Water scarcity: A challenge with which industrialised countries will be faced in the future?

Dossier spécial Water - 07/04/2011

Water scarcity: A challenge with which industrialised countries will be faced in the future

Climate change, pollution, wastage, demographic growth… as Ban Ki-moon pointed out at the 2008 Economic Forum, a third of the United States and a fifth of Spain is affected by water shortages. Although previously only associated with developing countries, the increasing scarcity of water is now affecting northern countries. Above and beyond all the economic, political and social issues, one question has to be asked: How can this "blue gold" be sustainably managed?

© FAO/Giampiero Diana

By Sonia Eyaan

1- Rich Countries, Poor water?

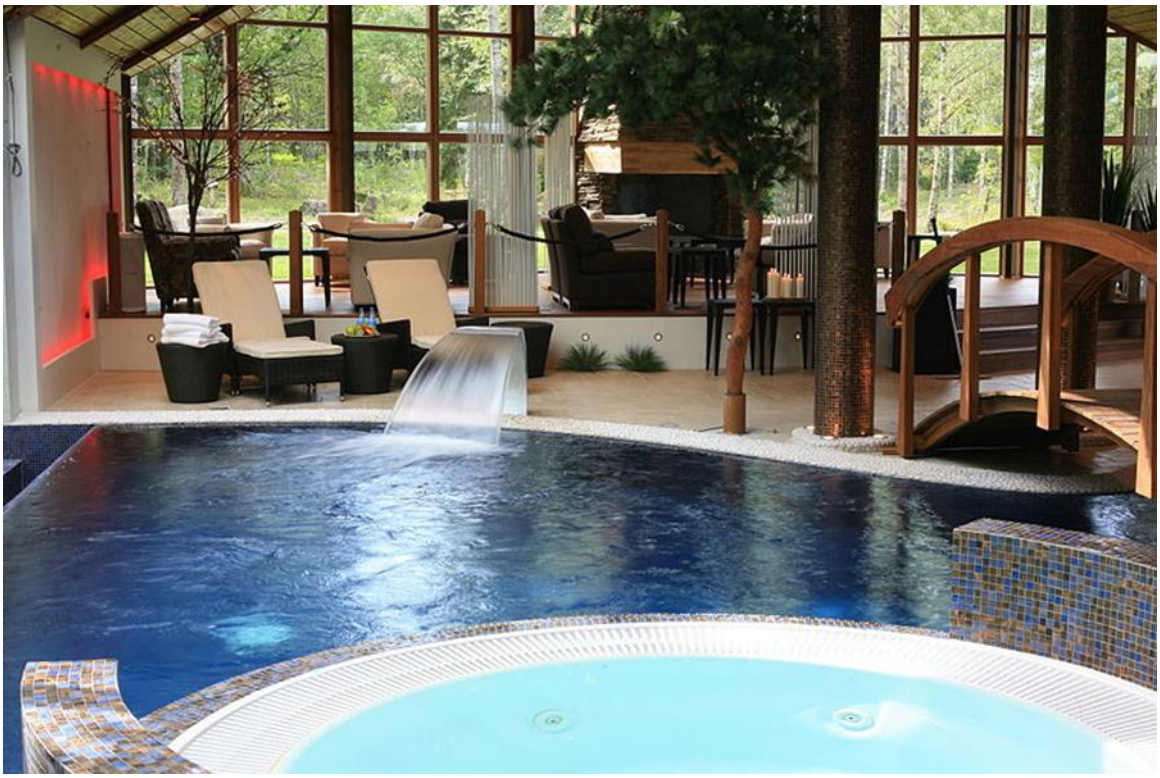
Have the world's richest countries become poor with regard to water? Not quite. This is simply the title of a report published in 2006 by the WWF. But there isn't exactly cause for celebration either. Water may run from the taps of most households in developing countries in abundance, but the recurring droughts that have been ravaging a number of European countries for a dozen years or so are gradually changing the picture. According to the Commission of the European Communities, the number of regions and populations affected by drought increased by around 20% between 1976 and 2006. To date, "at least 11% of the European population and 17% of the area covered by the European Union has experienced water scarcity". And if the current trend continues, 35% of Europe's population could well be experiencing water stress by 2070.

Drought, however, is not the only evidence of climate change. Snows are melting increasingly early and the increase in rainfall is resulting in rivers and streams that are more swollen in winter and dryer in summer, further raising fears of water shortages.

Overuse

And this is only the start. Water is set to become increasingly scarce over the next few years, according to the Commission of the European Communities… but not only as a result of climate change. Malaga - with all its hotel complexes - perfectly illustrates the damage that is being caused by mass tourism in Spain. As a coastal resort, water is more or less a prerequisite if the needs of all the British and Dutch tourists looking for sun and hot beaches are to be satisfied. But the situation is pretty unambiguous: the water tables are shrinking. In 2003, more than half of Spain's 100 aquifers were being overused, according to a report published by the United Nations Environment Programme (UNEP).[1] It's worth adding, by way of an anecdote, that the average tourist in Grenada uses seven times more fresh water than a local resident. In Majorca, the average tourist uses 440 L a day, while the average "luxury tourist" uses 880 L." (UNEP 2004, Blue Programme 2004, Tourism Concern). Should we be unconcerned by this? Not really - unsurprisingly, the local populations are the first to suffer.

[1] http://www.un.org/News/fr-press/docs/2003/PNUE88.doc.htm



Water Lounge. Crédit Nova Park

Different factors are at play in other countries, but according to the WWF, the outcome is the same: in the US, overly intensive farming is leading to a growing risk of water shortages. For a number of years now, American farmers have been reliant on their water pumps and sophisticated irrigation systems for ensuring that they remain the world's leading agricultural producing country. But inevitably, intensive farming crystallised by the famous "Food Power" concept has started to affect the quality of the country's groundwater and water tables. And in a number of US regions, the situation is even less sustainable since the rate at which land is being irrigated is higher than the rate at which the water tables are being recharged. As of nearly 10 years ago in the Midwest, almost a fifth of the Ogallala Aquifer water reserves had been used.[2]

Yet at the beginning of this year, the US Department for Agriculture forecast that revenue generated by farming would stand at US$94.7 billion in 2011. This is 20% higher than what the US government had predicted. There are good reasons for this: with the boom in biofuels, demographic change, economic growth in developing countries and changes in dietary habits, a great deal of evidence would suggest that US farmers are not about to stop their large-scale consumption any time soon. In fact, according to the OECD, agricultural production should increase by 50% between now and 2030. *"Projections suggest that*

[2] http://www.un.org/News/fr-press/docs/2003/PNUE88.doc.htm

demand for water will continue to rise, notably in countries where irrigated farming provides the major share of agricultural production, such as Australia, Mexico, Spain and the US."[3]

Agriculture and pollution

As well as depleting the water tables, overusing land for farming also speeds up the rate at which fresh water is polluted. *"Over a fifth of groundwater monitoring sites in agricultural areas of Denmark, the Netherlands and the US record nitrate levels that exceed drinking water standards",* according to an article published in the OECD Observer[4]. The problem lies in the fact that these water tables provide most of the water needed for human and animal consumption. The other problem is that - as the UK environmental agency points out - pollution is expensive. Very expensive. It costs the UK €345 million per year, while Canada has to spend $300 million per year on addressing the health problems that it generates[5]. Put simply, over exploiting, polluting and then trying to put things right afterwards is a little like giving with one hand and then taking away with the other.

2- Water scarcity and abundance

Basically, it's obvious: the impact that agriculture is currently having on water reserves is not sustainable. And you don't have to try too hard to imagine the worst case scenario: North America and Europe going to war to quench the thirst of its peoples. But the battles currently being waged over water in the Near East show that this scenario isn't actually *that* far-fetched. Professor Graciela Chichilnisky, who proposed and designed the carbon credit emissions trading market, points out that *"the shrinkage of the planet's sea ice brought on by global warming is creating friction between Canada, the US, Russia, Denmark and Norway."*

Harmonising water policy

So has the time come for us to sound the alarm? We've already done it. It was done on 23 October 2000 when European governments adopted the Water Framework Directive (WFD) which sets out to *"harmonise policy on water on an objective and compatible basis throughout the Community."* By 2015, *"bodies of groundwater must have good ecological status, and underground water good chemical and quantitative status.*

And it's a good thing too, as it is vital for water policy to be properly coordinated at EU level if a water crisis is to be prevented. But the fact still remains that the countries in question

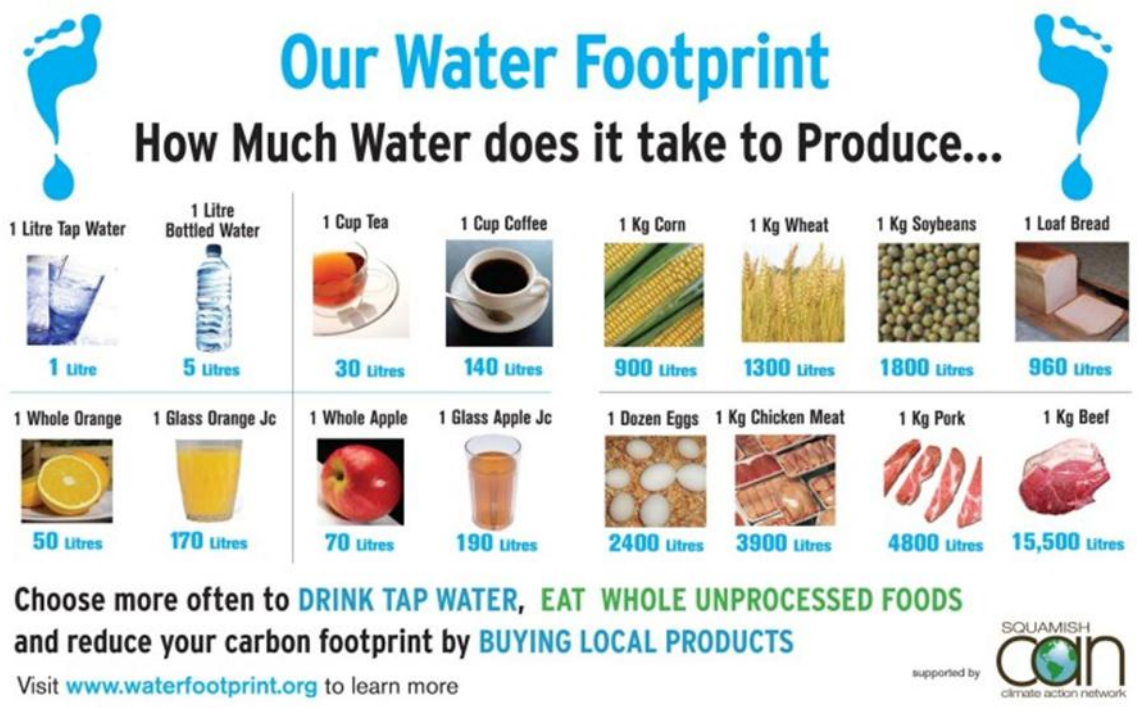
[3] http://www.observateurocde.org/news/fullstory.php/aid/1498/L_92eau_en_agriculture_:_de_l_92abus__E0_une_utilisation_durable.html
[4] http://www.observateurocde.org/news/fullstory.php/aid/1498/L_92eau_en_agriculture_:_de_l_92abus__E0_une_utilisation_durable.html
[5] http://www.ec.gc.ca/eau-water/default.asp?lang=Fr&n=11A8CA33-1

are all finding it rather difficult to sing from the same hymn sheet. *"The sheer diversity of local situations means that enforcing the framework directive is somewhat difficult",* a member of the European Commission who wished to remain anonymous told us. In the Netherlands, 95% of all groundwater reserves are considered at risk, as opposed to 20% in Estonia, according to an analysis carried out by the Water Information System for Europe. As far as finance is concerned, "*Romania does not have the same kind of budgetary resources for safeguarding water reserves as France has*", he added.

But anyway, a number of specialists don't think that regulations alone will be enough to stem the appetite of farmers for water. According to Peter Borkey, who until recently was head of an OECD team working on water, *"Member states need to reduce the subsidies that farmers and other economic stakeholders have access to for bringing the price of water down - they don't encourage people to behave responsibly."*

Water scarcity and its value

It's even more legitimate to ask questions about the relevance of these subsidies since the prices that farmers pay for water rarely reflect the cost of the infrastructure involved in providing it, the social and environmental values of water as a resource, or its scarcity. This, evidently, is what the members of the *Water Footprint Network* think[6], which looks at the impacts of human activities on water systems; an indicator of the direct and indirect usage of water by the consumer or producer.



Our water footprint © waterfootprint.org

[6] http://www.waterfootprint.org/?page=files/home

Did you know, for example, that for you to be able to enjoy a rare steak, the animal has to reach the age of three in order to produce approximately 200 kg of fresh meat? Or that over the course of its three-year life, it consumes 1300 kg of grain (wheat, corn, soya, etc.) and 7200 kg of grass? And that nearly 3 million litres of water are needed to grow these crops? Without forgetting the 24,000 litres of water that the animal drinks and the 7000 litres that are used to maintain it. In short, approximately 15,500 litres of water are needed to produce 1 kg of beef. So, imagine a world water bank where you could exchange Uncle Sam's juicy steak, or the 15,500 L of water that go into producing it, for dollars. It would be a heck of a sum!

Joking aside, *"the increase in the amount of meat that we are consuming throughout the world is cause for concern: meat has a significant water footprint because of the quantities needed for the production of animal feeds",* as Arjen Y.Hoekstra, creator of the water footprint concept and scientific director of the Water Footprint Network, points out. One wonders if our governments factor in the water footprint of a given product when choosing between farming policies. *"Spain was the first country in Europe to factor in water footprints in its regulations",* says Arjen Y.Hoekstra. The Professor is still optimistic about other governments getting involved in the future. *"The concept is relatively new. Other countries will most likely follow later on".*

If the idea of being able to determine the water footprint of a given product at a time when water resources are becoming increasingly scarce is evidence of considerable progress, should we be thinking about gradually phasing out certain foodstuffs which require particularly large quantities of water? "*Absolutely*", says Graciela Chichilnisky. *"We have a duty to provide the millions of people who are victims of water shortages with enough to drink. But we don't have a duty to maintain meat production. Which isn't even good for our health".* Peter Borkey (OECD) takes a less radical view. According to him, "*one possible solution would be to review farming practices and adapt them to take the planet's new hydrological conditions into account*". In other words, "*we should already be planting commodities that do not require large amounts of water in places where it is scarce as a matter of routine*". But whatever solution the experts finally end up adopting, the situation is the same: it's time to start laying the foundations of a more sustainable agriculture.

3- Business culture based on responsibility

As far as industry is concerned - refining crude oil, producing medicines, mining gold and manufacturing all different kinds of goods -, it all requires considerable quantities of water, as outlined in an article in Global Watersheds[7]. 18 L of water are needed to produce 1 L of fuel, 400,000 L are needed to make a car, 750,000 L for 1 t of newspaper and 8,000 L of

[7] http://www.partagedeseaux.info/article42.html

water are needed per tonne of final product when processing tar sands and bituminous shale in Canada. And, of course, using heavy metals, greases, solvents and other industrial products all contribute to the ever-growing levels of pollution.

In fact, industry damages the planet's hydrology systems just as much as farming. But rather than protesting vehemently, let's instead applaud the progress that has been made in using less water. For example, in 2007, to reduce the amount of water needed to make its tomato sauces, *Unilever* decided they would only get their supplies from farmers who used drip irrigation methods. And two years later, they sponsored a training programme for Spanish-speaking irrigators in partnership with the University of California.

Coca-Cola is another interesting example. They have been the target of bitter criticism over the last few years because of the large quantities of underground water that they use in India, but are now seeking to promote themselves as a company that will be "water neutral" by 2012.[8] The aim of the American company - the world's third largest producer of bottled water - is to apply the same targets of neutrality and compensation to water as are already applied to carbon. It aims to do this by financing programmes to restore rivers and investing in projects to recover rainwater.

© Ivan Mikhaylov

Water management in companies

[8] http://www.greenetvert.fr/2011/01/12/coca-cola-veut-restituer-a-la-nature-l%E2%80%99eau-douce-utilisee-pour-sa-production/11939

In 2009, banking on transparency, the Finnish cereal product company Raisio became the first to introduce an H2O label, providing information about the number of litres of water used to make each of its products. So, for example, to produce 100 g of Elovena oat flakes, 101 L of water are needed. 99.3% of this water is for growing the crops, 0.57% is for production and the remaining 0.16% for the packaging materials.

And food industry specialists are not the only ones to be adopting more responsible behaviour. According to an article published in *Global Watersheds*[9]*,IBM apparently saved 375,000 m³ of water over the course of one year through various initiatives to use it more efficiently, and a further 315,000 m³ through recycling.* And Columbia Steel allegedly saved 63 million m³ by using rainwater and by redesigning its cooling towers so that they now reuse the water circulating around within them.

There's no doubt that these initiatives are a first milestone in the drive that companies are embarking on to save freshwater. Except that if you look more closely, setting aside money and deploying a range of technological means to significantly reduce water consumption are not things that all countries are in a position to do.

4- The right to water and hydraulic infrastructure in Europe

Over the last few years, governments have been adopting more proactive policies to communicate and raise people's awareness of water related issues - no doubt partly to encourage people to use water more responsibly. And the results have been positive. In Berlin, water consumption has fallen from 211 million m³ in 2003 to 189 million m³ in 2011. Over the same period, Parisians have gone from consuming 218 million m³ to 119 million m³.10

But none of this necessarily means that victory is in sight. A lack of investment and the dilapidated state of water distribution networks in the UK resulted in the equivalent of 300 Olympic swimming pools' worth of water being wasted every day in London in 2006, according to the WWF's *Rich countries, Poor Water* report. In fact, the OECD estimates that France and the UK will have to increase their expenditure in the water sector by approximately 20% compared with GDP just so they can maintain current service levels.

And that's not the only spending needed. For around 10 years now, purification plants and water treatment factories have had to comply with the articles of the EU Directive on Urban Waste Water, and have had to do away with lead piping and ensure that they are in compliance with a range of other environmental and hygiene norms. All measures to offset the harmful effects that chemical and pharmaceutical pollutants have on water quality. It's

[9] http://www.partagedeseaux.info/article42.html
[10] http://www.credoc.fr/pdf/4p/192.pdf

worth pointing out that a study published in 2006 by the French Environmental Institute (IFEN)11 found that half of all the rivers and streams and nearly a third of the underground water tables checked in France in 2004 showed significantly high levels of pesticide contamination. The root of the problem? Some specialists believe that nitrates and pesticides can lead to cancer, neurological problems and difficulties conceiving.

Paying: liquidity problems, to put it bluntly

People living in developed countries - for the most part - have access to a healthy water supply. Except that climate change, wastage on the part of farmers and manufacturers and demographic change all mean that we are going to have to start saving water if we want to avoid an explosive situation. But the plot thickens: saving water raises the problem of how the sanitation services can make up for the lack of it. Ageing infrastructure and new public sanitation norms mean that considerable investments are needed. And these investments will have to be borne by consumers, according to the European Union framework directive which believes that "water pays for water". As such, in 2007, the *Earth Policy Institute (EPI)* found that water prices had increased significantly: by 27% in the US between 2002 and 2006, 32% in the UK, 45% in Australia and 58% in Canada.[12]

What is this all about? According to data from the *EPI,* the price of water in urban areas varies between $0.66 per m3 in the US and $2.25 in Denmark and Germany. In other words, increasing prices more or less involves harmonising water policy. According to Jean Benoît Charrin, lawyer and founder of the NGO *Waterlex*, *"bringing in tariffs is a way of encouraging people to appropriate the service at local level and bear operating and maintenance costs".*

But not everybody is in agreement over this. In Italy, where the average price of water is €1.29 per m3, a referendum against a law privatising the water services will be held in the next few months. With slogans such as "against the privatisation of water" and "water belongs to everybody", those opposed to the proposal are quick to quote UN resolution 10967 which came into force on 20 July 2010 and states that "the universal access to healthy drinking water is a fundamental human right". The measures have been effective: to date, more than 1,400,000 signatures have been collected.

So what does this mean? As far as Jean Benoît Charrin is concerned, these two ideas do not contradict one another. *"Making sure that everybody enjoys the right to water also means ensuring the long-term operation of the service. Water from rivers is free. What costs money is treating this water and then transporting it to people's households."* A major argument for the Berlusconi government. The fact remains nonetheless that if the referendum ends up being successful, prices will stay low. But the infrastructure will continue to decay.

[11] http://www.stats.environnement.developpement-durable.gouv.fr/uploads/media/eau_ree2006_01.pdf
[12] http://www.earth-policy.org/index.php?/plan_b_updates/2007/update64

By way of a parenthesis, Peter Borkey of the OECD thinks that it is inevitable that tariffs will have to be established for water "… *in order to finance the infrastructure and deter people from wasting it. But for the system to be viable and fair, the introduction of tariffs will have to be accompanied by measures designed to protect the poorer members of society and ensure equity".* France, for example, is taking up the double challenge of alerting households to their responsibilities with regard to water, while at the same time trying to provide everybody with access to it, he explains.*"One solution is to give specific allowances to the poorest people so that they are able to pay for their water".*

To come back to the European Union, suffice it to say that price setting policies have already been introduced in many member states. As is the case with Italy, in "*the former communist countries of Central and Eastern Europe where water was usually subsidised and so completely free, changing people's mentalities and introducing these kinds of policies is proving difficult*", says Peter Borkey. It's not easy to break into a song together when not everybody knows the words!

5- What does the future hold for the management of water services?

So it looks as though bringing in rates in order to finance the provision of water services is legitimate. But what's happened to state subsidies? According to many experts, they are on the wane.

It's a fact… and one that the governments of these industrialised countries can no longer hide. But does this mean that we are witnessing the end of the reign of town councils? No, there's no need to panic. As the *Aqua Publica Europea* website points out, *"More than 90% of the world's water and sanitation services are state-run".* And as recently as in September 2010, the European Union announced that it was going to release €40 million within the framework of a partnership to support water services in a number of countries in Africa, Asia and the Caribbean.[13]

Public/private: murky waters?

Obviously, given the size of debts and public deficits, the state cannot come to the rescue on its own. According to the OECD, the public sector "*is in a position to take advantage of the operational and administrative efficiency of private sector companies (particularly through the technical expertise and management skill of commercial operators), of more intense competition and of improvements in the services supplied to end users".*[14]

In fact, a handful of banks, including the *Pictet Water Fund* and the European Investment Bank (EIB) knew they were onto something good and so have started specialising in financing

[13] http://www.tni.org/article/water-privatisation-tide-finally-turning
[14] http://www.oecd.org/dataoecd/41/32/38297833.pdf

companies in the water sector. *"By investing in water, investors can not only help improve the living conditions of people all over the world, but also earn attractive returns",* says Denis Schmidil, Senior Product Manager, on the *Pictet* bank's website. [15]In 2008, a *Transparency International* report on corruption estimated that the total worth of all the infrastructure contracts and projects in Western Europe, the US and Japan was $210 billion (€133 billion).

But just as the debate is being reignited, with the spectre of overbilling and the monopolistic practices that the world's major water companies indulged in in the 1990s being raised, those advocating complete state control are not budging an inch: under no circumstances should water be privatised, they say! There are plenty of examples illustrating the ills of privatisation, and *Water makes money*, a documentary by Leslie Franke and Herdolor Lorenz, details the questionable practices of groups such as Veolia and GDF Suez. David Hall is director of the *Public Services International* Research Unit (PSIRU) at the University of Greenwich, and according to him, "*Unlike a company whose main aim is to generate as much profit as possible, public utility services are to be compared with services that have been set up in the general public interest, in the name of solidarity".*

Peter Borkey of the OECD is less than positive: *"The water sector is naturally monopolistic, and so it represents a major challenge for the regulatory bodies. They have to choose between the private sector which pays the monopoly rent back to the shareholders and the public sector which over-invests it and uses it to fund unnecessary jobs".* With regard to corruption, *Transparency International* explains in its report that public institutions are hardly paragons of virtue. David Hall goes on to say *"When it comes to money, some politicians are still sacrificing the common interest in the name of specific interest".*

Good governance

It goes without saying, as Peter Borkey emphasises, that *"a public-private partnership needs a solid regulatory framework, preferably a regulatory body such as Ofwat which can effectively supervise all aspects of water services".* Jean Benoît Charrin believes that "*good water governance means coherently aligning policies on water, environment, energy, agriculture, transport and economic growth and urban development".*

And both citizens and NGOs have roles to play in stamping out corruption. They can, for example, go to the courts in order to get details of the negotiations that take place between companies and the State, according to Jean Benoît Charrin. *"In light of the action being carried out by the Freshwater Action Network, pressure from NGOs can lead to impressive results: many governments are well aware of the risks they run of damaging their image if they are seen as violating people's fundamental right to water".*

[15] http://www.pictet.com/fr/home/communications/pictet_press/water_source.html

Ethical water market

Another way of addressing the water financing issue would be to create an ethical water market think some experts. But the Water is very different to CO2. *" So we have to have a water market that is appropriate for the specific features of water",* explains Graciela Chichilnisky. A specialist from a renowned bank that is dedicated to water who wished to remain anonymous tells us that *"the idea of creating a water stock exchange is not a new one. But it's not happening - except in a few very rare cases and for limited sums of money - because it's likely to be a very poor investment for a private investor".*

Something to think about

It should be borne in mind that these approaches - be they public or private - are essentially two sides of the same coin. What they have in common is the fact that they are both being adopted at a time when we've got our backs against the wall. *"A cynic"*, according to Oscar Wilde, *"is a man who knows the price of everything and the value of nothing".*

6- Water and the new challenges it is facing - Special interview with Graciela Chichilnisky

Special interview with Graciela Chichilnisky, professor of economics at Columbia University, who proposed and designed the carbon credit emissions trading market underlying the Kyoto protocol.

Graciela Chichilnisky

G&V: What will the consequences of a lack of drinking water be over the next 30 years?

Graciela Chichilnisky : It is of vital importance that humanity have access to healthy drinking water - it's a question of life or death. It's very simple… if we go a few days without drinking it, we die. This is quite dramatic, because we do actually have water. But we are having to deal with a plethora of problems, such as population growth, high levels of urban development in developing countries, climate change, water shortages for some, overconsumption by others… and, of course, pollution.

In fact, you're talking about problems 30 years from now, but we've already got them. Particularly in the Middle East, where the conflicts currently under way are partly to do with access to water And in the mid-term, developed countries will also enter into conflict over

water. For example, the sea ice is melting and this could become a major problem - it's a considerable economic issue for Canada, the US, Russia and Denmark.

G&V: How can we tackle the problems of water as a source of latent conflict?

G.C.: It's important that we prioritise our economic choices, since people across the world being able to access water is the main priority. When you consider the fact that 15,000 L of water are needed to produce 1 kg of beef, or that even more is needed to produce gold, while at the same time, hundreds of millions of people don't have access to drinking water. So we have to dramatically reduce the quantities of meat that we produce (which isn't even good for our health)… and the quantities of gold that we mine. And who actually has gold nowadays? Certainly not the people who don't have access to water.

G&V: Do you think companies that use a lot of water should be taxed?

G.C.: In California, a lot of water comes from the Colorado River. Such is the extent to which it is overexploited by farmers - mainly wine producers - that water regularly fails to reach its mouth in Mexico. Here's another example of how water being poorly distributed can lead to conflict.

Because wine production in California requires huge quantities of water, it's important that the government be able to levy taxes. People may well say that heavily taxing companies can damage a country's economy and lead to unemployment, but it's much better to sacrifice a few jobs than to have to sacrifice an entire population

G&V: Do we need to create a water market modelled on the carbon credit emissions trading scheme?

G.C.: The carbon credit emissions trading scheme is a genuine success. Both in Europe and the US. 22 US states recently signed up to it. But, although I am proud of the emissions trading scheme, I don't think we could do the same thing with water. Water is very different to CO2. CO2 is evenly spread across the planet. Whereas water does not flow in the same quantities in Argentina as it does in China, or in Palestine. We have to have a water market that is appropriate for the specific features of water.

Nowadays, there are a number of companies - such as the Pictet bank (Pictet Water Fund) - which offer financial services to stakeholders involved in water. I think we are going to have to further develop the world's water markets in the future. It's a completely new idea and it's going to be a long while before it can be usefully implemented on a large scale. As far as the CO2 market is concerned, it took me 20 years of work to get it working really efficiently. But I'm doing a lot of work at the moment on developing mechanisms that are similar to those in use on the carbon market, but adapted to meet the specific requirements of water.

G&V: What needs to be done in order to create an efficient water market?

G.C.: It has to be open to both large and small companies. The problem at the moment is that many stakeholders - particularly in the world's poorer countries - do not have easy access to financing. So the system has to be developed within the framework of a public-private partnership. And it's up to the State to set limits and provide regulation for the financial sphere if necessary. The State has to function as a shield against the market being abused or failing to function properly.

G&V: What are the challenges that international organisations are going to have to face in the 21st-century?

G.C.: A few decades ago, international organisations only looked ahead to the short or mid-term. But globalisation, climate change and demographic growth are now forcing us to look ahead to the long-term… or even the very long term. We now have to create an institution - different to the ones already in existence - that is capable of predicting the future. No such institution exists today. If we are to find solutions before the situation becomes irremediable, we have to adopt an entirely new state of mind and completely change the way in which we tackle problems. And we have to do this now. Let's hope that the issue we are facing with regard to water will help us do this.

Interview conducted by Sonia Eyaan