. As such, they go beyond

[3] See for more information: Transnational Institute & Corporate Europe Observatory (2005) *"Reclaiming Public Water – Achievements, Struggles and Vision from Around the World"*. Novaprova, Porto Alegre, Brazil.

existing markets, which fail to include indirect and direct external effects of the use of natural resources.

Several economic instruments exist to incorporate environmental costs in existing activities:

- Environmental taxes;
- Tariffs;
- Green funds;
- Tradable pollution permits;
- Sustainable labels that increase consumer awareness

Environmental taxes

Within a tax system, there are two ways of incorporating environmental costs:

- Through the general tax system, i.e. including a percentage that represents the use of environmental resources and collects and redistributes them as a normal part of the government's annual budget;
- Environmental taxes leveraged only of those that use a specific resource. Instead of adding to the general budget, these generated taxes are used to maintain, protect and improve the quality of the particular resource.

Tariffs

Three general types of tariffs can be identified:

- User charges (paid for a service rendered by the government) that include environmental costs, e.g. inclusion of environmental costs in drinking water and sanitation tariffs;
- Pollution charges, that allow for the internalisation of the costs of contamination due to harmful emissions to air, soil or water;
- User fees, a price paid for the appropriation or use of publicly owned natural resources or environmental services (e.g. entry charges at natural parks, concessions fees).

Green funds

These funds enhance the inclusion of environmental considerations in investment decisions through financial incentives for green technologies or for projects that aim at increased environmental sustainability. These funds provide loans against lower-than-commercial interest rates or allow for longer payback periods.

Tradable pollution permits

The major difference between pollution charges and tradable pollution permits is that the latter are more flexible when it comes to sharing the burden between groups of producers that all operate within the same ecosystem. Whereas charges motivate producers to reduce contamination of their own plant or plantation, tradable rights allow for an optimal use of producers' comparative advantages in reducing pollution.

Sustainable labels that increase consumer awareness

Through information on the production processes and conditions of trade of the goods and services offered to them, consumers are enabled to distinguish between socially and environmentally friendly products and unsustainable products. Based on specific information on production methods, consumers can consciously opt for buying (sometimes more expensive) products that represent a higher value to them because of their contribution to sustainable development.

Thus, information helps to create added value and labels may help to open up new markets.

Sustainable labels require strong public coordination to assure that information is correct and stakeholders' willingness and ability to choose for a more expensive but sustainable option. Labels may affect the position of small-scale producers that lack the financial and administrative resources to participate in such systems.

Economic instruments can assure the generation of finances for direct application in the management of the resource. However, often these finances generated through tariffs, and permits are channelled to other public uses. This type of disconnection could cause water users to observe resource deterioration, despite their financial contribution to conservation. On the other hand, this disconnection also allows for the creation of political willingness to accept the implementation of economic instruments, which is often a precondition to counterbalance economic interests.

Establishing the 'right' tariff is a balancing act between the actual environmental costs of the use of water on the one hand and the payment capacities of stakeholders. For example, the introduction of economic instruments can increase the costs of public services that depend on water use, such as hydropower plants and water and sanitation providers. This, in turn, may affect poor and marginalised people; high prices may deny them access to these services.

2.4 International and regional trade agreements

International and regional trade agreements have a major impact on the functioning and regulation of markets and the potential to use market mechanisms for sustainable resource management purposes. International and regional trade agreements can restrict the freedom of governments to develop and implement national market mechanisms to enhance the sustainable use of water and related services. These agreements imply a loss of control over domestic water supplies and sources.

Market introduction and liberalisation includes an opening up of the water services sector, as well as the creation of possibilities to start trading (import and export) water as a good. Simultaneously, including sustainability considerations in trade agreements can negatively influence the competitive position of the South in international markets.

The water-related environmental impacts of trade agreements go beyond the issues of water services and trade in water as a commodity. The agreements are often accompanied by large-scale infrastructure plans, such as the Plan Puebla-Panamá. These plans propose major interferences in river basins for transport and the generation of electricity.

Most challenging is the discrepancy between the international trade rules and the daily practice of sustainable water management. In order to protect water resources, water management organisations need flexibility to implement adequate management plans, which can respond to changes in environment and use patterns. A technical standard for pollution discharges that may appear adequate at one point in time may require tightening and strengthening in light of new scientific evidence or ecological developments, such as droughts. Similarly, ecological flow requirements may require permissions for the extraction of water at one level, but may require adaptation of these levels if generally less water is available.

However international trade rules favouring legal security and predictability, seek to 'lock in' policy choices once they are established. For example, for a signatory to a free trade arrangement, it is virtually impossible to reverse any previously agreed commitment. This is particularly problematic in light of the fact that domestic water laws are in a state of flux. There are serious concerns that future trade regimes will restrict countries' scope to impose crucial water regulations. The General Agreement on Trade in Services (GATS) of the World Trade Organisation (WTO) might limit a member's ability to:

- Set and implement specific standards for pollution discharge;
- Put certain quantitative limitations to service provision in order to avoid over-exploitation of water resources, and/or;
- Require Sustainable Impact Assessment when these measures are found to be a burden on market access and international trade in services.

This applies not only to central governmental entities of the member states, but also to regional authorities, municipalities and non-governmental or quasi governmental bodies, who increasingly set water management policies at lower levels.

GATS Article 20 allows countries to use certain measures to protect natural resources. However, the use of Article 20 can be challenged as a disguised barrier to trade. In fact, until now, every time a country has tried to protect an environmental or health law by using Article 20 against a WTO challenge, the WTO has won.

Instead of focusing only on including water and water services in trade agreements, much more attention should be paid to the ways to meet the water and sanitation needs of the world's poor and marginalised and to enhance the protection and sustainable use of water, wetlands and ecosystems. Providing clean water and safe sanitation will require much greater political commitment. Donors and governments should demonstrate this commitment in the overall resources they allocate to water and sanitation services. A much greater community involvement and ownership of water and sanitation policies is a precondition for sustainable water management.

3. Water markets and gender

Gender equity and inclusion of women in water decision-making and management processes are key factors of success to sustainable water management. However, the differences in the roles and socio-economic positions between men and women are often overlooked in analyses of water policies and related legal and institutional mechanisms, such as water markets.

The idea of water as an economic good is likely to shift away attention from 'non-productive' uses such as water for health and agriculture for household and/or local consumption. Mostly women are active in these areas. The division between different uses and the tendency to favour economically productive uses will benefit male-dominated activities to the detriment of women's activities.

Because of their often non-cash generating activities, women have less access to cash money and credit than men do. In some regions, women are not allowed to handle money or partake in public market dealings. Women have a relatively high willingness to pay for water, as it saves their time since water provision for domestic use is regarded as their responsibility. However, this willingness often is not matched by their ability to pay. Thus, women are caught in a vicious circle: without improved water supplies they have no spare time for income generating activities, but without income they cannot access water, nor invest in domestic water facilities.

The marginalisation of women is not only causing inequities on a domestic and social level. The allocation of water for male dominating activities means a loss of efficiency, diverts attention away from productive activities of women in the agricultural sector and household industries and causes the neglect of women's knowledge of water resources and effective use.

4. The Water tariff of a public service company and payment for environmental services in Costa Rica

Jorge Mora Portuguez; FANCA – Costa Rica

4.1 Introduction to Payment for Environmental Services

The development of economic and market instruments related to water resource management in Costa Rica is directly related to the establishment of a system of Payment for Environmental Services (PES) that started in 1996 with the enactment of the Forest Act[4].

Therefore, this system starts and develops in close relation to the protection of forests, in recognition of the economic value of services, that the forest provides for human beings. In this vein, the Forest Act identifies four kinds of environmental services:

- Biodiversity Conservation
- Landscape Beauty
- Carbon Fixing
- Conservation of the Hydrological Cycle

In addition, the enactment of the Regulating Authority of Public Services Act[5], the Biodiversity Act[6], and the Heredia Public Service Company Reform Act [7] has enabled the development of a system of water-related environmental services by adding an *environmental* variable to the water tariff charged by this company to its customers for drinking water services.

The proceeds of this tariff are invested in PES for the benefit of the owners of lands located in the upper basin areas of water recharge and aquifers where the company Heredia Public Service Company (*Empresa de Servicios Públicos Heredia S.A*, hereafter ESPH S.A.) extracts water for hydropower generation and human consumption. The PES is used for the funding of community water pipelines. Up to now, however, this water tariff is reflected only in the price charged for drinking water supplies and not for electrical services.

The model implemented by ESPH S.A. has served as a pilot project for the passing of a new regulation by the Ministry of Environment and Energy (*Ministerio de Ambiente y Energia,* hereafter MINAE). The new regulation, called '*Canon Ambientalmente Ajustado'* or 'Environmentally Adjusted Tax' includes a set of water variables that must be paid by those who hold concessions for the exploitation of water resources.

This case study will focus on the instrument created by ESPH S.A., which is a regional entity. However, since the ESPH S.A. water tariff is closely related to the national PES system and to the Environmentally Adjusted Tax, reference will be made to these as a general framework of this instrument.

[4] Act No. 7575, in Spanish *"Ley Forestal"*
[5] Act No. 7593 -1996, in Spanish *"Ley de la Autoridad Reguladora de los Servicios Públicos"*
[6] Act No. 7788 -1998, in Spanish *"Ley de Biodiversidad"*
[7] Act No. 7789 -1998, in Spanish *"Ley de Transformación de la Empresa de Servicios Públicos de Heredia"*

Origin of PES

Since its creation in 1996, the Costa Rican PES system is financed through a tax percentage charged on hydrocarbons, with international funds that stem from the voluntary implementation of a Clean Development Mechanism of carbon capture, as well as with funds from private entities (mostly hydroelectric companies) that have voluntarily endorsed agreements with the State.

PES is managed by the National Forest Fund (*Fondo Nacional de Financiamiento Forestal* or FONAFIFO), which falls under the auspices of the MINAE. This entity not only manages the funds, but also allocates the proceeds to private forest owners in cooperation with the National System of Conservation Areas (*Sistema Nacional de Áreas de Conservación* or SINAC).[8]

One of the forest services that has taken on more relevance during the last years is the protection and maintenance of the hydrological cycle. The economic recognition of this environmental service has allowed private companies that are interested in fostering the protection of certain regions to obtain funds for water conservation.

In this context, during 2000, the Regulating Authority of Public Services (*Autoridad Reguladora de los Servicios Publicos*, hereafter ARESEP), which is the entity in charge of approving tariff structures and rates to be charged for public services, approved the incorporation of an environmental variable into the tariff that the ESPH S.A. charged to its customers for the provision of drinking water supplies. This environmental variable has become part of the cost structure related to this service and is widely known as a 'water tariff.'

ESPH S.A. was created in 1976 as a State entity. However, in 1998, by means of the Heredia Public Service Company Reform Act[9], it was converted into a private company for public utility whose controlling shareholders are the Municipalities of San Rafael, San Isidro, and Central of Heredia Province.

Since becoming a private company, it has provided most of the cantons of Heredia Province, with electrical power, drinking water, public lighting, and sanitation sewage services. The company is not only providing these services to residential and urban areas within the area, but it also supplies industrial customers located throughout Heredia Province.

It was thanks to the above-mentioned legal reforms of late 90s that the incorporation of an environmental water tariff within the ESPH S.A. drinking water tariff system was favoured.[10] Within the cost variables that are included in drinking water supply rates, the ESPH S.A. water tariff represents a percentage that must be destined to the conservation and protection of the hydrological cycle,. This amount can be used to pay forest environmental services in water recharge areas, to purchase lands for protection purposes, or to finance the construction of rural pipelines.

[8]FONAFIFO and SINAC report directly to the Ministry of Environment and Energy.
[9] Act No. 7789. In Spanish, *Ley de Transformación de la Empresa de Servicios Públicos de Heredia.*
[10] Chapter XII of the 7554 Environmental Organic Act (*Ley Orgánica del Ambiente*) states the obligation that in order to operate and manage drinking water systems, certain criteria must be applied to protect the hydrological cycle and hydrographical basins from certain elements that may interfere, 1996. Act 7593 of the Regulating Authority for Public Services (in Spanish, ARESEP) establishes the obligation for public service providers to consider environmental issues that involve their activities and allows for the inclusion of environmental variables in the cost structure of the tarrif charged for the service.

Its main legal rationale is stated in Article 37 of the Biodiversity Act that literally states:

'In accordance with sustainable programs or projects duly approved by the National Council of Conservation Areas and the Regulating Authority of Public Services for public institutions or entities competent to provide a real or potential water or power service, that depend strictly on the protection and integrity as a Conservation Area, the Regulating Authority of Public Services may authorise charging users, by means of an appropriate tariff, a percentage equal to the cost of the service provided and within the parameters of the approved programme or project.'[11]

Every three months, the entity in charge of collecting said payment should make the necessary transfers or pay outs from the total sum of funds collected to a legal trusteeship fund for protected areas. Said trusteeship shall pay, within the same period, the owners, holders or managers of such real estate involved, and these payments will be used exclusively for the following purposes:

- Payment for services to protect underground water areas to private owners and holders whose property comes within the strategic areas defined by the Regional Council of Protected Conservation Areas and the organisations and institutions cited above, such as the National Councils of Conservation Areas and the ARESEP).
- Payment for services to protect underground water areas to private owners and holders, who voluntarily allow their property to become part of those areas under conservation and protection. The Regional Councils of Conservation Areas shall define said properties in advance[12].
- Purchase of or payment for real estate located in State protected areas that have not yet been bought or paid for.
- Payment for operating and administrative costs necessary for the maintenance of State protected areas.
- Funding for the construction of rural water pipelines, under the condition of an environmental impact assessment that shows sustainability of the water resource.

ESPH Scope

Although the system of Payment for Environmental Services has a nationwide scope, the environmental water tariff implemented by ESPH S.A. only has a regional scope. This tariff exclusively applies to those municipalities where ESPH provides its services for electricity and drinking water.

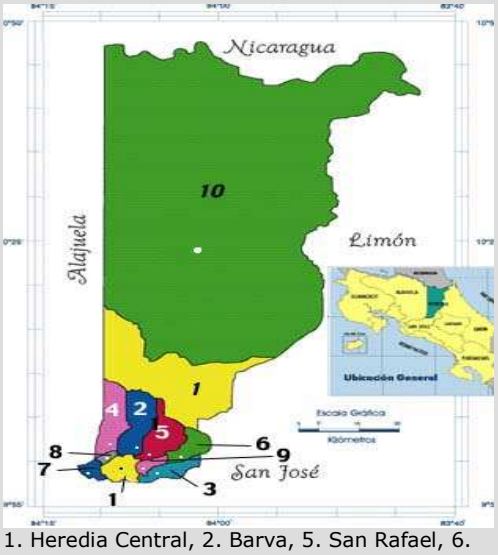
As already mentioned, ESPH S.A. is a public limited company pertaining to the San Rafael and San Isidro Municipalities as well as to the Central Canton of the Heredia Province (North of San Jose). It provides drinking water, sanitation sewage, and electricity services to these three municipalities, and to some sectors

[11] Translation of: 'En virtud de programas o proyectos de sostenibilidad debidamente aprobados por el Consejo Nacional de Áreas de Conservación y por la Autoridad Reguladora de los Servicios Públicos, por parte de las instituciones o los entes públicos competentes para brindar un servicio real o potencial de agua o de energía, que dependa estrictamente de la protección e integridad de un Área de Conservación, la Autoridad Reguladora de los Servicios Públicos podrá autorizar para cobrar a los usuarios, por medio de la tarifa pertinente, un porcentaje equivalente al costo del servicio brindado y a la dimensión del programa o proyecto aprobado.'

[12] The Environmental Regional Councils are a very important participatory body in the country. They are made up of five members representing different social sectors involved in the Area of Conservation, one of which will always be the local government. They have important functions in defining plans, policies, and programs for their own Area of Conservation. They also name the Director of the Area and are involved in the approval and audit of the budget. However, at present very few are participating since legal action was taken to declare unconstitutional the Articles of the Biodiversity Act that enabled the creation of these councils.

of the Barva, Flores and San Pablo Cantons, that are located within the Heredia Province. These six cantons are characterised by having the greatest concentration of population in the urban areas. Heredia is the fourth most important city in the country concerning population, goods and services, and commercial activity (following San Jose, Alajuela, and Cartago). The rest of the cantons within the scope of ESPH S.A. are markedly rural. These cantons produce coffee, raise livestock -including pigs-, and grow ferns; all of which are among the area's most important productive activities.

Map of municipalities serviced by the Heredia Public Service Company



1. Heredia Central, 2. Barva, 5. San Rafael, 6. San Isidro, 8. Flores y 9. San Pablo

The sector of the population directly receiving services from ESPH S.A. covers around 200,000 people, which equal 4.5% of the country's total population. Nevertheless, it must be taken into account that the municipalities, where ESPH S.A. operates, are located in the upper basin of the Rio Grande de Tárcoles. This basin contains the country's most important aquifer and supplies water to 60% of Costa Rica's total population.

From the map, it can be seen that the cities of Alajuela and Heredia are located in the micro basins that benefit from ESPH S.A. services. These cities are located just north, within the sphere of influence of the Capital City (San Jose), all of them located nearby the basin of Rio Grande de Tárcoles.

Given the strategic location of the cantons, basins, and micro basins where ESPH S.A. operates, the market instrument, which involves the incorporation of an environmental variable into the cost structure of the water tariff charged by ESPH S.A., acquires great importance for Costa Rica.

Future development of market mechanisms

The ESPH S.A. successful experience and the existence of an appropriate legal framework, which will be strengthened by the new Water Resource Act (in Spanish, *Ley del Recurso Hídrico*), foster the emergence of new economic and market instruments for the country's water resource management.

Currently, two additional instruments are being developed and are expected to become effective within the short-term or medium-term.

The first of these instruments was already approved as part of the new tax for Use of Water Resources, the already mentioned 'Environmentally Adjusted Tax' and states that:

In Costa Rica, everyone who holds concessions to use water resources shall pay a tax or right of use. Under the previous Act, this tax was very low and it did not reflect the real cost for different water uses, nor did it include any environmental variable in its cost structure. For this reason, a new regulation has been passed that adjusts the rate of this tax so as to include environmental variables in its tariff.

This regulation was issued by Executive Decree of August 2005 and it allocates 25% of the proceeds from this tax to the payment for PES directly related to the protection of the hydrological cycle[13].

The experience of ESPH S.A. and the collection of said water tariff were very important in the creation of this Environmentally Adjusted Tax for water use. All who have concessions for water use must pay the environmentally adjusted tax. In this sense, ESPH S.A. itself as a water consumer must also pay this tax as will be shown later.

Currently, MINAE has been working on the implementation of another instrument directed at identifying the environmental service that provides water resources for the dilution and transportation of pollutants. This instrument is called 'Canon Ambiental por Vertidos' or 'Environmental Dumping Tax', and is defined as the fee that must be paid for dumping contaminants into water bodies.

It is worth noting that there is a growing trend for the PES system in Costa Rica to protect forests. This is so because, under most agreements signed between FONAFIFO and forest owners (by which said owners receive PES payments), funds are allocated from a market approach to forest conservation and the support of sustainable forest production. Very few agreements between FONAFIFO and landowners, have as an objective the protection of water resources; most of which are financed by ESPH S.A. The importance of prioritizing payment to those areas which need forest conservation and protection for water production, is being increasingly recognised. The starting point is to recognise the forest as a water producer.

4.2 Implications

The tariff was approved in 2000, following a comprehensive process of negotiation and consultation with the parties involved. This included a series of workshops with the participation of key stakeholders, consultation with community members, and efforts to convince public authorities of the benefit of this instrument.

It is worth noting that, although the water tariff involves a small charge and therefore does give an incentive to reduced consumption, it is a very important first step directed at placing the issue within the political, business, and social realm. More than an instrument to reduce consumption, the water tariff seeks to identify the economic value of environmental services provided by the ecosystem to maintain the hydrological cycle.

Currently, the amount charged is 1,9 colons per cubic meter, that is US$ 0,004, but ARESEP has authorised ESPH S.A. to charge up to 3,8 colons per cubic meter. All consumers pay the same rate because the payment rate is determined by the quantity of water used, not by different kinds of use. Each customer of ESPH S.A.

[13] In Costa Rica, water is public domain; therefore, the State manages this resource by means of concession contracts that include the payment of a tax for use.

receives a receipt for the payment that clearly and specifically shows how much is being charged for the environmental water tariff. The tariff was approved by ARESEP upon ESPH S.A. request, after holding a public hearing where all interested parties participated[14].

As said, the actual rate is 1,9 colons per cubic meter. Nevertheless, when the new tax for use becomes effective, ESPH S.A. itself should start to pay a water variable to the Water Department of the MINAE, which most likely will be passed on to its customers. The sum established by MINAE is 2 colons per cubic meter and it has been determined by the value of the Environmental Water Service (EWS) by the following formula:

EWS = CV (Ecosystem Conservation Value in ¢/ m^3) **+ RV** (Ecosystem Restoration Value in ¢/ m^3)[15]

In order to determine said values, the MINAE studied three hydrographical regions as well as ESPH S.A.'s own pricing structure. The analysis provided the following results:

Case Studies	**Intake Value (¢/m^3)**	**Restoration Value (¢/m^3)**
Tempisque Basin	1,67	3,02
Tárcoles Basin	0,51	1,82
Savegre Basin	0,48	1,62
ESPH S.A.	2,70	4,89
ESPH S.A. Water tariff	**¢1,9/m^3** – Year 2000	
EWS proposal on the Tax	**¢2,0/m^3**	

As shown in the previous table, the intake value and the restoration value in the ESPH S.A. area of influence amounts to 7,59 colons per cubic meter; however, the value of water tariff is 1,9 colons per cubic meter. The MINAE proposes a tax of 2 colons per cubic meter because, as was proofed by the ESPH S.A. experience, this will result in a significant increase in the final price paid by consumers.

In other parts of Costa Rica, there exists a rate based on different kinds of use (residential, normal, profitable, preferential, and governmental). Nevertheless, the water tariff in Heredia is the same for all, irrespective of use.

Sector	Surface Water		Underground Waters	
	Current payment	Payment based on new tax	Current payment	Payment based on new tax
Households	0,5177	2,46	0,7187	2,63
Inhabitants	0,0088	2,46	0,0109	2,63
Hydroelectric (hydraulic power)	0,0001	2,27	NA	NA
Industrial	0,0252	3,64	0,1928	4,25
Tourism	0,0252	3,64	0,1928	4,25
Agricultural	0,0169	2,29	0,1304	2,40

[14] The application for charging an internal environmental factor on rates for drinking water services was approved by ARESEP in March of 2000 (Resolution RRG-1103 published in *La Gaceta* No. 48 March 8, 2000).
[15] In Spanish referred to as Servicio Ambiental Hídrico (SAH), VC (Valor de conservación de ecosistemas) and VR (Valor de restauración de ecosistemas)

Gender

Currently, no explicit consideration is given for gender within the ESPH S.A. water tariff scheme. However, in 2002, FONAFIFO carried out a series of studies to analyse this variable in the framework of its *'Strategy to include women and women's organisations in the programme of payment for environmental services'* (*'Estrategia para la Incorporación de Mujeres y Organizaciones de Mujeres al Programa de Pago por Servicios Ambientales')*. This study came to important conclusions about the beneficiaries of PES that is funded by the ESPH S.A. water tariff:

- According to FONAFIFO statistics, women's participation in Costa Rica's PES Programme is 20%. According to the Morales and Davila's results (2002), a basic impediment for women to access PES is the lack of land title deeds or no land ownership at all. Morales also raised the issue that neither strategies, nor policies exist to include women in this kind of programme. Although we may state that the authorities who coordinate the programme are willing to involve women in the PES programme, there are many other elements that hinder progress.
- It is necessary to be a landowner since this is one of the requirements to be a beneficiary of this programme. In most cases, lands in Costa Rica pertain to the husband and in the cases where women are heads of household; the majority has no title deeds to the farms.[16]

Ecological Implications

ESPH S.A. and MINAE joined efforts and signed an agreement to protect and conserve forest areas within their shared area of influence. Under this agreement, both institutions are to protect and recover water source areas and water recharge areas that are managed by ESPH S.A. for supplying drinking water.

In this way, part of the water tariff collected is used to pay environmental services to landowners of said areas as well as to recover forests located in public lands through activities of protection, conservation, and reforestation.

ESPH S.A. has used the proceeds to support the Central Volcanic Mountain Range Conservation Area (*Área de Conservación Cordillera Volcánica Central*) and to directly pay the owners of strategic lands within the company's area of influence for forest environmental services .[17]

At present, some 800 hectares are under PES System and are funded by the ESPH S.A. water tariff. Yet, the goal is to finance 1.300 hectares.

Social Implications

Proceeds of the water tariffs are destined to the protection and recuperation of the forest in the upper micro basins where the ESPH S.A. PROCUENCAS Programme is carried out to specifically protect the micro basins of Ciruelas, Segundo, Bermudez, Tibas and Para rivers. The PROCUENCAS protects micro basins that form the Virilla River Basin and provide drinking water services to ESPH S.A. customers. This Programme is a way to avoid activities that could have

[16] Badilla, Nuria, Milena Berrocal & Jorge Mora Portuguez: "*Estrategia para la incorporación de mujeres y grupos de mujeres al Programa de Pago por Servicios Ambientales de FONAFIFO*". San José, Costa Rica. FUDEU. 2001

[17] In spite of the fact that a degree of coordination exists between ESPH S.A. and FONAFIFO, this system has become parallel to the official system, since they pay the owners of this region directly and exclusively.

a negative impact on the quality of the water. By producing water of higher quality, ESPH S.A. generates a positive effect on the water users of the Virilla River Basin, which is the most important river of Cuenca Grande. Additionally, the protection and recovery of forest areas generate other environmental services, such as landscape beauty, biodiversity and clean air that positively improves society's quality of life[18].

In this way, the upstream users or owners of upper micro basins[19] share the responsibility of protecting and recovering the forest cover with downstream users or the customers of ESPH S.A and thus guarantee sustainability of the environmental water service provided.. ESPH S.A. is a facilitator between the upstream users and the downstream users or between providers and consumers, providing the structure necessary for consumers to compensate providers through payment of the water tariff. These resources are then channelled into the latter by means of the PES system as a shared environmental investment.

Economic Implications

From an economic perspective, the water tariff is defined as an instrument that recognises the economic value of the Environmental Water Service or the water production service provided by the forests. The water tariff also identifies environmental costs that are required to recover and preserve the areas where water sources are located.[20]

The incorporation of a water tariff into the cost structure of the ESPH S.A. constitutes a mechanism by which consumers are charged, and then, landowners are compensated so that they will commit themselves to protect and recover forest areas that provide water resources.

Hence, the forest is considered not only as a producer of wood, but also as a producer of environmental services. As such, the profitability from forests may be equal, if not more attractive than traditional land uses.[21]

ESPH S.A. collects a monthly rate from its customers for the provision of drinking water services. The environmental water service is clearly set apart on the invoices. The proceeds are deposited into an independent account separate from ESPH S.A. operating accounts and these funds can only be used for payment of environmental services, to support PROCUENCAS programmes, and the construction of rural water pipelines.

Stakeholders and beneficiaries

With the PES programme, a variety of direct and indirect stakeholders and beneficiaries are involved.

The first tier of beneficiaries is the inhabitants of the cantons that receive services from ESPH S.A.. These consumers are guaranteed the provision of drinking water, electric power, and sanitation services for their cantons.

---

[18] Cordero Camacho, Doris: "*PROCUENCAS, protección y recuperación de microcuencas para el abastecimiento de agua potable en la provincia de Heredia, Costa Rica.*", ESPH S.A. 2003

[19] In some cases, the landowners located in the area of upper micro basins are also service users or customers of ESPH S.A.

[20] Francisco. Jiménez, José Joaquín. Campos, Francisco Alpízar, Guillermo Navarro "*Experiencias de pago por servicios ambientales en basins en Costa Rica*", 2003.

[21] Barrantes, G. y Castro, E.: "*Estructura tarifa hídrica ambientalmente ajustada: internalización del valor de variables ambientales*". (Paper prepared for the Heredia Public Service Company, S.A.) Heredia, Costa Rica. Page: 102. 1999

In the second tier of beneficiaries is the remainder of the inhabitants of Costa Rica's Central Valley. It is through the PES system that forests in the upper basin of the Tárcoles River are protected, where the most important aquifers are located. As previously mentioned, these aquifers provide water for nearly 60% of the country's total population. ESPH S.A. states:

> *'The water tariff represents a contribution made by the community of Heredia so as to facilitate the development of the PROCUENCAS Programme that promotes activities to protect and recover micro basin forests, which provide drinking water to ESPH S.A. customers and other important sectors of the metropolitan area. The water tariff helps society to recognise water as a social and economic good as well as to integrate the interests of both upstream and downstream users. In this way, water consumers (downstream) compensate service providers (upstream) so that they commit themselves to protect and recover forest water resources.*[22]'

In the third place, State agencies such as SINAC and the municipalities that own ESPH S.A. are other important beneficiaries, as it is through this instrument that they are able to collect economic resources in order to fulfil their duty to protect and preserve the forest and water resources.

Funds

An agreement for cooperation exists between ESPH S.A and MINAE, which aims at uniting efforts of both organisations to contribute to the protection and recovery of the forest cover in the aquifer recharge areas for drinking water managed by ESPH S.A. with the funds collected through the water tariff[23].

In this way, the Ministry[24] provides technical, administrative, and legal expertise to develop, promote, assess, follow-up, and monitor projects that receive funds. In exchange, the Ministry receives the sum of ¢1.500/ha/year according to the water schedule for PES during the life of the contracts concluded by ESPH S.A. This is paid through the water tariff paid by ESPH S.A. customers. Currently, 800 hectares are covered by the PES system.

Additionally, ESPH S.A. contributes to the Ministry a sum of ¢11.500/ha/year during a five-year period for each parcel of land in the Braulio Carrillo National Park. Up to September 2002, the total area that was included is 373 hectares which represents ¢ 4.289.500 annually and a total of ¢ 21.447.500 for five years. These funds are managed by the National Park Foundation (*Fundación de Parques Nacionales*).

Management

This agreement also establishes an Advisory Committee whose responsibility is to insure transparency and the good management of water tariff funds, as well as, to open a space for citizens to participate in the development of the programme. The Advisory Committee is made up of five members:

- a representative from each of the municipalities partner of ESPH S.A. (Heredia, San Rafael y San Isidro);
- two members elected by the company's Board of Directors;

[22] www.esph-sa.com/probasins.shtml , Web site consulted July 7th, 2006.
[23] Cordero Camacho, Doris: "*PROCUENCAS, protección y recuperación de microcuencas para el abastecimiento de agua potable en la provincia de Heredia, Costa Rica*.", ESPH S.A. 2003
[24] Represented by the Office of the Central Volcanic Mountain Range Conservation Area (Dirección del Área de Conservación de la Cordillera Volcánica Central or ACCVC)

- an official of MINAE as general auditor;
- the FONAFIFO Director participates as an observer.

Since January 2002, this group meets on a monthly basis.

The technicians of the ESPH S.A. Environmental Office and an outside Forest Manager are in charge of providing technical service to property owners who voluntarily adhere to the PES water programme.

The technical and legal requirements to become a beneficiary of this programme as well as the obligations of the beneficiaries and ESPH S.A. are outlined in the programme regulations. At this moment, contracts have been signed for the protection of about 800 hectares, including private land and a section of the Braulio Carrillo National Park.

The Environmental Office is in charge of approving projects subject to the PES water programme. It also follows-up and monitors such projects. However, MINAE may conduct visits to monitor or assess the projects. In addition, ESPH S.A. can hire an assessment entity o an external auditor for technical, administrative and financial consulting.

Minimal conditions that must be considered as a sustainable solution (or how to avoid not being sustainable)

This instrument can be easily enforced since it requires no significant infrastructure, nor institutional capacity. Its practical application is based on a cost structure already in place by the entity in charge of enforcing it (in this case, ESPH S.A.).

Collection is the most complex part of the instrument, and is resolved by including an environmental variable to the invoice for the service of drinking water.

Secondly, from an environmental point of view, good use of these resources requires close *coordination* between the ESPH S.A. Environmental Office and MINAE in order to determine the areas that should receive priority in terms of protection.

As long as ESPH S.A. continues providing drinking water services, it will be able to continue using this economic instrument. There is greater potential for other operators throughout the country to increasingly replicate a similarly designed economic instrument due to the successful experience of ESPH S.A. Firstly, because it was the first time that the economic value of water itself was recognised. Secondly, because it did not create conflicts among customers as they accepted the payment of the water tariff offering no resistance. And thirdly, because a system was designed that allows for forest landowners to be paid for environmental services to protect aquifers. This has helped to make progress toward integrated management of the basins where ESPH S.A operates in coordination with the Ministry of Environment.

Another very important aspect of the company's assessment studies was the *Willingness of Payment* by the drinking water service users. These studies showed that customers are very willing to pay costs that are invested in the conservation of the hydrological cycle. This shows the extent to which the instrument can be applied.

4.3 Conclusions and recommendations

ESPH S.A. was a pioneer in implementing this instrument and its very valuable experience serves as an example at the regional level. Especially because this instrument is based on a legally institutionalised plan that can be used as an example within other legal frameworks, keeping in mind its strengths and weaknesses.

The company's implementation of the PES System has been very efficient and in some ways, it has enhanced some integration with the MINAE/FONAFIFO national scheme. However, it must be noted that it is not advisable for each drink water provider to create its own PES scheme. As such, it would be necessary to find options so that service providers are only intermediaries of the PES collection. The idea is that first, they directly pay MINAE for the conservation costs for the water that they actually use, and then the drinking water providers include the cost in the tariff rate.

At the beginning of the ESPH S.A. experience, there were many obstacles in dealing with financial management. These are public funds and, therefore, they are subject to a series of controls and restrictions.

Strengths

The water tariff is an instrument that gives economic value to environmental services through a relatively simple system of payment that did not require ESPH S.A. to make significant changes in its administration or operation structure.

The instrument was widely agreed upon by consensus and negotiation with both the communities and the productive sector. Thus, it was implemented without much resistance from those sectors that would be possibly 'affected'.

The water tariff has highlighted the importance of public participation in measures aimed at protecting and conserving natural resources. In the studies conducted to evaluate contingent assessment and willingness of payment, in part to determine what tariff should be charged, it was concluded that consumers would be willing to pay a much higher amount than the current tariff.

The water tariff contributes to supporting conservation efforts by MINAE and the Payment for Environmental Services System of the FONAFIFO. Thus, the water tariff has turned into a financial resource to forest owners within the ESPH S.A. area of influence.

Weaknesses

Currently the water tariff is an instrument that is not being used by all the country's drinking water providers. ESPH S.A. is the only company using the instrument and it is not being used at the national level.

It is a mechanism that is 'authorised' but not 'required' to other water supply system operators. This indicates that any other company that provides water services, is entitled to include an environmental variable in its tariff rate, but is not required to do so. However, every client of a company that incorporates an environmental variable into its tariff, is compelled to pay it, even if other companies are not including an environmental variable in their rates in other regions of the country. ESPH S.A. itself is also a user of water, and therefore, must also pay as a user and not just charge its customers. This situation must be corrected with the new tax for use that has become effective. The new tax

represents a challenge for ESPH S.A. and its water tariff because most likely it will transfer the new tax cost to its customers.

Opportunities

Currently, the process to reform the water regulation framework in Costa Rica strives to enhance the creation of economic instruments for water management. Therefore, schemes such as the water tariff and payment for environmental services shall be strengthened once they have attained legal status under the new Water Resource Act (*Ley del Recurso Hídrico*).

In any case, the National Water Strategy (*Estrategia Hídrica Nacional*) and the Central American Integrated Water Management Strategy (*Estrategia Centroamericana de Gestión Integrada del Agua*) are currently being developed to include the creation of payment systems for environmental water services. Tariff instruments, taxes, and rates are also being developed not only within Costa Rica's legal framework, but also in the entire Central American region.

Threats

The main threat to the current tariff scheme and corresponding PES is the low amount paid for each hectare of forest protected and it does not represent an economic incentive when compared with other more profitable ultimate uses. Mechanisms that allow for an increase in the tariffs paid for PES should be wisely planned so that such increases do not harm or threaten the quality of life of the population subject to paying it.

What needs to be done and by whom?

What is now required to maintain the standing of economic and market instruments as fundamental tools for Costa Rican water resource management is the passing of the new Water Resource Act, which is currently being debated in Congress. This Act would primarily harmonise all existing instruments and systems of payment for environmental services as well as those used to determine the economic value of water.

Secondly, it would allow for these instruments to attain legal status. At present, most of them operate under regulations issued by the Executive Power through Decrees.

4.4 Additional Information

Web sites

- ESPH S.A.: www.ESPH S.A.-sa.com/
- FANCA: www.freshwateraction.net/fan-ca

References and further reading

- Badilla, Nuria, Milena Berrocal, y Jorge Mora Portugués (2001) "*Estrategia para la incorporación de mujeres y grupos de mujeres al Programa de Pago por Servicios Ambientales de FONAFIFO*". Fundación para el Desarrollo Urbano (FUDEM), San José, Costa Rica.
- Barrantes, G. y Castro, E. (1999) "*Estructura tarifa hídrica ambientalmente ajustada: internalización del valor de variables ambientales*", Paper prepared for the Public Service Company Heredia S.A., Heredia, Costa Rica.
- Cordero Camacho, Doris (2003) "*PROCUENCAS, protección y recuperación de*

microcuencas para el abastecimiento de agua potable en la provincia de Heredia, Costa Rica", Empresa de Servicios Públicos de Heredia S.A. (ESPH S.A) Heredia, Costa Rica.

- Francisco, Jiménez, José Joaquín Campos, Francisco Alpízar, Guillermo Navarro (2003) "*Experiencias de pago por servicios ambientales en cuencas en Costa Rica",* Turrialba, Costa Rica.

5. Challenges to governance and environmental sustainability in the private exploitation of mineral and underground waters in Brazil

Rubens Born, Reynaldo Guedes Neto, Cristina Orphêo; Vitae Civilis Institute for Development, Environment and Peace - Brazil

5.1 Introduction & objectives

According to the applicable Brazilian legislation[25], mineral waters (both thermal spring waters and potable water) are not recognised by our public administrators as water resources. They are, rather, considered mineral resources, class VIII, under the exclusive management of the National Department of Mineral Production (Departamento Nacional de Produção Mineral or DNPM), the agency linked to the Ministry of Mines and Energy (Ministério de Minas e Energia or MME), which issues the licenses for exploration and extraction.

Consequently, in contrast with common underground waters, which are under the dominion of the States, and subject by decentralised and participatory regulatory instruments, as set out in Law of the Water Resources National Policy[26], mineral waters under the direct dominion of an agency of the federal government.

Being considered a mineral, isolated from the hydrological cycle, mineral water could have its aquifers[27] exploited[28] to exhaustion, with quantitative and qualitative changes, especially in terms of the physical and chemical composition that gives them medicinal properties that distinguish them from common underground waters.

Because of the current Brazilian regulatory framework for mineral waters, there are conflicts over use and jurisdiction, because depending on the intended use, mineral waters can be regulated by different agencies.

If used for common purposes, such as drinking water supply or irrigation, mineral waters are regulated under the State Water Resources Systems. If destined for bottling or for bathing in spas, on the other hand, they fall under the DNPM.

As learnt in the case study of the conflict created in São Lourenço, Minas Gerais, the existing legislation and regulations covering mineral waters are outdated and have serious gaps, and must be changed to integrate licensing procedures for extraction and right to use this water resources, through the Watershed Committees, with the balanced participation of governmental bodies, users and civil society.

---

25 Decree-Law 227, dated February 28, 1967 (which revised Decree-Law 1985, from January 29, 1940, the Mining Code), Decree 62934, dated July 2, 1968, which approved the regulations for the Mining Code, and Decree Law 7841, dated August 8, 1945 (Minerals Waters Code), included in the 1988 Federal Constitution.

[26] Law 9433, dated January 8, 1997

[27] Underground water, confined or not (Dicionário Brasileiro de Ciências Ambientais. Rio de Janeiro: Thex Editora; 2002). According to Rebouças (1999), they are "rocky bodies with characteristics relatively favourable to the circulation and storage of underground water".

[28] Exploitation: use or utilization, especially for profit (Random House Webster's Unabridged Dictionary). In mining, it refers to the phase of extraction for commercial purposes, as opposed to exploration, which is the research phase of a mineral good.

Objectives

The present study seeks to analyze the current legal and institutional framework for management of water resources in Brazil, as well as assess the potential for governance (public accountability) and environmental sustainability of the market for and expanding exploitation of mineral waters.

To this end, it succinctly addresses the importance of mineral waters in the context of underground waters, as a strategic reserve for the supply and use in Public Health, through thermal and hydrotherapeutic practices, and the linkages with governance and environmental management.

It introduces basic concepts in management of underground waters, and presents a case study of the conflict over water use in the municipality of São Lourenço in Minas Gerais, which demonstrates the ineffectiveness of current management instruments. It also takes into account potential development in the mineral water market in the region of the municipalities of São Lourenço da Serra, Juquitiba, Embu-Guaçú and Itapecerica da Serra in the state of São Paulo, which, according to projections, could become the largest production hub of the bottled mineral water industry.

Finally, it discusses proposals for integration of procedures of and coordination between different agencies and bodies with jurisdiction over water resources, mining activities and the environment, in terms of the licensing of exploration and extraction of mineral waters.

Specific objectives

This document is based on a study carried out with the following specific objectives:

- Identify legal and institutional gaps associated with the deficient environmental management of mineral waters, with a view to promoting transparency and public accountability (governance);
- Assess the current status and trends of the mineral water market in Brazil;
- Identify and assess the application of economic instruments in the context of exploitation of mineral waters;
- Analyze the current situation of the irregular case of exploitation of mineral waters in São Lourenço, Minas Gerais, by the concession-holding company;
- Support the activities of the Preparatory Working Group of the Second Forum of Mineral Waters and Tourism of the Southeast Sub region of the São Paulo Metropolitan Region – Municipalities of Taboão da Serra, Embu das Artes, Itapecerica da Serra, Embu Guaçu, São Lourenço da Serra and Juquitiba - Case Study 'Transformation of a region into a Mineral Waters Resort Area'.

5.2 Markets and economic instruments for mineral waters

Present situation and trends

The growing difficulties that urban centres have in finding sufficient good quality drinking water, due to scarcity, distance or pollution of water catchment areas or underground waters, along with the use of mineral water as a fashionable beverage, cosmetic product or food complement, means that the market for bottled mineral waters are facing a period of rapid expansion.

Thus, the traditional use of mineral waters, consumed or used on-site in spas and thermal and mineral water bathing resorts for therapeutic purposes has been gradually replaced by off-site use, through large-scale extraction. Brazil is no exception to this rule.

The global panorama of bottled water markets, presented in October of 2004 in the *First Global Bottled Waters Congress* in Evian, France, revealed that global consumption of mineral water will likely reach 206 billion litres by 2008.

In 2003, Western Europe produced 44 billion litres, with an average per capita consumption of around 112 litres/year, followed by North America, with a production of 26 billion litres and an average per capita consumption of 80 litres/year. Latin America, in the same period, produced 27 billion litres with a per capita consumption on 50 litres/year. The highest single rate of per capita consumption belongs to the Arab Emirates, with 223 litres/year, followed by Italy with 189 litres/year, and France, with 158 litres/year.

In terms of individual country production, the USA produced 24,3 billion litres in 2003, followed by Mexico with 13,8 billion; China with 11,8 billion; Italy with 10,8 billion; Germany with 10,6 billion; France with 9,5 billion; Indonesia with 7,9 billion; Thailand with 5,3 billion, and Spain with 5,2 billion.

The leading global company is Nestlé Waters, followed by Danone, Coca-Cola and Pepsi, who together hold 31% of the global market for mineral and other bottled waters.

The Brazilian statistics refer exclusively to bottling of mineral waters and drinking waters, while in most countries it also includes production of treated waters and/or those with artificial addition of salts.

The Brazilian mineral water bottling industry has plants established practically throughout the country. The mineral water market is highly distributed, with a very large number of small and medium-sized companies. In terms of the number of licenses for extraction, up to 1995, 319 licenses had been issued for extraction of mineral water, but by 2004 this number had risen to 706.

The numbers for 2004 indicate 801 applications for exploration for mineral water, table water and thermal waters in DNPM and 689 exploration licenses issued. In the same year, 4,1 billion litres of mineral and table waters were bottled, and 19 brands accounted for 40% of this market.

The Edson Queiroz Group continued being the largest national producer, with 15,2% of the market, through the bottling of the mineral waters Indaiá (11,6%), with plants in various Brazilian states, and the brand Minalba (3,6%), produced in Campos do Jordão (SP). Other large companies include Flamin Mineração Ltda. (SP), producer of Lindoya BioLeve (2,8%), followed by Empresa de Águas Ouro Fino, in Campo Largo (PR), with around 2,5% of the national total, and 53% of the market in the state of Paraná. The brand of water Schincariol, bottled by Primo Schincariol Indústria de Cervejas e Refrigerantes, in SP, BA, PE, MA and RJ, has 2,3% of the market; Lindoya Genuína, bottled by Lindoyana de Águas Minerais Ltda (SP), 2,2%; Spal Indústria Brasileira de Bebidas S.A. (SP), producer of Crystal water, 1,7%; Empresa de Águas Dias D'Ávila (BA), 1,5%; Aquanova Empresa de Mineração (SP), 1,3%; Comercial Zullu Multi Mineração (SP), 1,3%; Empresa Mineradora Ijuí (RS), 1,3%, and Águas Minerais Sarandi (RS), 1,2%. Nestlé Waters of Brazil holds a 1,1% market share, with plants in MG and RJ, and Superágua Empresa de Águas Minerais, in Araxá, Cambuquira,

Caxambu and Lambari (MG), held a 0,7% market share until it closed down in June of 2005.

In regional terms, the Southeast region is far and away the leader, producing 2.2 billion litres in 2004, or 53,4% of the total water bottled in Brazil. The Northeast region is second, with 22,5%, followed by the South (12,3%), North (6,0%) and Centre West (5,8%). The State of São Paulo is the largest producer of bottled mineral water in Brazil, with around 1,5 billion litres, 37,3% of the national total. Other significant states are Minas Gerais (8,7%), Pernambuco (5,7%), Rio Grande do Sul (5,7%), Rio de Janeiro (5,6%), Bahia (5,1%) and Paraná (4,6%).

Brazil's imports of mineral water in 2004 were down 47,2% from 2003, with 502.000 litres, worth US$137.000, coming from France (59%), Italy (35%), Portugal (4%) and the United Kingdom (1%). The principal economic blocs of origin were the European Union (92%) and Mercosul (2%).

Exports were not significant, with only 384.000 litres, worth US$114.000, going mainly to Angola (31%), USA (22%), Paraguay (17%), Japan (7%) and Argentina (5%). The principal economic blocs of destination were Mercosul (60%), Aladi countries (21%) and Africa (12%).

According to the DNPM, there is a global trend towards continued increase in consumption of mineral water and ample space to be won by the Brazilian bottled water industry, which has attracted large groups from the food and beverage industry, such as Nestlé, Danone, Coca-Cola and Pepsi:

'With the objective of strengthening its brands of water, becoming established in an increasingly competitive market, and keeping abreast of the needs and preferences of consumers in search of quality of life, increasingly aware of the benefits of mineral water for health, it is essential to add value to water, in order to meet the demands of the various market segments, observing quality standards, diversification of product lines, innovations in packaging, marketing and good distribution services to clients and consumers'.

The Brazilian market has been following the global trend, with greater share of un-carbonated water and in packaging of over 10 litres. Although Brazil is one of the largest producers of mineral water, its per capita production of around 25 litres/year is still very low.

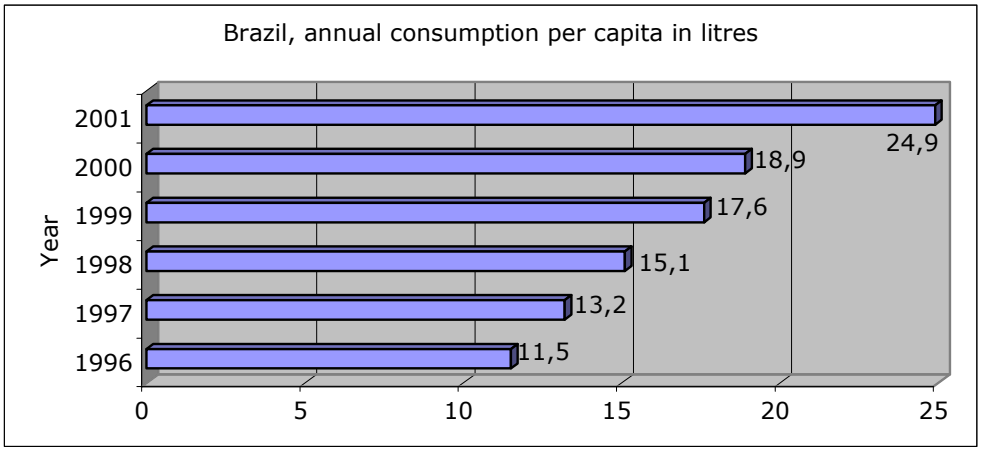


Table 1, below, presents the principal statistics on the mineral water market in Brazil, according to DNPM.

Breakdown		**2002(r)**	**2003®**	**2004(p)**
Production	Bottled (10^3 liter)	3.966.857	4.164.000	4.170.388
	Ingested at source (10^3 liter)	116.587	116.573	116.464
	Industrial Products (10^3 liter)	888.890	735.637	807.617
Imports	Manufactured (³) (10^3 liter)	821	952	502
	US$-FOB	300.000	264.000	137.000
Exports	Manufactured (³) (10^3 liter)	230	215	384
	US$-FOB	51.000	53.000	114.000
Apparent Consumption¹	(10^3 liter)	4.972.925	5.016.947	5.094.637
Prices²	PET Carbonated 2 liter (US$/UN)	0,29	NA	0,37
	PET Carbonated 1,5 liter (US$/UN)	0,28	0,25	0,32
	PET Natural 1,5 liter (US$/UN)	NA	0,22	0,30
	PET Natural 0,51 liter (US$/UN)	0,18	0,13	0,17
	PP Natural 0,51 liter (US$/UN)	0,12	0,13	0,15
	Glass 0,2 liter (US$/UN)	0,05	0,05	0,05
	RET 0,51 liter (US$/UN)	0,09	0,13	0,06
	One way 0,3 liter (US$/UN)	0,19	0,17	0,21
	Large bottle 20 liter (US$/UN)	0,93	0,83	1,05
	TETRA BRIK 1 liter (US$/UN)	0,16	0,14	0,26

Table 1. ® Confirmed data; (p) Projected data; (¹) Production bottled + ingested at source+CPI+Imports-Exports; (²) Average price FOB supplied by bottlers; (³) Mineral water – Carbonated – N/A; (...) Not Available; Obs.: Average dollar 2004: US$-R$2,65. Sources: DNPM-DEM; MF-SRF; MICT-SECEX.

Economic instruments for mineral water management

Financial Compensation for Mineral Exploitation (Compensação Financeira pela Exploração de Recursos Minerais or CFEM), the equivalent of royalties for the extraction of mineral water, was established by the 1988 Federal Constitution, in Article 20, Paragraph 1. Holders of concessions for extraction rights owe this to states, the Federal District, Municipalities, and to Federal government administrative agencies, as a union organisations, , as compensation for the economic use of mineral resources in their respective territories. CFEM is a fee which has the legal character of a public price and a compensatory character, and therefore does not constitute a tax.

CFEM is generated by the removal of the mineral product from the mining areas, salt production area, or other mineral deposits. CFEM is also generated by any industrial transformation of the mineral product or the consumption of the mineral product by the mining company. The CFEM is calculated by determining the net revenue, from the sale of the mineral product, based on the net sales revenue, less the taxes on sales and the costs of transportation and insurance for the product. When the product is not sold, because the mining company itself consumes, transforms or utilises the mineral product, the material is still considered as value, and the CFEM is calculated based on the sum of the direct and indirect costs until the moment the mineral product is used.

The percentage applied to net revenue in order to determine the CFEM amount varies depending on the type of mineral substance. In the case of mineral water, the percentage applied is 2%. The CFEM resources are distributed as follows: 12% go to the Federal government (10% to DNPM and 2% to the National Scientific and Technological Development Fund (Fundo Nacional de Desenvolvimento Científico e Tecnológico or FNDCT)); 23% goes to the state where the mineral substance was extracted, and 65% for the producing

municipality. CFEM resources are created to the States and Municipalities, in their respective Specific Movement Account, in the sixth business day following payment by the mining companies. The resources originating from CFEM cannot be applied to debt payment or to the permanent staff of the Federal government, the states, the federal district, or the municipalities.

The legislation specifies also that the revenues must be used 'for projects that, directly or indirectly, return to benefit the local community in the form of improvements to infrastructure, environmental quality, health, and education. This, however, has not occurred in practice.

In the last 9 years, according to the DNPM[29] CFEM collection has grown significantly, at an annual rate of 24,43%. This accomplishment led the collection fund, which in 1995 was around R$57 million, to reach R$293 million in 2003, and R$325 million in 2004, which today represents a *net revenue for* DNPM to R$33 million. According to the Brazilian Mineral Annual Report of 2001, the CFEM collected in 2000 from production of mineral water in Brazil was R$1.293.689,85; the production of mineral water in the state of São Paulo reached 1.499.820.000 litres of bottled water, with only 3.652.000 litres, or 0,25% of this having been consumed at source. Sales of US$71.014.330 were registered. In 2004, the municipality of São Lourenço da Serra in São Paulo received R$4.629,29, as its share of CFEM[30].

The Water Resources National Policy Law - Law # 9433, from January of 1997, treats water as a limited natural resource with economic value – and it is worth noting that this legal principal emerged in a period when economic instruments were getting more attention than any other alternatives. Article 5 of this Law identifies the five instruments of Brazilian water policy, but we will examine four of them which are of special interest here: the Water Resource Plans; the granting of water use rights; charges for use of water resources; and compensation for municipalities.

The charge for water use, based on this law, was initiated by the federal government in the Rio Paraiba do Sul watershed. This mechanism is gradually being implemented in other watersheds, however the use of water use charges is still in its early stages. In this scheme, payment of a certain amount, whether based on the polluter pays or user pays principle, does not address the need for responsibility for conservation of natural resources, nor does it transfer title to the environmental good or service.

In the state of São Paulo, state law 12.183, dated December 2005, established a charge for water use, and will likely generate resources for the State Water Resources Fund. The resources will have to be allocated to projects approved by the watershed committees. In the State Fund of Water Resources (Fundo Estadual de Recursos Hídricos or FEHIDRO) system, based on the state water resources policy – Law 7663, of 1991 - the projects can be presented by representatives of municipal and state governments, universities, NGOs or other organised civil society groups. The fees charged for the use of water resources must respect limits and conditions set by the State Water Resources Council and proposals from the Watershed Committees, including the 4-year investment plans to be financed by the funds generated. Therefore, it is important that society has the capacity to monitor the water use fees and the allocation of financial resources, as well to present projects that can be financed by these resources. The law also established that the Upper Tietê Watershed Committee, which

[29] www.dnpm.gov.br
[30] www.dnpm.gov.br/cfem

covers the Metropolitan Region of São Paulo, must allocate at least 50% of the resources from the water use fees for conservation, protection and recuperation of water catchment areas that are in its region for a period of 10 years. Although law 12.183 does not apply to mineral waters, in light of existing legislation in this area, clearly the use of resources for conservation of catchment areas could be beneficial for governance and management of all types of water use.

Another important experience is the state Tax on the Circulation of Goods and Services (Imposto sobre Circulação de Mercadorias e Serviços or ICMS[31]), an environmental policy instrument created in various states in the 1990s. This mechanism gives funding to municipalities whose territories contain state conservation areas, and which are, therefore, not free to carry out economic development activities without rigid environmental restrictions. Compensation comes from a state ICMS fund and is distributed based on a weighting of the types of conservation units and their ecological and / or biological importance and the areas that they occupy. In many cases, municipalities have earned significant revenue from this instrument, which in turn has had a positive impact on the local economy.

To give an idea, in the state of Minas Gerais the state regulations governing the ecological ICMS Tax recognised the contribution of treatment and sanitary disposal of sewage to environmental conservation. Thus, some municipalities have received additional revenue, via the ecological ICMS Tax, through implementing wastewater treatment systems. The National Water Agency looks to adopt a similar procedure for allocation of resources generated through the water use fees: 'payment' for sewage treated. These are examples of how economic instruments; specifically those based on a protector-receiver principle (those who protect the environment receive the incentives) can offer opportunities to better environmental quality. Meanwhile, what is not publicly debated is how the ecological ICMS could be used for conservation activities in mineral water extraction areas.

In the meantime, although the new federal and state laws allow for the use of economic instruments for water management and conservation, the legislation is not applicable to mineral water, as mineral water is treated as a 'mineral' resource and not as a 'water' resource. Thus it is very unlikely that the charge for the use of water, based on law 9433, applies to the mineral or underground water extraction activities.

Mineral Water Resorts: economy and sustainability related to water exploitation.

Mineral Water Resorts, or treatment spas, are based on two concepts. In some countries, they are set up, according to Martins[32], as sanitary cities, treatment and rest spas that have specific regulations regarding dietary limitations, practices, physiotherapy treatments, etc., where, often, the mineral water is merely a supporting factor in the treatment. In other countries, the concept of 'Specialisation in Spring Water Resort' is adopted, which considers the mineral water as a principal therapeutic factor in the spa, and the other practices play a supporting role in curative practices[33].

[31] The constitution determines that 25% of the total revenue collected by the States is distributed to the municipalities according to various criteria. The state of Paraná was a pioneer in the introduction of environmental criteria for allocation of a percentage of the total allocation as an incentive to the creation of protected areas.
[32] Martins et al (2002)
[33] Roche (1975)

In Brazil, the concept of 'mineral water resorts' emerged from Decree-Law 7.841, dated August 8, 1945, especially in articles 19 through 22, but was firmly established by Federal law #2661, dated December 3, 1955. Under this legislation, areas where thermal spring water, mineral water, or simply mineral water springs, are located are 'recognised as such by state law that covers sources of thermal spring, mineral water, or natural water sources will be explored in accordance with this law and the federal decree #7841, of August 8 1945.' It is interesting to note that the third paragraph of the first article of this law already anticipates urban and land use planning: 'In any case, for the effects of this law, the establishment of mineral bath resorts, thermal water resorts, or hotels, sports areas, water parks, walking parks, and public parks will always considered an integral part of spring water sources, as set out in the master plan for improvements to the springs area.'

Concern for environmental preservation and protection of the mineral water catchment area was already evident at the time the law was created. This legislation called for Federal government support to Mineral water resorts, as set out in paragraph 4 of article 153 of the Federal Constitution of the Republic then in force, to be provided through agreements to be signed with the effected states and municipalities, with the following purposes:

For each of the mineral water resort areas, the development of a master plan for improvements, that should include

- Official plan;
- Determine boundaries of protection for mineral spring areas;
- Water supply network;
- Sanitary sewage and storm water runoff network;
- Comprehensive study of electric energy problem;
- Urban development plan;
- Highway planning for access to site and trails;
- Carry out a study of mineral water for medicinal applications and works for drawing and piping these waters;
- Determination of the areas that, acquired by the Federal government and incorporated into its heritage, should be reforested, in order to protect catchment areas and springs;
- Promote, through the National Department of Sanitation, the implementation of sanitation projects in the mineral water resort areas.

If these legal requirements are adequately followed, Spring Water Resorts would be a viable local arrangement in terms of the potential of mineral water use, stimulating the economy in general, as well as in particular economic sectors associated to extraction, bottling, or medicinal and recreational uses of mineral water, thermal spring water, etc. However, to achieve environmental and social sustainability, these productive arrangements will also require instruments and conditions for effective governance, which means public control and accountability over the implementation of government policies and programs, as well as market initiatives.

<u>Two examples: São Lourenço, Minas Gerais and São Lourenço da Serra, São Paulo</u>

This study highlights some of the challenges to promoting environmental and social sustainability. It also demonstrates how to take advantage of the potential of mineral water through the harmonious combination of economic instruments and systems under the government and the public's control. To this end, we have considered two cases: São Lourenço, Mineral water Resort in the state of Minas

Gerais (SL/MG), and the municipal region of São Lourenço da Serra, in the state of São Paulo (SLS/SP).

The first case, SL/MG, has for decades had its economy linked to the functioning of bathing resorts; from hotels and tourism services and other associated activities to the use of therapeutic contact with subterranean waters. Its one of the oldest mineral water resorts in the country. For many years mineral waters have been exploited as well, by a large company that was under Nestlé's control, which acted as a concessionaire and operator of exploration. The neighbouring municipalities were integrated in the Water Circuit of Minas Gerais, separate from Caxambu and São Tome das Letras as well, whose economy and local market is linked to the mineral water market (bottling, therapeutic use, etc.) as well as to tourism.

However, the apparent harmony between local development and the mineral water exploration was put to the test when, in the end of the 1990s the Water Company of São Lourenço (Empresa de Águas São Lourenço), later Nestlé Waters of Brazil, began to disregard legal regulations and conditions for exploration in the existing springs in the city park of São Lourenço. Springs and parks are operated by the company under certain licenses and concessions. Without the appropriate licenses, the company altered the chemical characteristics of the water from a particular spring in its industrial processing, seeking to market it as a special product (de-mineralised water with the brand *pure life*), in the face of growing competition in the sale of bottled mineral water. In addition, the company had disregarded the maximum water extraction limits. This situation demonstrated the lack of coordination and effective control of the government bodies at various levels (union and state) and in various departments (environment, sanitary safety, department of mineral products), as well as with the Brazilian judicial system. With public denunciations about the unregulated exploration of mineral water, a broad spectrum of civil society organisations mobilised, inciting the media and government and the Public Ministry to correct the problem. Supporters of the mineral water and tourism industries, on the other hand, sought to minimise the criticism and guarantee 'flexibility' in the processing and bottling of mineral water.

It became evident that, after the concession of licenses for extraction of mineral water, the public hadn't been given the sufficient information and instruments to guarantee control, environmental sustainability, or adherence to the sanitary norms or to consumer protection. The EASL was notified that it would have to stop production in the well where it had been producing the product *pure life*, and the product was taken off the market. Meanwhile, the well continued to be explored for carbonic anhydride, without indicating whether there had ever been a hydro-mineral study.

Under the agreement between the Public Ministry and Nestle Waters of Brazil, the company promised the following[34]:

1. Cease the industrial exploration of the Primavera Well, opened and operated illegally at least eight years prior, and from which more than one million litres of water was taken daily (the normal water withdrawal limits of the park are a few thousand litres per day);
2. Leave the well in operation, with a maximum water withdrawal limit of 9.600 litres per day, only for the park users;
3. Interrupt the removal of natural carbon dioxide from other waters to 'fortify' (original quotes) the gasification of the bottled water;

[34] www.circuitodasaguas.org/modules.php?name=News&file=article&sid=123

4. Replace exotic trees (pines) of a 26.000 m^2 area in the park, operated as compensation for damage to the natural vegetation, and donate the revenue from the sale of all firewood removed to five non-profit organisations.
5. Submit to any inspection authorised by the Public Ministry, with complete divulgence of information, such that 'whichever member of the public can, and every public servant ought to feel obliged to, communicate to the Public Ministry any deviations or failings [...]'.

The case of SL/MG revealed various factors which ought to be considered regarding the functioning of the mineral water exploration market and economy:

- Inadequate capacity for governmental control and inspection, worsened by the conflict of competencies and legal interpretations regarding who does what in water management;
- The importance of public mobilisation, directly related to the availability and means of access to information, instruments of public inquiry, monitoring, etc;
- The risks posed to some economic sub-sectors (e.g. tourism) linked to the exploration of mineral waters, by ineffective management. In these sectors, good management is the foundation for a sustainable economy.

The exposure in Brazilian and international media as well as the lack of greater clarity and mobilisation in overcoming these problems, requiring mobilisation of other social groups to put pressure on the company and on government has certainly discredited the economic and social contribution that can be made through the exploitation of mineral water, which is even greater in regions with tourism and recreation potential. The water parks of Caxambu, Lambari, Cambuquira and Araxá, as well as in Minas Gerais, recently competed for mineral water exploration contracts with private companies. Meanwhile, according to recent news, there are no candidates for this exploration, perhaps due to the companies' fear of residents' control of the community in the use of public environment for the private good. The parks in these four cities are considered Codemig property, the state governing body that carries out environmental management operations for COPASA, a company that operates in the area of sanitation, and in which the government has partial control.

The second region, including various municipalities near São Lourenço da Serra, in São Paulo, and very close to the capital of São Paulo, the marketplace of the largest metropolitan region in Brazil. This area shares a similar mineral water potential, and local governments and the state have promised to transform the area into the largest hub of industrial production of bottled mineral water. Nearly 100 processes of research and licensing for mineral water cultivation in the region have been submitted to the federal government. Part of the region is considered as protected water catchment area for the metropolitan region of São Paulo, and contains a forest cover of what little remains of the original Atlantic rainforest. Through the promotion of ecotourism, proposals have been discussed for viable local arrangements for the mineral water industry, for the transformation of the cities into Spring Water Resorts, and for use of water use fees for using the surface water in funding conservation and sustainable development projects.

Given the strategic location, near Brazil's largest consumer market and with nearly 20% of the renaming 7% of the Atlantic rainforest, the SLS/SP area is a good bet for industry and the services associated with exploration of mineral water. Whether or not this occurs depends, to a degree, on the lessons learnt in the case of SL/MG, which demonstrated the challenges and conflicts in existing institutional arrangements, be it in the application of economic instruments or in governance for sustainability and local development.

5.3 Implications and conditions of governance

Mineral water institutional and legal framework

Mineral waters[35] (both thermal spring waters and potable water) are not recognised as water resources according to the present legislation[36].They are, rather, considered mineral resources, under the exclusive management of the DNPM, the agency linked to the Ministry of Mines and Energy, which issues the licenses for extraction.

Consequently, in contrast with common underground waters which are under the dominion of the States and subject by decentralised and participatory regulatory instruments, as set out in Law 9433, dated January 8, 1997, mineral waters under the direct dominion of an agency of the federal government. Being considered a mineral, isolated from the hydrological cycle, mineral water aquifers can be exploited to exhaustion, with quantitative and qualitative changes, especially in terms of the physical and chemical composition that gives them medicinal properties that distinguish them from common underground waters.

Brazilian legislation incorporated the international principals of protection of natural resources, and took into account the characteristic of minerals as natural resource, in defining the subsoil as an environmental resource in Federal Law 6938/81 (National Environment Policy). The use of mineral resources, from the perspective of this Law, is based on rational use, *with the goal of their preservation and permanent availability*.

The Mining Code itself prohibited the 'excessive extraction' and destruction of the source, and set as a condition for issuing the license the presentation by the interested party of the plan for utilisation of the source, which must be rigorously respected, subject to imposition of sanctions on the mining company, which could result in the cancellation of the concession. The Code also contains definitions of mineral exploration and extraction, and while these activities are part of the concept of the mining industry, in the legal system in force they are to distinct and successive phases, in which the second only occurs after the successful conclusion of the first, with the approval of the report of the work carried out, which must demonstrate the technical and economic viability of the source, which when in production is defined as a mine.

The authorisation (specific to the exploration phase) precedes the concession (specific to the production phase). According to Freire[37], the use of the term *authorisation* to refer to the nature of the mining title authorised is not appropriate, because it generates confusion with the classic terminology of Administrative Law. In fact, according to Meirelles[38] *the classic authorisation is a unilateral, discretionary and provisional administrative act*, by which the government permits the proponent to carry out a certain activity, service or

[35] The Water Mineral Code (Decree-Law #7,841, of August 8 1945, modified by Law #6,726, of November 21, 1979) defines mineral waters as being "waters which come from natural springs or artificial capture, which possess a chemical composition, physical properties, or chemical-physical properties that are distinct from common water, with characteristics that give them a medicinal action." The medicinal activity, in turn, must be attested by the Permanent Commission of Crenology of the DNPM.

[36] Decree-Law 227, from February 28, 1967 (which revised Decree-Law 1985, from January 29, 1940 - the Mining Code), Decree 62934, from July 2, 1968, which approved the regulations for the Mining Code, and Decree Law 7841, from August 8, 1945 (Minerals Waters Code), recognised by the 1988 Federal Constitution.

[37] Freire (1996:78)

[38] Meirelles (1990)

utilisation of particular public or private goods, of their exclusive or predominated interest, which the law makes conditional on the prior acquiescence of the Regulator. With an authorisation, the government decides on its own discretion about the appropriateness or not of granting the intention of the proponent or of cessation of the act authorised. There is no subjective right to the issuance or continuity of the authorisation, and the Regulatory can deny it at will, and can withdraw a license at any moment, with no compensation whatsoever. On the other hand, the concession of the right to mineral production is a binding administrative act, for which there is no discretion.

With the priority established by the precedence of the application protocol, without rejection of the plan, the mining company acquires the right to receive the mining title, given compliance with the legal provisions. A set of successive administrative acts is created, interrelated and interdependent, with a single purpose, *which is to enable the transformation of the inert mineral deposit into wealth*, bringing to society all the resulting benefits. There is no margin for choice for DNPM, whose role is restricted to the strict compliance with the Mining Code.

The license for production expresses the consent of the Government for a private party to exploit its mineral resources, with an economic value proportional to that of the source, since the concession enables the exploitation of the mineral by the concession-holder, *until the mine is exhausted, and is alienable and transferable to other parties that meet the legal and regulatory requirements of mining* (article 55 of the Mining Code).

According to Freire[39], it is treated as 'a negotiable legal good, like any other, subject only to the mining legislation of the Country. Its economic value is part of the assets of the private party and is negotiable like the other private goods. That's why any time the Government removes or restricts the concession, outside the cases of forfeiture called for in the Mining Code; it is obliged to compensate the concession-holder'.

It can thus be concluded that in terms of mineral waters, the Code of Mines and the Code of Mineral Waters lead to a 'privatisation' of a water resources, which should be considered at minimum a public good, if not a diffuse good.

Another issue of concern is in the definition of potable table waters. Chapter 18 of Agenda 21, and all the more recent Brazilian legislation, give primary importance to the use of water resources for supplying drinking water to the population. Thus, because it is a resource conceded to private parties for commercial use, its overexploitation could cause an imbalance in the availability of water for public supply to the population, thus undermining what is established in this principle. Therefore, we understand it to be important to disassociate the management of potable table water from mineral water, here understood in its broadest sense.

<u>The management of underground water resources and the adoption of new perimeters of protection for sources of mineral waters</u>

According to Hirata[40], the difficulties of trying to implement policies for protection of underground waters include questions about the characteristics of underground water resources, because of the lack of precision in the estimates of both recharge and storage capacity of the aquifer; uncertainties about the scale of risk of contamination and the inherent characteristics of transport of contaminants; and the high number of urban and rural water supply systems that are normally

[39] Freire (1999:101)
[40] Hirata et al (1997)

more vulnerable, along with the legal problems related to the exploitation of underground waters, or with existing sources of pollution, prior to the introduction of a new policy for protection of the aquifer, which thus constitutes a liability.

The policy of protection of aquifers should consider aspects of management of quality and quantity, which cannot and should not be separated. A programme of comprehensive assessment and administration of underground water resources should be begun with a survey of aquifers, through the registration of wells in operation or deactivated, by regional and local hydro-geological maps, by the definition of the regional flow regime and by the preliminary assessment of underground water resources.

DNPM Administrative Decree Portaria 231[41] establishes that the holders of an exploration license for water classified as natural mineral or potable table water must present the 'area of protection' of their source, including in the Final Report of Exploration Work.

This is a valid attempt to expand the original perimeters of protection, equivalent to the active polygonals of the 'Mine Manifests', limited to not more than 50 hectares, the maximum area conceded by the Ministry of Mines and Energy to the concession-holder of exploitation of mineral waters, and generally insufficient to allow the adoption of measures to control the use and occupation of land around the springs and wells, especially in older mineral water baths and resorts.

For the effects of this Portaria, the areas or perimeters of protection of mineral or potable table waters, extracted through wells or natural springs, are aimed at the protection of quality of waters and have the objective of establishing the limits within which there should be restrictions on occupation and specific uses that could compromise their utilisation.

For the definition of the protection perimeters, Portaria 231 established three different zones, according to its water-related characteristics:

- The *zone of influence* (ZI) is that associated with the cone of depression (lowering of the piezometric surface) of a well for pumping or of a natural spring, considered here as a site where the water table or piezometric surface reaches the soil surface, equivalent to a drain.
- The *zone of contribution* (ZC) is the recharge area associated with the point of extraction (spring or well), delimited by the flow lines that converge at this point.
- The *zone of transport* (ZT), or of extraction, is that between the recharge area and the point of extraction. It is this zone that determines the time it takes for a contaminant to be transported from the recharge area to the point of extraction. In general, this time depends on the distance of underground flow, the hydraulic characteristics of the aquifer, and the hydraulic gradients.

The zone of influence (ZI) associated with the immediate perimeter of the well or spring, defines an area where only activities inherent to the well or springs will be permitted, and also delimits a perimeter of microbiological protection. Its dimensions are established as a function of the hydro-geological characteristics and the degree of vulnerability or risk of contamination in the short term. In this zone, no buildings will be allowed, and there will be severe restrictions on agricultural activity and other uses considered potentially polluting.

[41] Portaria 231, dated July 31, 1998, pursuant to the provisions of Article 12 of Decree-Law 7841/45,

The zones of contribution and transport (ZC and ZT) are established to ensure protection from more persistent contaminants, such as industrial chemical products and other toxic substances, for example. Its size and characteristics will be based principally on the activities, levels and intensity of the land occupation and use, taking into account as well the estimates of transit time.

Challenges for the integration of mining concession procedures, approval of water resources and environmental licensing.

In terms of how to integrate management procedures, a key development is the work being carried out by the Mineral Waters Working Group of the National Water Resources Council (Conselho Nacional de Recursos Hídricos or CNRH), made up of members of the Underground Waters Technical Committee (Câmara Técnica de Águas Subterrâneas or CTAS) and the Technical Committee on Integration of Procedures, Licensing Activities and Regulatory Activities (Câmara Técnica de Integração de Procedimentos, Ações de Outorga e Ações Reguladoras CTPOAR).

The draft Resolution of the CNRH, discussed on August 21, 2003, in a meeting of the Working Group in the city of São Lourenço, Minas Gerais, the site of one of the most well-known conflicts over the use of mineral waters in Brazil[42], proposed the adoption of guidelines for integration for the licensing of the right to use underground water resources, with use of mineral waters and potable table waters, or destined for bathing spas.

The National Water Resources Council has the powers, granted by Law 9433, dated January 8, 1997, and by Federal Decree 4613, dated March 11, 2003, to establish complementary guidelines for the implementation of the National Water Resources Policy (Política Nacional de Recursos Hídricos or PNRH), application of its instruments and the activities of the National Water Resources Management System (Sistema Nacional de Gerenciamento de Recursos Hídricos or SINGREH). It also has the power to establish general criteria for licensing the right to use water resources, as provided for in Article 35 (X) of Law 9433, dated January 8, 2000.

Furthermore, the integrated management of mineral waters by the SINGREH, through standards created by the CNRH, is supported by CNRH Resolution 15, dated January 11, 2001, which establishes general guidelines for the management of underground waters; by CHRH Resolution 16, dated May 8, 2—1, which establishes general criteria for licensing the right to use water resources; and by CNRH Resolution 22, dated May 24, 2002, which establishes guidelines for including underground waters in the 'Water Resources Plan'.

At the same time, the Working Group on Mineral Waters recognised that mineral resources are public goods under the dominion of the State, according to Article 20 of the Federal Constitution, and their utilisation is governed by specific legislation. However, it recognised also that according to Art. 176 of the Federal Constitution, exploration and extraction of mineral resources must only be authorised or conceded in the national interest.

The draft of the Resolution presented then, and still not approved, introduced into the field of management of water resources two concepts that until then did not exist:

[42] www.circuitodasaguas.org

- *Licensing Right of Use*: an administrative act through which the issuing authority gives the authorised party the right to use the water resources, for a set period of time, under the terms and conditions expressed in the license, pursuant to the specific legislation. It is a rescindable act, and the license can be suspended in cases of need to meet the priority uses, of collective interest, for which there are no other alternative sources, or in the case of preventing or reverting grave environmental degradation.
- *Prior Manifestation*: an administrative act issued by the competent licensing authority, equivalent to the *preventative license* (as set out in Article 6 of Law 9984, dated July 17, 2000) aimed at reserving a flow that can be licensed, enabling investors to plan the undertaking that require these resources.

The prior manifestation and the technical opinion of the regulatory agency of the water resource will be considered in the analysis and approval of the Final Research Report by the DNPM.

Despite the valid attempt to prepare a Resolution about the adoption of integrated management, it is useful to recognise the problem represented by the conflict of jurisdiction and by the hierarchy of the laws, which could result if a holder of a concession of the right to extraction were to contest the Resolution in question, in light of the Decree-Law 7841/45, which is hierarchically superior, not to mention the Constitution itself.

There have been sufficient legal interpretations holding that decisions of the DNPM or the administrative body cannot override existing laws or creating new jurisprudence. Thus according to the constitution, we know that the national environmental legislation[43] and water legislation[44] should be applied to mineral water and underground water management. To this end, we understand that it is necessary to overcome resistance of those defending the *status quo* of mineral water management.

5.3 Conclusions and recommendations

Because of the current regulatory framework for mineral waters, there are frequent conflicts over use and jurisdiction, because depending on the intended use, mineral waters can be regulated by different agencies. If used for common purposes, such as drinking water supply or irrigation, mineral waters are regulated under the State Water Resources Systems. If destined for bottling or for bathing in resorts, on the other hand, they fall under the DNPM.

The need for integrated management of mineral waters emerges from the application of the National Water Resources Policy. Due the lack of knowledge in Brazil of the hydrogeology of underground waters in general, and of mineral waters in particular, along with the lack of legislative and institutional coordination between regulatory agencies in the federal, state and municipal spheres, the control of use and quality of underground waters is unsatisfactory.

Mining is widely recognised as an economically and socially important activity to Brazil. Mineral resources, however, are natural resources, and thus part of the environmental heritage. They therefore should be the focus of protection to the same degree as other environmental resources such as water, air, soil and vegetation.

[43] Law 6938 and its amendments
[44] Law 9433

There are gaps in the existing legislation and regulations, which must be changed to enable the integrated management of underground water resources, especially mineral waters.

According to Boson[45], if current system is maintained, 'mineral waters will not be considered to be a finite good with economic value, and thus not subject to the regulatory instruments of water resources: licensing for the right to exploitation and charges for use of water'.

Challenges for governance over ownership and management of mineral waters

Although they are water resources, Brazilian mineral waters were not covered by the Waters Code from 1934, but specifically by the Minerals Waters Code[46] and by the Mining Code[47].

The commercial utilisation of sources of mineral or table water is regulated by the above Codes. Exploration is authorised by a license issued by the DNPM, and the concession for extraction is authorised by the State Ministry of Mines and Energy. Regulation of all aspects of exploration and production of mineral waters is the jurisdiction of the DNPM, according to Art. 23 of the Mineral Waters Code and Art. 3 of Law 8876, dated May 2, 1994, which addresses the DNPM.

In recognizing the legislation covering mineral waters, the 1988 Federal constitution confirmed the jurisdiction of the Federal Government over them[48], while the other categories of waters, underground or not, except those resulting from Federal Government projects, were considered as goods belonging to the States, as set out in Article 26(I) of the Federal Constitution. For this reason, mineral waters continue to be administered by the Ministry of Mines and Energy and by DNPM, thus escaping the system of decentralised, participatory and sustainable management called for in the National Water Resources Policy.

With the passage of Federal Law 9433, dated January 8, 1997, a new paradigm for management of water resources in Brazil was established. This Law made clear, among other things, that the use of underground water is also subject to a regime of licensing, and identified the need for complementary legislation, especially at the state level.

The institution of state laws for water resources established new rules for the use of underground waters, requiring their rational and sustainable use, with the goal of maintaining the quality and quantity of waters to supply the needs of future generations.

In the State of Minas Gerais, for example, Law 13771, dated December 11, 2000, which addressed the protection, conservation and administration of underground waters under jurisdiction of the State, made clear that mineral waters are under the jurisdiction of the Federal Government, as set out in Article 1(2):
'When underground waters, because of their physical and chemical qualities and oligomineral properties, lend themselves to exploitation for commercial or therapeutic purposes and can be classified as mineral waters, their use will be regulated both by federal legislation and by state legislation related to public health, *as well as by the specific provisions of this Law'* (Minas Gerais, 2000).

[45] Boson (2002:42)
[46] Decree-Law 7841, dated August 8, 1945, under the Federal Constitution of 1937
[47] Decree-Law 227, dated February 27, 1967, passed under the Federal Constitution of 1967
[48] Article 20(IX) and Article 176

In other words, this means that underground waters for which concessions have been awarded for extraction for economic utilisation, such as mineral water (or potable table water), through bottling for use and consumption in mineral water spas, continue under the regulation of the Minister of Mines and Energy, through DNPM. However, beyond this legal condition, when not classified as mineral water, they are regulated by the state water resources agency.

Furthermore, because of their status as underground water resources, the use of mineral waters is subject to legal principles superior to the legislation governing them, because of the priorities of use in conditions of scarcity.

The current model, in which mineral waters fall under the legal regime of mineral resources, proves to be wanting in terms of their protection, and *could result in disruption of the unity of the hydrological cycle* of the region where they are exploited, as dramatically demonstrated recently in the municipality of São Lourenço, Minas Gerais.

Recommendations

It is necessary, therefore, to change Brazilian legislation so that mineral water is treated as a water resource and subject to the legal framework of Law 9433, dated January 8, 1997, which calls for decentralised management, with the participation of civil society and users, along with government, through watershed committees and state water resource councils.

Until this occurs, the Federal governments, states and municipalities, through their various regulatory agencies, including the National Health Surveillance Agency (Agência Nacional de Vigilância Sanitária or ANVISA) and the Ministry of Health, must pursue effective coordination with the DNPM, in order to contribute to the regulation and monitoring of mineral waters, as well as establish mechanisms to ensure that these activities are carried in conformity with water resources and environmental legislation.

In the area of reinforcing governance, it is important to strengthen the technical, operational, and financial capacity of civil society organisations to carry out activities such as monitoring the licensing systems, and management and monitoring of mineral water exploitation. It is also necessary to strengthen their capacity for participation in decision-making bodies, such as watershed committees, municipal councils, and local production arrangements. It would also be very beneficial if civil society organisations were able to monitor the use of financial resources, like the CFEM and water use fees.

For Vitae Civilis, 'the command and control side of these mechanisms, which are as much for administrative control as they are for technical management (land use planning, regulation, and licensing of land use, etc), implemented by the states, have as well a variety of economic instruments, that either reinforce and make the first two viable, or permit the market to 'control' the goods and services associated with public resources. From the point of view of citizens, and their quality of life and integrity of their environment, both command and control mechanisms and economic instruments require attention to the fundamental conditions that are necessary in achieving objectives of a democratic society in the search for social justice and sustainability'.

In a previous study[49], we stated that 'the application of water management instruments (as well as environmental) with economic dimensions may be useful

[49] Vitae Civilis (2004)

in promoting socially and environmentally sustainable development. These instruments include economic and fiscal instruments such as taxes and tariffs for water use, compensation for conservation and restoration of environmental services, including as well market instruments These range from advising consumers about the environmental quality associated with the product and its production (the various forms of certification and labelling) to the formation of markets and private actions for the sale of services related to the right of access to water, as long as they are subject to verification and control.

Furthermore, there is insufficient knowledge of the dynamics of mineral water aquifers in Brazil. In order to meet environmental sustainability conditions in mineral water exploitation, based on technical and scientific knowledge, we recommend, therefore, that complementary and more in-depth activities and studies be carried out to bring hydro-geologic models closer to reality:

- Permanent registration of water springs related to mineral water aquifers, of great importance to obtaining data on the lithological characteristics, hydrodynamic parameters, static and dynamic levels, productivity of aquifers, relations with faults and the chemical qualities of waters.
- Geophysical studies necessary to the delimitation of Cenozoic sediments related to the occurrence of mineral waters, through shallow seismic refraction and electro-resistivity methods.
- Drilling and percussion probes to characterise the lithostratigraphy of alluvial sediments of the water body, and upstream from it, to support the calibration of geophysical methods to be applied; the probe wells can serve as piezometric wells for physical, chemical and bacteriological sampling.
- Chemical profiles in deactivated tubular wells, non-installed and in the probe wells, that are coated and which present entrances for waters at specific levels.
- Control of pollution sources, with identification and registration of slaughterhouses, gas stations, sewage systems, garages, agricultural activities, cemeteries and landfill sites.
- Dating of mineral waters, to establish transit times and the possible routes of percolation of the recharge waters.
- Determination of reserves of mineral waters, through the planned pumping tests, where the hydrodynamic parameters (transmissibility and permeability) will be defined for calculation of the volume of water available, establishing a rational regime for exploitation of aquifers in which *the volume exploited will correspond, in an ideal situation, to the recharge volume, and no longer to the volume of the reserve*.
- Chemical, physical-chemical and microbiological monitoring of the waters, in accordance with the regulations of the Ministry of Health and ANVISA on mineral waters and potable table waters, at least four times per year.
- Preparation of legislation to regulate the use of underground waters in the proximity of bathing spas and thermal and mineral water resorts, avoiding the overexploitation of aquifers and including the proper treatment of deactivated wells, which should be required to be cemented over to avoid the intentional or accidental introduction of contaminants into aquifers.
- Development of adequate master plans for urban development, with legislation for zoning, land use and occupation compatible with the maps of vulnerability of mineral water aquifers, and defining, restoring and protecting the area of recharge, and expanding the areas of protection of the sources such that they coincide with the boundaries between watersheds.

- Adoption by the DNPM, water resource and environmental agencies of the Precautionary Principal (Rio Declaration, principal # 15), based on the assumption that it is difficult or impossible to repair environmental damage.
- Prioritisation of the therapeutic use of mineral waters as a Public Health policy, encouraging research related to recovery and development of knowledge of hydrotherapy and on-site consumption.

5.4 More information

Websites

- www.dnpm.gov.br
- www.cnrh-srh.gov.br
- www.circuitodasaguas.org

References and bibliography

- Andrade Júnior, J.F. *"Águas minerais brasileiras"* Miner. Metal., 2 (9). Rio de Janeiro, Brasil.
- Boson, P.H.G. (2002) *"Quem é o responsável pela gestão das águas minerais?"* Seminário Águas de Minas II, Assembléia Legislativa do Estado de Minas Gerais. Revista do Legislativo nº 34. Assembléia Legislativa do Estado de Minas Gerais, Belo Horizonte, MG, Brasil.
- Brasil (1998) "*Constituição da República Federativa do Brasil*". IMES P, São Paulo, Brasil.
- Brasil (1945) "*Decreto Lei nº 7841, de 8 de agosto de 1945*". Código de Águas Minerais".
- Brasil (1955) "Lei nº 2661, de 3 de dezembro de 1955". Regulamentação do § 4º do artigo 153 da Constituição Federal e dá outras providências. Diário Oficial da República Federativa do Brasil, Rio de Janeiro, Brasil.
- Carneiro, R. (2001) "*Direito ambiental: uma abordagem econômica"*. Forense, Rio deJaneiro, Brasil.
- Feitosa, F.A.C e J. Manoel Filho (1997) "*Hidrogeologia: conceitos e aplicações".* CPRM, LABHID-UFPE, Fortaleza, Brasil.
- Freire, W. (1996) "*Comentários ao Código de Mineração*". Aide, Rio de Janeiro, Brasil.
- Guedes Neto R., B.M. Aquino e M.A.O. Campos (2003) *"Gestão integrada: uma proposta para a exploração sus tentável das águas minerais"* Monografia de conclusão do Curso de Especialização em Gestão Ambiental NISAM - Faculdade de Saúde Pública da USP, São Paulo, Brasil.
- Hirata R.C.A., C.R.A. Bastos e G.A. Rocha (1997) *'Mapeamento da vulnerabilidade e risco de poluição das águas subterrâneas no Estado de São Paulo".* Instituto Geológico CET ESB, São Paulo, Brasil.
- Tanno, Luiz Carlos e Ayrton Sintoni (2003) "*Mineração & município: bases para o planejamento e gestão dos recursos minerais*". Instituto de Pesquisas Tecnológicas, São Paulo, Brasil.
- Iritani, M.A., S. Hassuda, G.H. Oda, L.M.R. Ferreira, S. Yoshinaga, G.M. Garda, A.M.S. Maximiano et al. (1996) *"Estâncias hidrominerais: identificação dos problemas hidrogeológico".* IX Congresso Brasileiro de Águas Subterrâneas, Salvador BA, Brasil.
- www.igeologico.sp.gov.br/prod_1996_2.asp [2003 jul 11].
- Lopes. R.S. (1956) *"Águas minerais do Brasil: composição, valor e indicações terapêuticas"*. Publicação da Comissão Permanente de Crenologia do DNPM, Rio de Janeiro, Brasil.
- Meirelles, H.L. (1990) "*Direito administrativo brasileiro*". Revista dos Tribunais, São Paulo, Brasil.
- Milaré E. (2000) *"Direito do Ambiente".* Revista dos Tribunais,São Paulo, Brasil.
- Minas Gerais (1999) *"Lei nº 13199, de 29 de janeiro de 1999".* Política Estadual de Recursos Hídricos e dá outras providências - Minas Gerais Diário do Executivo, Belo Horizonte, Brasil.
- Minas Gerais (2000) *"Lei nº 13771, de 11 de dezembro de 2000". A*dministração, a proteção e a conservação das águas subterrâneas de domínio do Estado e dá outras providências - Minas Gerais Diário do Executivo, Belo Horizonte, Brasil.
- Mukai, T. (2001) *"Atuação administrativa e legislativa dos poderes públicos em matéria ambiental (DOUTRINA)".* Rev de Direito Administrativo.
- www.editorarenovar.com.br/rda/geral/ger-223/g-t-223.htm [2003 nov 21].
- Rebouças, A.C., B. Braga e J.G. Tundisi (1999) *"Águas doces no Brasil: capital ecológico, uso e conservação".* Escrituras Editora, São Paulo, Brasil
- Reis, M.J.L. (1995) *"ISO 14000: gerenciamento ambiental: um novo desafio para a sua competitividade".* Qualitymark Ed, Rio de Janeiro, Brasil.
- Souza, M.G.) 1995) *"Direito minerário e meio ambiente".* Del Rey; Belo Horizonte, Brasil

6. Water privatisation in Bangladesh

ATM Zakir Hossain; Jagrata Juba Shangha - Bangladesh

6.1 Introduction

The Bangladesh government started its first intervention in water supply and sanitation 62 years ago in the rural areas. Before that time, rural people depended on surface water (ponds, rivers, canals) for their daily use. In 1972, the Department of Public Health Engineering (DPHE) of Bangladesh started with support of UNICEF to install shallow tube wells together with hand pumps in the rural areas to reduce water-borne diseases like cholera and diarrhoea. This created an increased pressure on the groundwater sources. Up to 1976, the hand pump and tube well were provided free of charge by the government. Installation, operation and maintenance of the hand pumps and the tube wells were conducted by DPHE. From 1976, users had to pay for the installation of the tube wells. Rural communities were responsible for the operation and maintenance of the hand pump and tube wells.

The responsibility for installation, operation and maintenance of urban water supply[50] was initially with DPHE; however, it is shared now with the Pourasabha, the administrative body of local, decentralised government. The government is encouraging and supporting the involvement of other partners, such as Non-Governmental Organisations (NGOs); market-oriented business organisations and private organisations in water and sanitation development[51].

National Water Policy

In 1999, the Government of Bangladesh has adopted the *National Water Policy* that is creating scope for water privatisation. It clearly states that the Government may confer water rights to *private and community bodies* in order to attract private investment. The provision made in this policy, is that the ownership rights are secure, defensible and enforceable. However, *'defensible and enforceable'* are not defined. The Water Policy explicitly states:

> *'Public water schemes, except for municipal schemes, with command areas of over 5.000 ha will be gradually placed under private management, through leasing, concession, or management contracts under open competitive bidding procedures, or jointly managed by the project implementing agency along with local government and community organisations'.*

The policy also supports private development of groundwater irrigation for agricultural growth. There is no clarification about *private development;* it is related to development of innovative approaches, which can be privately owned and leased to others.

The National Water Policy does not address the use of water for domestic purposes. The issue of domestic water has been dealt with in the *National Policy for Safe Water Supply and Sanitation* that was adopted in 1998.

[50] Except in the regions Dhaka, Narayangonj, Chittagong.
[51] National Policy for Safe Water Supply and Sanitation 1998, Bangladesh.

World Bank & Asian Development Bank

Water markets in Bangladesh are increasing day-by-day, due to the conditional loans from World Bank and Asian Development Bank (ADB), which are putting pressure on countries in the South, as on Bangladesh, for liberalisation of the services sector. The World Bank argues that the governments of countries in the South are too poor and too indebted to subsidise water and sanitation services.

The World Bank has included water privatisation in the Country Assistance Strategy (CAS) of Bangladesh as one of the conditions for the admission to loans. This includes that the poor have pay for water services. The World Bank's structural adjustment loans and its water and sanitation loans include '*economic pricing'*.

The World Bank has suggested a 'Water Resources Assistance Strategy' to the government of Bangladesh, which outlines the linkages between the different water sub-sectors and proposes medium to long-term priorities. Water sub-sectors include:

- Development and management of infrastructure for irrigation;
- Flood management and droughts;
- Water quality and;
- Water protection from pollutions.

Within each sub-sector, the World Bank advises to focus on:

- Institutional frameworks, including roles and responsibilities of government and other agents in the system;
- Management instruments, including tools to ensure effective participation of stakeholders and ways to increase accountability and;
- The political economy of water management and reform, including incentives and policy reforms to encourage sustainable use of resources.

There is not much difference between the ADB and the World Bank policy on water. According to the ADB's Country Strategy, water for agriculture in Bangladesh is one of the priorities that need strong private participation.

In addition to the private involvement in drinking water, the irrigation equipment sector, which used to be the working area of the government, is now open for private companies. As a result, foreign companies are big players in market.

At present the following water markets are present in Bangladesh:

- Markets for groundwater;
- Markets for surface water;
- Trade in bottled water.

Markets for groundwater: drinking water in slums

In 1992, drinking water privatisation has started in the capital of Bangladesh Dhaka. The Dhaka City Water & Sewerage Authority (WASA) is responsible for the drinking water supply system. It is supplying water to people with official residence in Dhaka only. People without official residence who are living in the slums don't have rights to drinking and sanitation water supplied by WASA. Dushtha Shasthya Kendra (DSK), a Bangladesh NGO, started negotiations with Dhaka WASA management and formed a partnership in 1992 about the provision of water in two slums, resulting in the construction of two water points in these slums. Cost recovery through a cost sharing procedure is met by the beneficiaries. The beneficiaries are financially contributing based on economic status. They have to repay the construction costs within 2 years and have to pay

a water fee to WASA. A serious problem of this project is that there are many extremely poor people in these slums who remain outside the water supply system of DSK, since they have no ability at all to financially contribute to the cost recovery of the project.

Another project from this partnership is the selling of water through mobile vans. DSK buys water from WASA and brings the water to the areas without drinking water points and sells it to the beneficiaries. WASA supplied water users, who live in the official residential areas, pay BDT 4,75 per 1000 litre, whereas the water from the DSK van system costs BDT 125 per 1000 litre[52]. This means that very poor people have to pay 25 times more for their water.

Now 47 other NGOs, under the umbrella organisation known as Coalition for the Urban Poor (CUP), have decided to follow the approach of DSK in helping the poor getting access to safe water. Water Aid Bangladesh, Water Partner International and World Bank have contracted these NGOs as partners in replicating the DSK model. There are concerns that the poorest people cannot even pay the price set by the NGOs.

Markets for groundwater: mini pumps for irrigation

Small-scale irrigation started in Bangladesh in 1962 by the East Pakistan Agricultural Development Corporation, which became after independence the Bangladesh Agricultural Development Corporation (BADC). Private (thus not collective) small-scale irrigation and encouragement of the private commercial sector for irrigation equipment gradually have came up since the governmental restriction on import of small diesel engines was removed in the late 1980s. In the 1980s and 1990s, BADC installed deep tube wells and pumps and leased these to farmers' cooperatives at the rate of BDT 5.000/ year. The cooperatives were responsible for the costs of power and maintenance. BADC also sold deep tube wells and pumps at subsidised cost of BDT 168.500. In 1992, the BADC subsidy on deep tube wells was abandoned, due to the Structural Adjustment Programme that was advised by the World Bank and absent unity among farmers. This opened the market for private investors in (the construction) of tube wells and irrigation equipment.

As a result there are a number of private (individual and/or collective) investors active in the irrigation sector. These investors are selling irrigation water to (poor) farmers for high prices. In Joypurhat district, small scale irrigation privatised by the owners of mini pumps and shallow tube wells[53]. Among different parts of Joypurhat (Sadar upazila, Kalai upazila, and Akkelpur upazila[54]), poor and marginalised farmers (who don't own a mini pump) have to pay a fee of BDT 2.000/acre (BDT 2.471 for 0,5 hectare) for irrigation water from these mini pumps. Many farmers pay irrigation water fee after the harvest of their crops. According to the agriculture extension officer of Joypurhat, farmers usually get less profit or no profit at all due to high price of the irrigation water[55].

[52] Water and Rights, Bi-monthly Newsletter (September - October 2004) of Chittagong Nagorik Uddogh, Bangladesh
[53] The Daily Protham Alo (A national newspaper), 12 Nov 2005
[54] Upazila is the 2nd layer of local government in Bangladesh. There are four layers of local government (from bottom to top) village, union, upazila and zilla. An upazila consists of more than one union.
[55] Boro rice is one of the major crops in which most farmers are involved and has high irrigation demands. Farmers, who do not own a private pump, have to pay around BDT 2.000 - 2.200 per acre

Privatisation of irrigation water is happening in most of the rural areas. Poor farmers have no other alternative than to buy water from private investors.

Markets for surface water: fishing areas in wetlands and rivers

More and more fishing areas, especially in beels (wetlands) in Bangladesh are privatised during the last decade. Wetlands are leased through a bidding process. The bidding winners are often influential and wealthy. This process deprives the community and the local people of the common use of these wetlands.

In Khulna district, the Mayur River, a branch of Kajibacha River, is now a privatised fishing area. 350 Households of fishermen/women are directly dependent on this river for their livelihoods. Because local government has leased the river to a local rich man for commercial fish cultivation, these fishermen/women have lost their rights to access the river. At present, some NGOs in the Alliance of Food Sovereignty Campaigns (AFSC) are working with this community to regain their fishing rights.

Trade in bottled water: drinking water in bottles

In the 1980s, trade in bottled water started in Bangladesh and has been increasing since then. There are more than 58 types of bottled water companies active in Bangladesh[56]. Although Bangladesh Standard Testing Institute (BSTI) has fixed standards for bottled drinking water and bottled natural water, there is still confusion regarding the quality of the water. Around 99% of the water in bottles is collected from tube wells. People have to pay BDT 20-25/litre bottle water[57]. The demand for bottled water is increasing due to high level of arsenic contamination and the increasing salinity of the water in the South Western region of Bangladesh. People have to buy it as alternative of drinking water. Another incentive for bottled water is that an increasing number of people are travelling through Bangladesh.
Although national and local vendors are providing the bottled water in the local markets, international players are involved in bottled water through local distributors.

6.2 Implications

The actual control over and access to water is gradually going under private ownership in Bangladesh. It is a great risk for poor and marginalised people in the short run and for all people in the long run. According to Bangladesh law, the owner of land is also the owner of the groundwater under that land. However, water aquifers are not to be divided or bordered as land. Extraction of water from any specific point is actually taking out water from the whole aquifer. Sustainability is for most private commercial companies of minor importance to profit. Consequently, private commercial companies are extracting as much water as possible. When

(BDT 2.471 – 2718 for 0.5 hectare) for their irrigation water. If they get good harvest, their return is about BDT 2.500 per acre (BDT 3089 for 0.5 hectare). The water price is thus not in proportion with the returns and as a result their income is not enough to sustain their livelihoods and poverty remains.

[56] Water and Rights, Bi-monthly Newsletter (September - October 2004) of Chittagong Nagorik Uddogh, Bangladesh

[57] Interestingly, people can buy 1 litre milk in same value!

government control on the extraction is lacking, which is case in Bangladesh, and people can gain good profits from the extraction of groundwater, an unsustainable situation occurs. Water scarcity and availability become of growing concern throughout Bangladesh.

Arsenic contamination of the aquifers

The groundwater resource of Bangladesh is identified by three aquifers:

- Upper aquifer or composite aquifer (at 5 m. depth in North-West until 80 m. depth in the South);
- Main aquifer (at 6 m. depth in North-West until 83 m. in the South);
- Deep aquifer (up to 130 m. depth).

Over-extraction of groundwater from the upper and main aquifer through mini pumps and shallow tube wells, is pulling arsenic that is stored in very high volumes in the Bangladesh' soil into the water. Arsenic contamination is mainly found in the upper and main aquifer, however, the deep aquifer is possibly contaminated as well, because there are areas where it is connected with the main aquifer.

High levels of arsenic in drinking water can cause serious human health problems if imbibed for a long time (from 5 to 15 years) including:

- Skin ailments;
- Damage to internal organs;
- Skin and lung cancer and;
- Death.

Recent studies on arsenic in water, carried out by the research organisation Bangladesh Centre for Development Studies, reveal that among 2.000 of the 30.000 tube wells studied exceeded the national standard of 0,05 mg arsenic per litre for drinking purposes[58].

The most seriously affected district is Chandpur. The problem is acute in the regions where deep tube wells abstract groundwater from 10 to 100.m. depth from the main and deep aquifer. To a lesser extent, some parts of the Northeast region and along the river Ganges are affected. It is estimated that more than 20 million people consume water that exceeds the national standard for arsenic levels. Some deaths and thousands of cases of arsenic poisoning have been recorded among local people.[59]

In agriculture and food processing, there are also serious implications from the transfer of arsenic into food crops that are under irrigation with arsenic-contaminated water. The food crops that are most likely to absorb arsenic from irrigation water are leafy vegetables, coconuts and melons.
There is little evidence of arsenic contamination in rice grains through irrigation. However, boiling rice in arsenic-contaminated water causes serious problems.

Private investors see a good market in selling irrigation water which results in high levels of water extraction and increased arsenic volumes in the water.

[58] Note that the WHO guideline is 5 times lower than the Bangladesh standard, namely 0,01 mg/l
[59] Clinical studies are being carried out by the Dhaka Community Hospital.

Desiccation

In 1975, the Farakka barrage was built in the Indian part of the Ganges, this resulted in a reduction of the water flow in the Ganges. Water distribution between Bangladesh and India is highly influenced by regional and internal politics. After the 32nd meeting of the Indo Bangladesh Joint Rivers Commission[60] in Dhaka, the Indian honourable minister of state for water resources Mr. Sis Ram Ola acknowledged that during the period from January until May 1997, Bangladesh did not get its agreed share of water[61].

Due to extensive use of surface water by India, the Northern region of Bangladesh is suffering from desiccation and people are forced to use the deep aquifer for irrigation and drinking water. Consequently, the Farakka barrage did not only lower the water levels of the Ganges, but also contributed to the reduction of groundwater tables. These changes in of surface water and groundwater have also big impacts on the biodiversity and ecosystem of the region.

Bangladesh, land of rivers

Bangladesh is a land of rivers; some 250 large and medium rivers criss-cross the country. 57 Of these large and medium rivers have their origin outside the country, 54 in India and 3 in Myanmar. Most of the rivers of the country are, in fact, the tributaries or distributaries of the Ganges River originating in India. Over the last 20 years the groundwater levels of the Ganges, Mahananda and Garai-Madhumati, have gone down by 2 to 10 feet (approx. 0,61 – 3,05 meter).

Some figures about the Farakka barrage in the Indian part of the Ganges:

- The average minimum flow of the Ganges during the dry months before Farakka was built was 69.700 cusecs (1.974 m^3/s).
- In 1976, when the barrage started to function, the flow came down to 24.500 cusecs (694 m^3/s).
- Between 1977 and 1988 the flow was regulated by agreements between India and Bangladesh. In the period 1989 - 1992, the discharge was released the Indian authorities varied between 14.756 -22.259 cusecs (418 – 630 m^3/s)
- In 1993, the flow fell down to 10.000 cusecs. (283 m^3/s).

Source: Professor Mohammad Muniruzzaman Miah (2003) "*Hydro-politics of the Farakka barrage"*

Due to increased water demand, arsenic contamination and desiccation, extraction of water from the deep aquifer has doubled over the last few years. This has another threat; namely soil subsidence, which is the irreversible process of sinking of the land surface as a result of groundwater being pumped. This could have the same negative impact in Bangladesh as in Bangkok and Mexico.'[62]

Urban areas

Urbanisation is big in Bangladesh; most of the migrants are from poor farmer families and are forced to live in the slums. Because the slums are growing, the urban slum dwellers have to wait long time in queue for drinking and sanitation water. It is reducing their potential working time, productivity and income. As all people have the right to water, sanitation, health and education, the local government has the obligation to provide these services to slum dwellers.

However, dwellers of urban slums are not included in the piped water network services of public authority. Street fire hydrants are connected to the piped network and are 'occupied' by persons who illegally are selling water to the slum

[60] At a press conference at 19 July 1997
[61] Professor Mohammad Muniruzzaman Miah (2003) "*Hydro-politics of the Farakka barrage"*
[62] 'Two decades ago land subsidence of a few inches took place every year [in those countries] due to unbridled groundwater extraction.' Professor Nazrul Islam of the Department of Geography and Environment at Dhaka University www.sos-arsenic.net/english/groundwater/

dwellers at high prices. When there is a safe water point that is constructed by a private company or a NGO, slum dwellers pay high charges (much higher than registered residents pay to public authority) for drinking and sanitation water to the private company or. As a result, it enhances the social discrimination in the urban area.

Rural areas

As the government does not support the provision of shallow tube wells anymore, it is very hard for poor rural people to access safe drinking water. In arsenic contaminated areas, people need to install deep tube wells which cost BDT 35.000. The income of a poor farmer ranges from BDT 35.000 – 40.000 per year, so the costs of a deep tube well are insuperable. Moreover, most of them are unable to cover the costs for operation and maintenance. Poor rural people, who do not own a tube well, are relying on neighbours who have a private tube well, or use pond or river water which is unsafe and makes these people very susceptible for water borne-disease as diarrhoea and cholera among these poor people. Morbidity and mortality caused by water-borne diseases are high in Bangladesh.

The beels (wetlands), lakes and rivers that are being leased by the government to commercial fisheries cannot be accessed by poor fisher men and women. Traditionally communities and rural people are using the beels (wetlands), lakes and rivers as fishing grounds. Through leasing the fishery rights, the government is selling surface water to the highest bidder. In the current bidding system for fishery leases, political biasness, bribe, nepotism etc. play a vital role. Rich and/or influential people are the winners and restrict access to the water of other people. Poor rural people and the communities are the losers in this system. Fishery leases do not only deprive people from their rights but also create income and health problems.

Rural and urban women

Slowly, women in Bangladesh are raising their voice and asserting their rights although discrimination of women is still prevailing. Age-old traditions, social norms, religious taboos, economic dependency, illiteracy and silence of women in public life make that women keep a humble state within their families, communities and country. Across the classes, women are undervalued, their work is being unseen and unpaid if done within the home and unrecognised and underpaid in the (in)formal employment sectors. Individually and within their families, women have little power; as a 'social' group; they have in reality even less rights, because they are often trampled upon.

The lack of access to mini pumps, decrease of groundwater tables due over-extraction, pollution of rivers and groundwater by arsenic are speeding up the drinking water crisis. Women and girls are directly affected by this crisis, because they are often responsible for water collection. In rural areas, women and girls

are forced to walk longer distances to collect water, this makes them loose time for school and income generating activities.

In addition, the allocation of water rights is linked with land rights that are often allocated to men. Women have less access to water rights. Although there are women owners of a mini pump in some rural areas, the mini pumps are mostly owned by men. This causes that women have less power in decision-making process over irrigation water.

Urban women, especially women of urban slums, also suffer from the water crisis. Female dwellers of slum areas belong to the poorest of the Bangladesh society. Consumption of water that is delivered through water sellers at street fire hydrants and/or DSK require the ability to pay. DSK has to hand over a small portion of the charge to Dhaka WASA and invests the remaining part to expand their activities. However, the price for water is often too high for the poorest, female dwellers. As discussed earlier, it is worrisome that several NGOs are now duplicating this model.[63]

6.3 Conclusions and Recommendations

Conclusions

As a limited resource with a growing demand, water is attracting private investment throughout the world. When looking at water as a commodity, huge profits can be made. However, water cannot be seen as a commodity only, because than it neglects the social, economic, environmental rights of (poor and marginalised) people to water and livelihoods.

But private organisations involved in water supply system are considering water as a commodity, and they are not concerned about 'affordability of water by poor people'. Organisations that are providing safe drinking water in slums areas are self governing and government authorities have no control over the price. As a result, poor slum dwellers have to pay 25 times more than the people with an official residence pay to the public authority. Also poor farmers are buying irrigation water at high prices from others as they can not afford to buy their own irrigation pumps.

Government policy says that the ownership of water cannot be given to an individual. However, there are several water related policies made, which they leave the door open for privatisation. Commercial investors see Bangladesh with its 140 million inhabitants as a with 140 million water costumers. Access to drinking water is a human right. A large number of the poor people of Bangladesh, will suffer severely if water is converted into a commodity. The government should make all affords to change necessary text in the policy papers to stop privatisation of water service.

Minimal conditions in order to be sustainable or to avoid being unsustainable

Actually, there exists no single 'right way' for sustainable water services to all people. Successful solutions must be evidence-based and will involve a variety of different approaches. In Bangladesh, the institutions and governance system are

[63] Water and Rights, Bi-monthly Newsletter (September - October 2004) of Chittagong Nagorik Uddogh, Bangladesh

weak and regional and international trade negotiations restrict the government's role in water services.

- In order to achieve the Millennium Development Goals, safe drinking and sanitation water for all needs huge infrastructural investments. Public-private partnerships are an option. However, the control and management of this public-private partnerships and of the infrastructure should be with the public authority, in order to ensure democratic participation, local accountability and community involvement;
- Encouragement of local cooperatives to invest, install and manage water supply systems. In Bangladesh, local communities have developed their own creative water management solutions like rainwater harvesting systems. The public authorities should take steps to invest in, to stimulate and conserve these initiatives;
- Avoid people to collect water from deep aquifers that contain arsenic. Government should take the necessary steps in finding safe alternatives;
- The government should provide support and subsidies to the poor and marginalised farmers so they are able to reduce irrigation costs. Privately owned mini pumps and tube wells must be controlled and monitored by the public authority or by community groups in order to prevent over-extraction;
- All decisions on international and regional agreements and conditional loans with the World Bank that are related to drinking water should be taken after proper democratic discussion among the people of Bangladesh;
- For leasing of community fishing areas, wetlands should be leased by the government giving apex priority to community people depending on these fishing areas. Leasing procedure should be fair and corruption free.

<u>Recommendations</u>

- Water is a natural resource that is fundamental for all people. It is therefore declared as human right by the UN. So, the government must take efforts to secure this right and ensure access for all people.
- As the national government is pressurised by the different forces as the World Bank, ADB, and TNCs for water privatisation, it needs to be cautious about all forms of loans that are putting conditions about the control and access over water.
- Efforts to change water into a commodity for profit and privatisation of water must be stopped immediately. However, water used for economically profitable purposes must be paid for.
- The national water policy must be shaped demographically on participatory principles and be based on social justice and environmental sustainability.
- Sustainable water management practices, as rainwater harvesting must be introduced and encouraged throughout rural areas.
- Initiatives have to be promoted to make positive changes in the urban water supply and sanitation system.
- The arsenic contamination is an acute problem in Bangladesh. A long term sustainable plan must be developed.
- Women are affected most by any decision over water, their voices must be central in water management.
- All forms of environmental pollution must be banned. Actions must be taken against any person or organisation that is responsible for waste discharges that pollute water.
- Water must be promoted as an invaluable and sacred element of nature. Its conservation and judicious use must become a part of every citizen's attitude to life.

- Sustainable irrigation systems in rural area should be encouraged. The government should ensure access for poor and marginalised farmers in irrigation equipment through soft loans.
- The government must ensure water infrastructure and services to all, and especially to the poor.
- Education and training should be focused on water wisdom, that means make optimum use of water resources.
- Local communities' and cooperatives' involvement in the water management must be encouraged.

6.4 More information

Websites

- 'Water in private hands': www.choike.org
- Bangladesh & arsenic: www.SOS-arsenic.net
- 'Private water, public misery': www.indiaresource.org/issues/water/2003/privatewaterpublicmisery.html
- 'World Bank and ADB's Role in Privatizing Water in Asia': www.jubileesouth.org/news/EpZyVyEyylgqGYKXRu.shtml
- www.corporateeurope.org/observer7/water.html
- www.worldwaterforum.org/
- www.lboro.ac.uk/well/resources/Publications/llfneitwss/papers/a10-Dushtha.pdf.
- www.navdanya.org/earthdcracy/water/water-parliament-reco.htm
- www.qantara.de/webcom/show_article.php/_c-476/_nr-471/i.html
- www.water2001.de/outcome/BonnRecommendations/Bonn_Recommendations.pdf
- www.jubileesouth.org/news/EpZZZZkVklINTiHJSC.shtml
- www.waronwant.org/?lid=7411
- www.wdm.org.uk/campaigns/aid/alterns.htm#wrapper
- www.citizen.org/cmep/Water/alts/index.cfm
- www.bangladeshobserveronline.com/new/2005/03/04/editorial.htm
- www.elca.org/countrypackets/bangladesh/hunger.pdf.
- www.bangladeshgov.org/moa/moa.html

References and bibliography

- Local Government Division (1998) '*National Policy for Safe Water Supply and Sanitation 1998'*. Ministry of Local Government, Rural Development and Cooperatives, Bangladesh.
- Bangladesh (1999) *National Water Policy 1999*. Bangladesh.
- Chittagong Nagorik Uddogh (…) "*Water and Rights, Bi-monthly Newsletter"* [1st year (1st, 2nd, 3rd issue); 2nd year (1st, 2nd, 3rd issue)], Bangladesh.
- Haren, N. van, A. Douma, D. Hirsch, J. Mora Portuguez, R. López, A. Aguilar, R. Born, S. Jardim, S. Tallochi (2005) "Summary of the White Paper on Water Markets and Market Mechanisms" Both ENDS, Amsterdam, The Netherlands
- World Health Organisation (2003), "The Right to Water"
- Gleick H. Peter et. al. (2002), "*The New Economy of Water: The Risks and Benefits of Globalisation and Privatisation of Fresh Water".* Pacific Institute for Studies in Development, Environment, and Security, Oakland, California, USA
- Rajepakse Ruana (2003), "*Water as a Human Right: Legal, Social and Economic Implications"*. www.elaw.org/resources/text.asp?id=2019 [7 july 2006]
- M. Muniruzzaman Miah, M (2003) "*Hydro-politics of the Farakka barrage"*. Gatidhara Publishers, Dhaka, Bangladesh.

Summary and conclusions

A major risk for all water markets is the inequity they can create or exacerbate due to the inequitable allocation of water rights and thus water access and to inadequate monitoring and control mechanisms. In terms of environmental sustainability, a serious problem is the lack of regulation in these markets to assure sufficient recharge and protection of water resources in order to avoid depletion, pollution and environmental degradation. Under the circumstances, existing and emerging water markets tend to increase inequalities and pose a serious threat to sustainable livelihoods.

The potential impact on gender equity of these markets is significant. Although women are important water users –as producers as well as the primary providers and users of water for domestic use-, their stake and role in water markets or other water management systems are sometimes invisible and often marginal. Water markets will exacerbate these inequities, unless conscious efforts are made to redress existing inequities and avoid new causes of inequities, such as lack of access to information, financial resources and the physical or institutional market place.

Market mechanisms identified in this working paper have a potential to contribute to more sustainable management of water resources and water-related ecosystem, *if* from the early start of their development social considerations and stakeholders are included and public institutions can guarantee regulation and control over those markets.

In any market-based system, the allocation of water rights should be fair and transparent. Moreover, participatory mechanisms should be in place to prevent rich and powerful players to monopolise or dominate these markets. From the start of allocation, provisions should be made to assure participation of women and access by poor people and marginalised groups. Institutional arrangement should guarantee monitoring and control, as well as compliance with existing rules and regulations.

Tradable water rights and the privatisation of water services both touch on the bases of people's livelihoods. In the case of tradable rights, explicit attention must be given to equity considerations and to the inclusion of the environmental costs in all activities. Tradable water rights and privatisation of services pose a major challenge to the public control over water: in some cases, governments have been loosing significant influence on the management of entire ecosystems and private stakeholders have gained effective control. In these situations, commercial interests prevail and environmental concerns, ecosystem limitations and human rights are ignored in final decision-making.

Given the high risks involved in water services privatisation and the low impact it is expected to have on the poor and marginalised in rural areas, international attention should be refocused, allowing other provision options, such as community-based management, low-tech provisioning systems and participatory management to develop.

Even in those cases where market mechanisms are introduced in a sustainable and equitable way, there is a need for instruments and conditions that allow public monitoring and assure compliance. This requires local and national government agencies to have adequate monitoring and control capacities.

Moreover, it also requires awareness raising, mobilisation and capacity building of local actors and civil society to monitor water use.

Economic instruments that internalise environmental costs of the use of water can make water use more sustainable through better-informed production and investment decisions. The effective implementation of these instruments increases when they are context and user specific. Integration of the instruments in general tax systems increases the overall integration of environmental considerations in all budgetary decisions. Challenges include:

- Implementation of institutional structures and instruments for effective monitoring and control of payments and ecosystem conservation;
- Calculation of appropriate tariffs, charges and user fees demands a balancing act between economic profitability, competitiveness and the true value of a natural resource and the ability of stakeholders to pay;
- Balance between equity, economic and environmental considerations;
- Combination of economic instruments and command and control mechanisms to sanction excessive exploitation.

The freedom of national governments to decide on the development and implementation of market mechanisms to enhance the sustainable use of water and related services is significantly influenced by regional and international trade agreements. The strategy to ensure a given level of liberalisation, conflicts with the flexibility needed to design and implement management policies. As a result, future rules and commitments could restrict a WTO member country to impose crucial water regulations for sustainable water management.

Instead of focusing on the inclusion of water and water services in trade agreements, much more attention should be paid to the approaches to meet the water and sanitation needs of the world’s poor and marginalised both in rural and (peri-) urban areas and to guarantee the protection and sustainable use of water, wetlands and ecosystems.

References and further reading

- Alianza Chilena por un Comercio Justo, Ético y Responsible (ACJR) (2002) *"El derecho al agua en el Sur de las Americas"*. Santiago, Chile p. 38. www.comerciojusto.cl
- Anjali Kamat, (2002) *"Water Profiteers".* India Resouce Center, 28-05-2002. www.indiaresource.org/issues/water/2003/waterprofiteers.html
- Bate, Roger & Richard Tren (2002) *"Trading in Water"*. Moneyweb, 22-02-2002. m1.mny.co.za/mnsbx.nsf/0/C2256B190030A01742256B680028DD19?OpenDocument
- Beuret, C., et al (2000) *"Norwalk-like Virus Sequences detected by reverse transcription-polymerase chain reaction in mineral waters imported into or bottled in Switzerland"*. Journal of Food Protection 63, 1576 - 1582. apt.allenpress.com/aptonline/?request=get-abstract&issn=0362-028X&volume=063&issue=11&page=1576
- Boelens, Rutgerd & Margreet Zwarteveen (2005) *Prices and Politics in Andean Water Reforms.* Development and Change, Volume 36,Number 4, July 2005, pp. 735-758(24) www.ingentaconnect.com/content/bpl/dech/2005/00000036/00000004/art00006#avail
- Born, R.H. & Gunn, L. (2003) *Promessas e riscos da OMC: para quem valeria o "sucesso" ou o "fracasso" da reunião ministerial de Cancun.* VC Informa especial, 09-2003. www.vitaecivilis.org.br
- Both ENDS (…) *Certified Green Gold.* www.bothends.org/encycl/cases/viewcase.php?cat=1&id=18&id_language=1
- Bruns, Bryan Randolph (1998) *"Water Rights Questions, an essay prepared for the Tenth Afro-Asian Regional Conference on Irrigation and Drainage,Bali, Indonesia".* 19/25-07-1998. home.vol.com/~bryanbruns/bruns-WRquestions.pdf
- Cleaver, F., Elson, D., (1995) "*Women and Water Resources: Continued Marginalisation and New Policies".* Gatekeeper Series No. 49, International Institute for Environment and Development (IIED), Sustainable Agriculture and Rural Livelihoods Programme.
- Dalhuisen, J., (2002) *"The Economics of Sustainable Water Use: Comparisons and Lessons from Urban Areas*". Tinbergen Institute Research Series 290, Thela Thesis Amsterdam.
- Dinar, Ariel, R. Meinzen-Dick and M. W. Rosegrant (1997) "*Water Allocation Mechanisms principles and examples*". www.worldbank.org/html/dec/Publications/Workpapers/WPS1700series/wps1779/wps1779.pdf
- Earle, A. and Turton, A. (2003) "*The virtual water trade amongst countries of the SADC*". Virtual water trade: Proceedings of the International Expert Meeting on Virtual Water Trade, Delft, The Netherlands 12/13-12-2002. Delft, Netherlands.
- Ferrier, C. (2001) "*Bottled Water: Understanding a Social Phenomenon*". Discussion Paper, commissioned by WWF.www.panda.org/livingwaters/pubs/bottled_water.pdf
- Frederick, Franklin (…) "*I don't agree with water privatization*". Iinterview with a Brazilian environmental activist.www.kfe.unizh.ch/interviews/water.htm
- Fujita, K. and Hossain, F., (1995) "*Role of the Groundwater Market in Agricultural Development and Income Distribution: A Case study in a Northeast Bangladesh Village*". The Developing Economies, XXXIII-4 (12-1995)
- Gleick et al (2003) "*Principles and practices for the New economy of Water: Protecting public interest in water Privatisation*". Pacific Institute for Studies in Development, Environment and Security, Oakland, California.www.pacinst.org/reports/new_economy.htm
- Hale, A., ed. (1999) "*Trade Myths and Gender Reality - Trade Liberalisation and Women's Lives*". Global Publications Foundation, International Coalition for Development Action (ICDA) and Women Working Worldwide
- Hellegers, P.J.G.J. (2002) "Treating Water in Irrigated Agriculture as an Economic Good" Paper submitted for the conference on Irrigation Water Policies, Agadir, Morocco, 15/17-06-2002, Agriculture Economics Institute, The Hague, the Netherlands.
- Hilary, John (2003) "*GATS and Water: The Threat of Services Negotiations at the WTO*" Save the Children, London, UK.www.stoppgats.at/down/dokumente/GATS%20and%20water.pdf
- Hodgson, Stephen (2004) "*Land and water – the rights interface* ". FAO Legal Papers Online #36 www.fao.org/Legal/prs-ol/lpo36.pdf
- Hoekstra, A.Y and Hung, P.Q. (2002) "*Virtual Water Trade: A quantification of virtual water flows between nations in relation to international crop trade*", Value of Water Research Report Series No.11, IHE Delft, the Netherlands.
- Hofwegen, P. van. (2003) "*New draft synthesis report of e-conference on virtual water*" World Water Council www.worldwatercouncil.org/virtual_water/documents/virtual_water_draft_synthesis.doc
- IHE (2003) "*Virtual Water Trade, Proceedings of the International Expert Meeting on Virtual Water Trade*", edited by A.Y. Hoekstra, Value of Water Research Report Series No. 12, Delft, The Netherlands. www.worldwatercouncil.org/download/VirtualWater_Proceedings_IHE.pdf
- Informal Working Group on Gender and Trade (1998) "*Briefing Statement produced as a lobbying tool for the second WTO Ministerial Conference in 1998*"
- International Conference on Water and Environment (Dublin, 1992) "*Dublin Statement Principle No. 4: Water as a human right*"

- International Food and Policy Research Institute www.ifpri.org/themes/wra/institutions.htm
- IUCN (2002) "*Pro-Poor markets for Environmental services: A New Source of Finance for Sustainable Development?*" workshop at the World Summit for Sustainable Development, 28 August 02, biodiversityeconomics.org/incentives/020828-01.htm
- Jayaraman, N. (2002) "*No water? Drink Coke!*", in Corpwatch India, May 28, 2002
- Kemper, K. E. (2001) "*Markets for tradable water rights*" In: R.S. Meinzen-Dick and M.W. Rosegrant (Eds.), Overcoming water scarcity and quality constraints, Focus no. 9, International Food Policy Research Institute, Washington D.C.
- Kloezen, W.H. (2002) "*Accounting for water : institutional viability and impacts of market-oriented irrigation interventions in Central Mexico*", Wageningen University dissertation, Wageningen, The Netherlands.
- Koepel van de Vlaamse Noord-Zuidbeweging 11.11.11 (2003) "*De wereld is niet te koop: GATS en Water*", Politiek dossier campagne 2003, Belgium, www.11.be/campagnes/2003/politiek_dossier_2003.pdf
- Mathur et al (2003) *"Analysis of pesticide residues in bottled water, Delhi region*", Centre for Science and Technology, India
- Meinzen-Dick, R. (1997) "*Groundwater Markets in Pakistan; Participation and Productivity*", Research Report 105, www.ifpri.org/pubs/abstract/abstr105.htm
- Meinzen-Dick, R. and Appasamy, P.P. (2001) "*Urbanisation and Intersectoral Competition for Water*", article in Finding the Source: The Linkages Between Population and Water, Environmental Change and Security Project, Woodrow Wilson International Centre for Scholars, wwics.si.edu/topics/pubs/popwawa3.pdf
- Mentor, J, Jr. (2001) "*Trading Water, Trading Places: Water marketing in Chile and the Western United States*", August 6-8 AWRA/IWLRI-University of Dundee International Conference Specialty Conference 2001, Globalisation and Water Resources Management: The Changing Value of Water.
- Meyer, Peter B. (Ed.) (2001) "*Glossary of Research Economics*" [online]. Available: econterms.com
- Mora, López y Aguilar, FUDEU (2004) "*Primer inventario sobre comercio en recursos hídricos e instrumentos económicos relacionados en Centroamérica*" (February 2004)
- Moreno, R. (2003) "*El Tratado de Libre Comercio entre Estados Unidos y Centroamérica: Impactos económicos y sociales*."
- Nieuwoudt, W.L. (1998) "*Water Market Institutions in South Africa, Lessons from Colorado*", Department of Agricultural Economics, University of Natal, South Africa, www.lnweb18.worldbank.org/ESSD/ardext.nsf/18ByDocName/WaterMarketInstitutionsinSouthAfricaLessonsfromColorado/$FILE/NIEUWOUDT.pdf
- No author given (2003) "*Priceless, A Survey of Water*", in The Economist, July 19, 2003
- No autor given (2004), The Daily Star, April 8, 2004. Dhaka, Bangladesh www.thedailystar.net/2004/04/08/d40408011111.htm
- No autor given, The New Economy of Water,
- NRDC/ Natural resources Defense Council (1999) "*Bottled Water: Pure Drink or Pure Hype?*", New York, USA, www.nrdc.org/water/drinking/bw/bwinx.asp
- OECD (Organisation for Economic Cooperation and Development) (2000) "*Background Paper on Private Sector Participation in Urban Water Supply and Wastewater Financing and management: an Opportunity for increased financing and Improved Efficiency*" Ministerial Consultation between Economic/Finance and Environment Ministers on Water Management and Investments in the NIS in Almaty, Kazakhstan, 16-17 October 2000, Paris, France.
- Riaz, Khalid (2002) "*Tackling the issue of rural-urban water transfers in the Ta'iz region, Yemen*", in Natural Resources Forum 26 (2), 89-100.
- Rosegrant, M.W., Gazmuri, R. (1994) "*Reforming water allocation policy through markets in tradable water rights: Lessons from Mexico, Chile and California*", EPTD Discussion Paper No. 6, Environment and Production Technology Division, International Food Policy Research Institute (IFPRI), Washington, USA, www.ifpri.org/divs/eptd/dp/papers/eptdp06.pdf
- Rosegrant, Mark W., with contributions from Sonia Davila-Poblete, David Dawe, Howard Elliot, Mingsarn Kaosa-ard, Ruth Meinzen-Dick, K. Palanisami, Prabhu Pingali, Madar Samad, Brent Swallow and Aaron Wolf (2003) "*Policies and Institutions for Sustainable Water Resource Management:A Research Agenda*" theme5.waterforfood.org/conceptual/background.pdf
- Savenije, H. (2001) "*Why water is not an ordinary economic good, or why the girl is special*", 2nd WARSFSA/WaterNet Symposium: Integrated Water Resources Management: Theory, Practice, Cases; Cape Town, 30-31 October 2001, Delft, the Netherlands.
- Transnational Institute & Coproorate Europe Observatory (2005) *"Reclaiming Public Water – Achievements, Struggles and Vision from Around the World"*. Novaprova, Porto Alegre, Brazil.
- Turral, H. (1995) "*Recent Trends in Irrigation Management: Changing Directions for the Public Sector*", Overseas development Institute (ODI), London, UK, in Natural Resource Perspective, nr. 5, September 1995, www.odi.org.uk/nrp/odi_irrigation.html
- United Nations Commission on Sustainable Development, Economic and Social Council (2004) "*Freshwater Management*", Report of the Secretary General, twelfth session 14-30 April 2004, item 3 of provisional agenda, E/C.17/2004/4
- United Nations Committee on Economic, Social and Cultural Rights (2002) "*General Comment No. 15 on the Right to Water*", adopted in November 2002 in Geneva
- Vaz, Álvaro Carmo and Zaag, Pieter van der (2002) "*Sharing the Incomati waters: cooperation and competition in the balance*" www.skpe.co.sz/Report2.pdf

- Vitae Civilis (2004) "*Water Management and Governance in Brazil: The Challenge of Market-based Approaches*", January 2004
- Warner, J. (2003) "*Virtual water – virtual benefits? Scarcity, distribution, security and conflict reconsidered*", in Proceedings of the International Expert Meeting on Virtual Water Trade, IHE, Delft, The Netherlands.
- World Bank / WWF Alliance for Forest Conservation and Sustainable Use (Nigel Dudley and Sue Stolton) (2003) "*Running Pure: The importance of forest protected areas to drinking water*", UK, lnweb18.worldbank.org/ESSD/envext.nsf/80ByDocName/RunningPureTheimportanceofforestprotectedareastodrinkingwater/$FILE/RunningPure2003+.pdf
- World Bank (1999) "*Institutional Frameworks in Successful Water Markets: Brazil, Spain and Colorado, USA*", Technical Paper no. 427, edited by Mariňo and Kemper, Washington D.C., USA.
- World Parks Congress (2003) "*Sustainable Finance Stream*", September 2003, Durban, South Africa, Session: Institutional Arrangements for Financing Protected Areas, www.conservationfinance.org/WPC/WPC_documents/Inst_C_Georgieva_v1.pdf
- Zenith International (2003) "*Zenith Report on Global Soft Drinks*", July 2003, UK. www.zenithinternational.com/reports/reportprofile.cfm?ReportID=43
- Zimmer and Renault (2003) "*We eat more water than we drink: some figures*" (IHE, 2003)
- Zwarteveen, M.Z. (1998) "*Identifying gender aspects of new irrigation management policies*", in Agriculture and Human Values 15: 301-312, 1998, Kluwer Academic Publishers, Netherlands.


FAN


Both ENDS
Environment and Development Service


Vitae
Civilis
Desenvolvimento, Meio Ambiente e Paz


JJS