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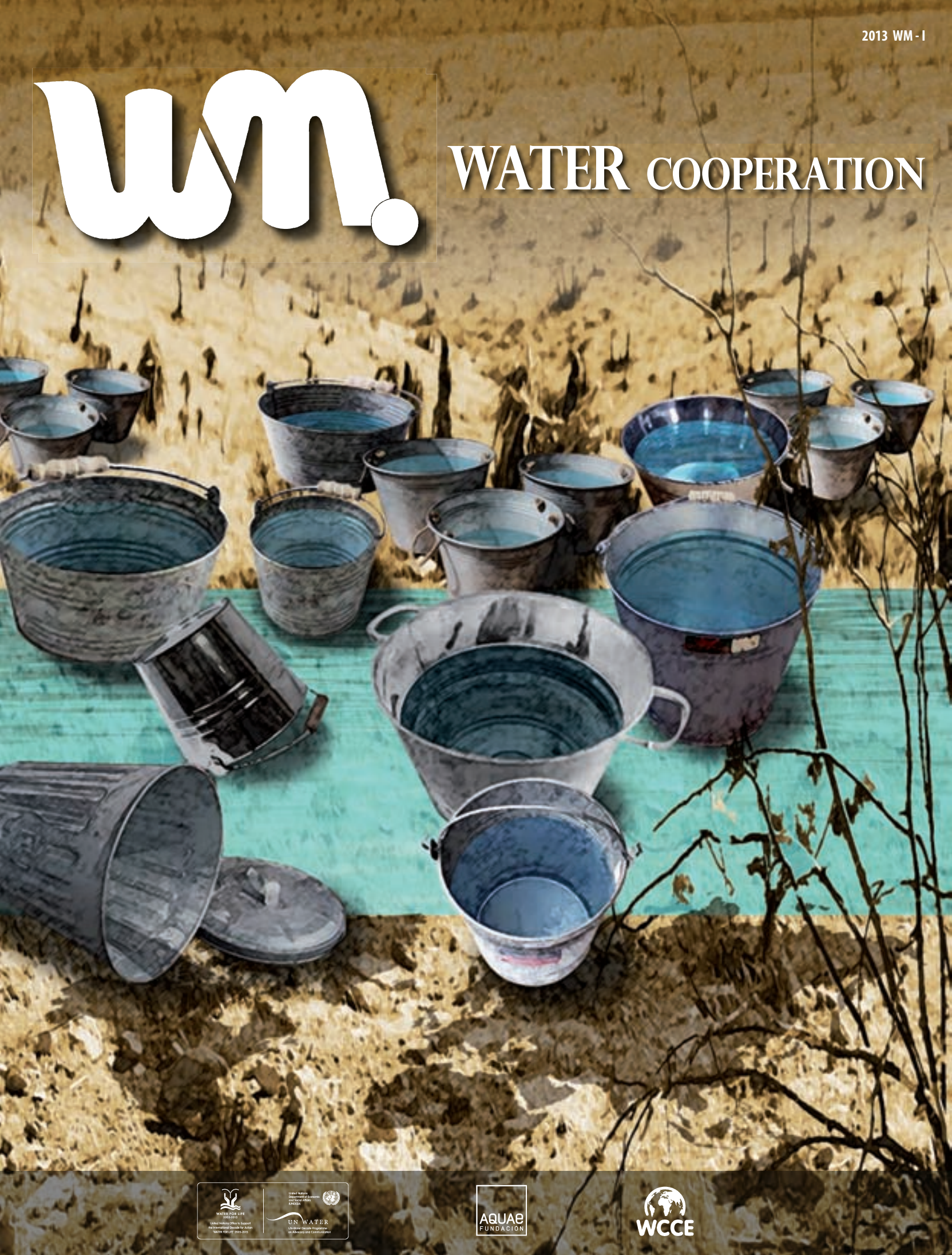
WATER COOPERATION



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Water Monographies

WATER COOPERATION

WATER COOPERATION WM 1 - 2013

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EDITORIAL

Our capacity for cooperation defines us. José Agustín Goytisolo, a Spanish poet, wrote for the birth of his daughter:

(…..)

A man alone, a woman,
taken as such, one by one,
are like dust, they are nothing.

But I, when I talk to you,
when I write you these words,
I also think of other people.

Your destiny is in others,
your future is your own life,
your dignity is that of everyone.

Others expect that you resist,
that your happiness help them,
your song among their songs.

(…..)

Allow me to start in this way. With the years, nothing excites me more than the sincere desire for cooperation, and nothing upsets me more than sophisticated ill-intentioned manuals, constructed haphazardly, assembled and argued in great part by false prophets. As Josefina Maestu says: "Strike a balance between the aspirations and choices of each of the parties involved, and help base discussions on technical and scientific evidence, not on emotion or ideology."

Renunciation as the basis for cooperation, renunciation as recognition of other peoples' rights. Cooperation as the ultimate reason that we deserve to carry on going forward.

But we are also talking about water. Our origin, our fundamental matter, the substratum of life on the planet. Water which slips through the hands of men and women when they act for themselves, but which, when they are acting and agreeing collectively, can be collected to quench the thirst of chapped lips, of children without future, of parched fields that don't produce enough crops.

We are so many, and we will be so many more, that, without cooperation, water will be scarce, not only in countries with thirsty lips and fields, but everywhere. But it is not a problem of real shortage; it is a problem of governance and a willing disposition/availability. Governance, which must achieve equity through generosity, and which only becomes real if we cooperate sincerely for our legitimate external objectives. And /a willing disposition, which requires the sharing of knowledge, and generosity in its transfer to those who do not posses it. And clarity, in understanding that we must generate knowledge if we are to save ourselves at the impending crossroads to which we are headed, where water will either unite all hands or create confrontations. And again, knowledge is above all the fruit of cooperation.

The United Nations Office for International Support for the "Water for Life" Decade of Action, The World Council of Civil Engineers and the Aquae Foundation, wanted to develop the proposal by the General Assembly of the United Nations for the year 2013 on Water Cooperation, by promoting and disseminating the ideas and experiences to do with the subject of some representative figures from around the world. And they have done so by cooperating in the publication of what you have before you in your hands or in front of your eyes. Thank you for reading it.

It is the time to be present, no one is superfluous, everyone counts. Nobody is can distance themselves-themselves from the tree of good and evil. It is time to remember water, from which life was born through the planetary placenta.

We are water, children of the same mother. All of us.

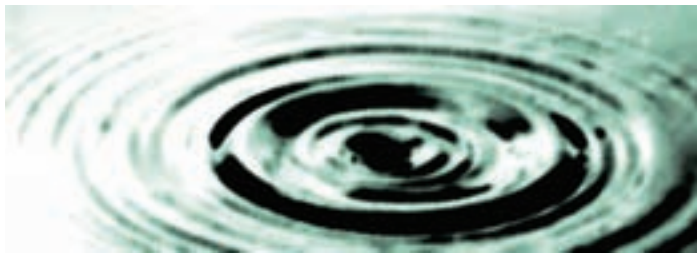
Ramiro Aurín

A leaf of paper the entire world: autumn rain. (© Illustration: Hiroshi Kitamura).

INTRODUCTION
THE IMPORTANCE OF WATER COOPERATION

Josefina Maestu Unturbe

Keywords: water, cooperation, international year, United Nations, partnerships, rural areas, cities



THE INTERNATIONAL COMMUNITY RECOGNIZES THE IMPORTANCE OF PEACEFUL AND SUSTAINABLE MANAGEMENT AND USE OF WATER RESOURCES

On 11 February 2011, the UN General Assembly, in its resolution 65/154, decided to proclaim 2013 the International Year of Water Cooperation. Resolution 65/154 calls on the United Nations system and all other actors to take advantage of the year to promote actions at all levels, including international cooperation, as appropriate, aimed at achieving the internationally agreed water-related goals contained in Agenda 21, the Programme for the further Implementation of Agenda 21, the United Nations Millennium Declaration and the Johannesburg Plan of Implementation, as well as to increase awareness of their importance.

UN International Years have been declared by the United Nations since 1959. By declaring 2013 the International Year of Water Cooperation (IYWC), the international community recognizes the importance of the peaceful and sustainable management and use of water resources. Nurturing opportunities for cooperation in water management and improving understanding of the challenges and benefits of water cooperation builds trust and mutual respect among water users. And in turn, it contributes to promoting peace, security and sustainable economic growth.

A main objective of the year has been to form strong and lasting partnerships and initiatives on water cooperation that will help maintain peace and security among nations, communities and stakeholders, while ensuring the fair and equitable distribution of water resources for society and the environment. Another key component, which underscores the importance of 'water cooperation', is for all stakeholders to recognize the current challenges and stresses upon globally shared water resources, so that a constructive and realistic dialogue may take place to address these challenges.

CONCERTED EFFORTS ARE ESSENTIAL TO RESOLVE CONFLICTS AND ACHIEVE SUSTAINABILITY

Competition between users of water, along with its conflicting uses, are increasing in almost all countries. Some think that this competition for water could increasingly become a source of tension. Degradations in water quality, along with inadequate water management and infrastructure development could contribute to this. However, water has also proven to be a productive pathway for confidence building, cooperation and conflict prevention. Water can even be a key factor in negotiating the end of a conflict. Cooperation in the search for solutions to resource scarcity and mismanagement can lead to innovation and the equitable sharing of costs, benefits and risks.

Quick facts

Since 1948, there have been only 37 incidents of acute conflict between riparian states over water involving violence. In the same period, 295 international water agreements have been signed. (OSU 2011).

Concerted efforts must be made to promote water cooperation at river basin and local levels, including transboundary river basins, irrigation districts and cities. Cooperation is necessary to deal with major issues such as water allocation decisions, upstream and downstream impacts of water pollution and water abstraction, construction and management of new infrastructures, dealing with illegal abstractions and overexploitation of surface and groundwater, deciding on the financing of water management, and improving water-related disaster management. The role of negotiation, mediation and other dispute resolution mechanisms are the key to improving cooperation processes.

Quick facts

More than half the world's population depends daily upon water resources shared by more than one country (INBO 2012).
40% of the world's population live in river and lake basins that comprise two or more countries and 90% live in countries that share basins (UN-Water 2008).

History has often shown that the vital nature of freshwater is a powerful incentive for cooperation, compelling stakeholders to reconcile even the most divergent views. Water more often unites than divides peoples and societies. Cooperation is necessary to address issues such as water allocation decisions, upstream and downstream impacts of water pollution and water abstraction, infrastructure development, overexploitation, and financing of water management.

Quick facts

Transboundary freshwater covers 45% of the world's land mass, connecting two or more countries in water resources above (surface) and below (groundwater) the earth's surface.

Challenges for water cooperation include:

- Water demand. Given the cross-cutting needs for water resources, there are competing demands for its use between sectors, nations, communities, and urban and rural environments.
- Water quality and water quantity. Concerns about water quality and water quantity can constitute a challenge to water cooperation. While the perspectives of upstream and downstream uses often differ, both can have consequences on the quality and quantity of water.
- Infrastructure development. Infrastructure developments such as dams may provide significant benefits for society, but can also negatively impact surrounding ecosystems and communities.
- Climate change. Climate change already impacts and is expected to further put pressure on water resources in many areas with fluctuations in water availability and water quality.
- Economic interests. Economic interests with regard to water and its uses can cause conflicts that change the balance of power in a region.
- Financing. Investment needs for sustainable financing of transboundary water management institutions often exceed the resources available to riparian countries.

Water cooperation can be promoted at the local, national, regional and international levels. All stakeholders should be engaged, paying special attention to the livelihoods of the poorest and most vulnerable people. Examples of tools to promote water cooperation include:

- Legal frameworks.
- Institutional arrangements.
- Sharing information and conducting joint assessments.
- Incentives for cooperation.
- Mediation and dispute resolution mechanisms.
- Cost and benefit sharing.
- Financing.

Quick facts

60% of the world's 276 international river basins lack any type of cooperative management framework. (OSU 2011).

CONSIDERING THE PROCESSES OF COOPERATION

Different experiences of water cooperation analyzed in Zaragoza during the UN-Water Preparatory Conference of the International Year of Water Cooperation showed that cooperation can be facilitated by legal and institutional frameworks and financing. However, they also showed that it is important to consider the processes of cooperation, specifically the mechanisms of dispute resolution.

There are many cases of successful water cooperation to learn

Fig. 1. Aerial view of the Panama Canal. © UN / Yutaka Nagata.

from. Countries that have signed the International Water Conventions agree that they have been important drivers for cooperation even where there were pre-existing cooperation agreements. Countries have committed to respect the principles of the Conventions, as was the case of the pre-existing Finnish-Russian agreement and the Helsinki Convention. Other common legal frameworks, such as the Water Framework Directive, have allowed for clear objectives to be set for water management, as in the case of Spain and Portugal, and have clarified the purposes of collaborative agreements.

It is important to recognize that in transboundary cooperation there is no one-size-fits-all model for cooperation. Rather than replicating models, efforts may be best focused on using available resources efficiently and creating the preconditions that may favour dialogue and agreement. The most important factor is to have the political willingness for cooperation.

Managing water effectively and sustainably requires that all the stakeholders of a common water resource cooperate in jointly managing, protecting, and developing the resource. National and regional bodies, such as water resource ministries and river basin organizations (RBOs) can manage the upstream-downstream issues that may arise between groups of stakeholders. Bringing parties to the table, raising awareness of challenges to be faced, and changing attitudes will be necessary if new agreements are to be reached and accepted. Opening channels for dialogue and frequent meetings serve to create trust between parties and a recognition of the diversity of interests. The dialogue helps identify synergies and common interests.

World Bank experience **in the Ganges (a complex system between Bangladesh, India and Nepal), the Nile Basin Initiative (NBI) and the Amu Darya Basin, show the critical importance of water cooperation in advancing towards each country's ambitious development goals, particularly in areas such as growth, poverty alleviation, sustainable development, and food, energy and water security.**

According to the World Bank, cooperation is a long process requiring a set of enabling conditions that must exist before the opportunity of reaching mutually beneficial and enforceable agreements may arise. A clear understanding of how this happens is the key to fostering similar processes in the future. While the associated economic benefits and costs of cooperation are generally well analyzed, the perceptions of decision-makers regarding political risks and opportunities have been much less explored. The critical institutional change that needs to be promoted is a shift in people's perceptions, so that, firstly, the opportunities may be perceived as more important than the risks involved in cooperation and, secondly, the benefits as more significant than the opportunity costs of not coming to an agreement. As the World Bank experience shows, in many countries risk reduction was an important pre-condition before countries would progress to negotiated outcomes. Reduced risks provided sufficient motivation for countries to reconsider the cooperation deal, and even sign an agreement. For that reason, the World Bank have identified seven areas that, depending on the context, may help in reducing risk and facilitating a shift from confrontation or deadlock to productive agreements. These areas are: knowledge and skill expansion, institutional development, programme design, financing, facilitation, and decision legitimacy.

Fig. 2. Students obtaining water supplies during the examination period in Darfur. © UN / Albert González Farran.

LESSONS FROM COOPERATION IN RIVER BASINS

There are some important lessons from the experience of cooperation in River Basins and especially in international River Basins. These include the following:

The legal imperative

International legal frameworks, such as those provided by the UNECE Water Convention and the UN Watercourses Convention on a global scale, or the EU Water Framework Directive at a regional level, have played a fundamental role in fostering cooperation agreements. They have been the key in the cases of the Sava and Tizsa River Basins and in the cooperation between Spain and Portugal in the framework of the Albufeira Conventions.

Institutions are essential

Cooperation is a long-term commitment and requires sustained efforts. The creation of joint institutions is essential to sustain these cooperative efforts. This has been the case with the Sava and Senegal Rivers, and with the Russia-Finland cooperation. Having funding for the cooperative efforts is also important both as an incentive to start (by international organizations) and for long-term development of cooperation (between the countries or the interested parties). This has been important in the cases of the Tisza and Sava River Basins Joint management.

The Secretariat role

This has been vital in insuring transparency and in generating the neces-

sary trust among parties. Exchanging information and establishing monitoring and assessment systems have also contributed. The case of the Senegal Commission and the case of the Euphrates and Tigris show how this works in practice.

Beyond governments

In some transnational basins, the incorporation of the concerned parties –outside any institutions– has enabled the introduction of mechanisms to share the benefits, costs and compensations among different types of users and different countries.

Process matters

Mediation can be important for enabling long-term cooperation. Mediators and diplomats have played a key role in cases like the Jordan River Basin, the Albufeira Convention and the various African cases where the World Bank has been involved (the Nile and Senegal Rivers, among others). They have been catalytic for assisting the parties and have supported processes geared towards acknowledging the differences and legitimate interests of the parties. The role of third parties, such as the World Bank, has been essential in establishing strategies to manage the perceived risks of cooperation, and has helped overcome barriers to cooperation.

Incentives matter

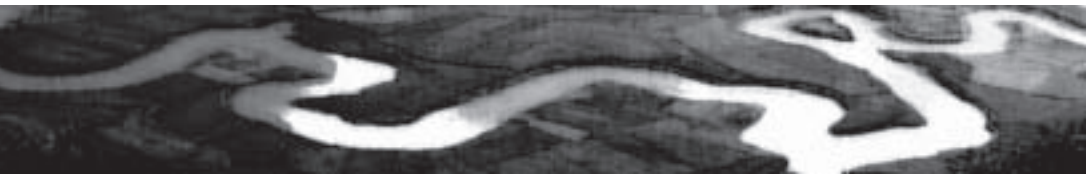
Coherence between users (agriculture, mining, fishing, etc.), location (upstream/downstream) and between urban and rural areas, needs to be based on the understanding of water as an economic resource. Payment for environmental services can facilitate reconciliation between users.

Context matters

Although situations of extreme drought or other shocks may complicate the achievement of an agreement (Albufeira Convention), they can be also provide opportunities to incentivize cooperation. An economic crisis context must not imply that the markets rule. Markets must be at the service of common objectives (Russia).

Decentralization

Where water policy and management decisions take place at a municipal or provincial level, there are specific challenges to coordinating these on a basin scale. Cooperation needs to be built relying on local communities, water users and river associations. It is also important to establish cooperation mechanisms that are appropriate at each level, and to consider mechanisms for coordinating between different levels.



WATER COOPERATION IN CITIES

Cities cannot be sustainable without ensuring reliable access to safe drinking water and adequate sanitation. Coping with the growing needs of water and sanitation services within cities is one of the most pressing issues of this century. The need for sustainable, efficient and equitable urban water management has never been as great as in today's world. Half of humanity now lives in cities and in two decades, three out of five inhabitants on the planet will be urban dwellers. This urban growth is faster in the developing world and creates unprecedented challenges.

Cities are sources of innovation in water management, creating new models for water and sanitation service delivery and finance, spurring technological development, and driving increases in the efficiency of water use (with some utilities promoting demand management, for example). At the same time, cities are sources of intense competition over scarce water resources, and must confront problesms of pollution and water poverty. Many slum dwellers and peri-urban citizens in rapidly growing cities lack decent services and pay a high price for the water and sanitation services that they do receive, buying water from vendors or obtaining it through their own efforts (e.g. digging a well, harvesting rainwater or constructing a latrine). Further afield, the footprint of cities' freshwater consumption and waste disposal has huge impacts on agriculture, livelihoods and the environment. These tensions between creativity and competition, between the positive and the negative sides of water use in cities are of course linked, and these trends may well co-exist in the same city. High demand for better services and pressures on scarce resources can drive innovation and improvements in some contexts with favorable governance arrangements, or lead to real hardships and environmental damage. The pressures are especially acute in the peri-urban peripheries where governance /deficiencies are frequent (Butterworth *et al*, 2007).

Fig. 3. Hai River and surrounding buildings in Tianjin, China. © World Bank / Yang Aijun.

Cooperation is particularly important where there are many actors and interests in the same location. Nowhere is this more the case than in cities. It is the dense complexity of actors and activities in cities that makes water management there so challenging, and at the same time which allows cities to generate so many innovative solutions. The majority of our human and economic exchanges happen in cities, and this is where we can have the most significant influence on our sustainable future.

Stakeholder engagement and public participation in cities are the key to the coordination of various actors and interests. Stakeholder platforms can bring together urban planners, water service providers, consultants and civil society organizations, to develop dynamic integrated approaches. In stakeholder platforms, a variety of stakeholders share a space to bring in innovation and contribute to solve water and sanitation challenges, to articulate their concerns and come to joint solutions. For example, companies are increasingly trying to understand their direct water use as well as the water footprint related to their supply chains.

Managing the cooperation process in cities and determining the right sequence of activities is essential for reaching effective agreements. Implementing gradual actions, which can demonstrate clear improvements, can be a way to capture stakeholders' attention and interest. Focused actions based on mobilizing existing resources and widening the scope of their use offer promising possibilities for enhancing cooperation. For instance, water utility technicians can train their colleagues – training trainers – thereby gathering and disseminating relevant information and skills. Experiences with collaboration among utilities show the need to be more inclusive and involve all actors. There is a need to support small-scale operators, and the peri-urban and poorer areas in cities, which requires an analysis of the capacity gap as part of the planning process.

WATER COOPERATION IN RURAL AREAS

Water commissions, water juries and irrigation cooperatives have played for a very long time important roles in helping to resolve disputes and manage water by bringing together local stakeholders. They have been created and have become indispensable where there is competition for scarce water resources and where there is need to control illegal water withdrawals and wastewater disposal which compromise the resources and may instigate conflict.

Fig. 4. Building a water pump in Mali. © World Bank / Curt Carnemark.

According to ICID (*Suresh A. Kulkarni, and Avinash C Tyagi*, 2013 Participatory Irrigation Management: Understanding the Role of Cooperative Culture), the philosophy of Participatory Irrigation Management (PIM) is based upon the involvement of farmers in the operation, management, and maintenance of irrigation systems at secondary and tertiary levels through 'Water User Associations' (WUAs). During the last three decades about 60 countries with significant irrigated areas have adopted PIM to varying degrees. WUAs are considered the most appropriate institution for bringing together farmers being served by a given infrastructure. They act as an interface between the farmers and the Irrigation Agency for the purposes of conflict resolution, cooperation and fostering synergies between all stakeholders.

Avinash Tyagi points out that, on the basis of experiences collated through various ICID workshops (1998, 2007), the following lessons have been distilled on the success or otherwise of WUAs:

- Sense of ownership. Real participation of farmers comes from a sense of ownership. Unfortunately, governments are still perceived as the owners of the irrigation infrastructure and water. Building a sense of ownership requires engagement with stakeholders in a lengthy process that demands time and patience.
- Cultural factors. The new institutions should be based on a thorough analysis of the social, cultural and political relations between various actors in the existing irrigation water management practices.
- Legal framework. A transparent and responsive governance structure is an important aspect of WUAs, which is necessary for conflict resolution and accountability. It should clearly articulate the possible sources of income, including water charges, subsidies, etc.
- Financial viability. It is necessary to develop a viable capital-financing plan that identifies the amount of money needed to establish and maintain the functions of the WUA. Potential sources of the financial capital include the members themselves, and surpluses generated by the WUA's activities or from outsiders. In most cases, governments provide the initial start-up costs.
- Initiatives and incentives. Unless a 'win-win' situation is clearly evident, the WUAs will not be able to deliver their objectives. It is unlikely that WUAs established through a forced or solely 'top-down' approach will be sustainable. Both 'top-down' and 'bottom-up' approaches are required for the start-up and effective functioning of WUAs.
- Capacity development. WUAs managing the activities of cooperatives require skills in financial and administrative management and should be backed by technical know-how. At the same time, the cooperative attitude is mostly driven by a dedicated and exemplary leader within a society. Such leaderships can and should be nurtured through various leadership building programmes.
- Integrated approach. Most water resource schemes besides irrigation have multiple objectives and there are competing interests mainly from domestic, industrial, hydropower and environmental uses. The participation of WUAs in such schemes can be made simpler by integrating similar functions.
- Replicability. There is no blueprint for a successful WUA. PIM involves interaction between different social groups, farmers, villagers and governments. Since these interactions and their historical backgrounds differ among different societies, replicating a successful WUA model from a given country may not necessarily lead to success elsewhere.
- Smallholder agriculture. Intervention in smallholder irrigation development through a 'top-down' approach generally encounters difficulties, such as too many implementing agencies and long delays caused by bureaucratic procedures. It becomes much more complex when organizing and dealing with a large number of smallholder farmers. Smallholders often face constraints such as weak property rights, poverty of resources, lack of access to markets and financial services, and limited ability to tolerate risks.

IMPROVING PROCESSES OF WATER COOPERATION

From the experiences of water cooperation in river basins, cities and rural areas, analyzed in the UN-Water Zaragoza Conference, preparatory to the International Year of Water Cooperation, there are some lessons that can be drawn in relation to improving processes of water cooperation. These are:

1. The importance of participatory approaches and of involving stakeholders

Stakeholders are any party who may affect or be affected by the outcomes of projects or programmes, ranging from governments, regulatory agencies, businesses, communities, civil society and NGOs. Engaging all stakeholders in the cooperation process implies reaching out to groups who normally do not get involved in water issues, but who could be affected by the outcomes of negotiation. However, cooperation requires the pre-existence of channels enabling anyone to be represented in the process and for stakeholders to form real alliances of interest. Success in reaching sustainable agreements requires also the existence of participation channels able to convert the agreement among the few seated at the negotiation table into a social pact to manage water in the interest of all the citizens, the parties and the regions involved.

2. Dealing with perceptions and cultural values

In some situations, cooperation might require looking beyond the traditional vision that sees water management issues as mostly technical problems not requiring social participation to identify, compare and choose among the options at hand/, to identifying, comparing and choosing among the options at hand. A transition from risk to opportunity and from costs to benefits in the way people perceive water challenges might be an important precondition to creating an institutional setting that favours cooperation.

3. Recognizing the parties' individual and mutual benefits

Cooperation implies understanding how the individual decisions and opportunities of all the parties are interdependent, and thus why managing water must be a matter of long-term social agreement to preserve these opportunities rather than short-term competition to capture their benefits. Real and sustainable cooperation can only be achieved if the parties entered the process on a voluntary basis. This can be achieved when all parties perceive the benefits of the cooperation process.

4. Generation of Trust

Any cooperation process implies the recognition of the different interests of the parties involved. In the end, all parties need to be interested in the same goal, even if for very different reasons, and these differences need to be accepted and publicly recognized. Turning a potential conflict into a workable cooperation agreement is a real institutional change that requires the transformation of many cultural values and emotions, and the perception of the same persons who were previously seen as rivals or enemies as trustworthy partners.

To realize a successful water cooperation process, the various stakeholders need to accept the agreements and commit to work on the discussed issues for a long time. Successful international water management is more likely when co-riparian states have a history of harmonious

Fig. 5. Wayuu indigenous people in Colombia suffer water shortages. © UN / Gill Flicking.

relations. A history of friendly relations enhanced efforts by Canada and the United States to effectively address numerous issues over the use of international and transboundary waters. The cooperation dating from the 19th century between Spain and Portugal on issues related to transboundary watercourses contributed to the successful negotiations on the Albufeira Agreement.

Capacity building in participatory groups allows the stakeholders to share their queries and ideas and contributes to generating trust between the participants and the facilitator. It allows the participants to share what they have learned, discuss problems and inform and sensitize the other participants. In the process, it also helps to solve any problems before they turn into conflicts (examples include Guatemala and Peru).

Joint projects can speed up the generation of trust. This may develop in the process of the change in the collective vision where water decisions are viewed as a zero-sum game, towards a new one which focuses on the joint creation of opportunities through the joint use and preservation of water resources.

In the Mekong Delta, the achievement of the construction of the Lao Nam Ngum Dam provided the Mekong Committee with a showpiece for further mobilization of financial support and investment. Other undertakings of the Mekong Committee have also been instrumental in strengthening mutual trust among the riparian countries, such as the Friendship Bridge and Mekong Ferry Crossing. In the cooperation process between Jordan and Israel, the storing arrangements of "Jordanian" water in Lake Tiberias in Israel has functioned well, generating trust between the two countries.

5. The critical role of third parties

Scientists, technicians, mediators, facilitators and all other agents are called to play a critical role in the cooperation process. The many roles they can play include: providing transparency, helping recognize the benefits of joint actions, finding the balance between the aspirations and the options of each of the parties involved, helping to root discussions in technical and scientific evidence rather than emotions or ideology, facilitating the access to finance and other resources, etc.

Epistemic communities (e.g. scholars/scientists) can play a role in negotiation processes; they can, for example, address issues that are not explicitly on governmental agendas and provide accurate scientific information. Additionally, they can provide fresh approaches to problems that seem to be at an impasse in deliberations among officials (examples include the Tigris-Euphrates transboundary dispute). In some cases, knowledge brokers can facilitate the implementation of water cooperation processes. Although time-consuming, the continuous interaction of knowledge brokers with all stakeholders was identified as a key success factor in the implementation of the Green Water Credits projects in Kenya and Morocco.

In the case of the Albufeira negotiations, a skilled team of hydraulic engineers, jurists and diplomats was engaged in the preparation of technical documents, drafts of the terms of agreement and the negotiations. Engineers provided the required technical basis of the agreement. Diplomats as experts in negotiations brought realism and an understanding of the wider implications of the negotiations. Experts on international public law were engaged for their indispensable knowledge and expertise on legally binding documents between governments.

Even when the political conditions do not favour, or even act against, the cooperation process, maintaining discussions off-stage at the technical level will help increase the possibilities of success once the /ppolitical conditions are again in place. The Incomati River Basin case study shows how, thanks to this continuous contact among experts, negotiations once started advanced rapidly, and Mozambique was able to secure a share of its waters thanks to the technical meetings that continued during the period 1974–91, when official political relations were almost entirely hostile.

The facilitator plays a key role in creating a conducive environment for cooperation. Without a credible and well-trained facilitator, stakeholder platforms can easily be dominated by the strongest participants. In the SWITCH Learning Alliances project, the role of the learning alliance facilitator was central to the cooperation process. This role went beyond facilitating meetings and events and involved ongoing efforts to push and pull information, and to engage alliance members and stakeholders outside the alliance. Generating trust among the stakeholders in the cooperation process can present a huge challenge. In the Murray-Darling Basin, the mediator played a key role in winning the trust of all the contending stakeholders, which was crucial for a successful cooperation process. In the case of the Israel and Jordan cooperation, before coming to an agreement the parties had basic coordination of some of their actions in the Jordan Basin via the so called 'Picnic Table Talks'. This 'umbrella' for discussions on water coordination in spite of the absence of a peace agreement was facilitated by the UN Truce Supervision Organization (UNTSO). In the Incomati River Basin, the role of a third riparian country as broker between the other two riparian countries was acknowledged as a key success factor. In the negotiations between Spain and Portugal, the European Commission played an important role at the start, before things were handled by both parties on the basis of good neighbourliness and friendship. The Commission and the Stability Pact for South Eastern Europe positively influenced the negotiations of the Framework Agreement on the Sava River Basin.

6. Dealing with asymmetries

Analyzing cooperative activities can reveal (power) asymmetries between the parties involved. On whose terms is the cooperation happening? Research seems to suggest that if parties can engage on more equal terms, the prospects for equitable and lasting cooperative processes increase (e.g. Jordan).

Riparian countries have equality of rights, but the benefits should be distributed equitably. This does not mean that water, when insufficient to cover all the "reasonable and beneficial uses", must be distributed equally, but that the agreed distribution must be perceived as coherent with the principle that each state is entitled to use and benefit from the transboundary waters in an equitable manner. Although this equity principle depends on the context, its

application provides more certainty and less opportunity for subjectivity. This can result in many different allocations of benefits that are perceived as being equitable - including, for example, inthe Columbia River Treaty (CRT), in which downstream hydropower and flood-control benefits from upstream storage are shared equally, whilst other downstream benefits are not shared across the international border by either Canada or the United States.

Capacity building can contribute to overcoming differences between riparian countries in terms of relevant expertise, to lingleveling the playing field and to making cooperation and water management sustainable. In the Mekong River Basin, emphasis was placed on the training of riparian personnel in various fields of cooperation, contributing to sustainable cooperation and to the sustainable development of the Mekong River Basin.

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HELSINKI WATER CONVENTION:
FROM REGIONAL TO GLOBAL

Iulia Trombitcaia

Keywords: Water Convention, transboundary cooperation, international water law, implementation, compliance

INTRODUCTION

The Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) was adopted in Helsinki in 1992 and entered into force in 1996. As of September 2013, it numbers 39 Parties –almost all countries sharing transboundary waters in the region of the United Nations Economic Commission for Europe (UNECE), which comprises countries located in the European Union (EU), non-EU Western Europe, South-East Europe, Eastern Europe, the Caucasus, Central Asia and North America.[1]

In 2003, the Parties to the Water Convention amended it to allow accession to the Convention by United Nations Member States outside the UNECE region. Such a decision was taken because the Parties to the Convention realized the advantages of opening the Convention's cooperative framework to the whole world –in particular, they wanted to offer its principles and provisions worldwide, to share the experiences of the Convention, to learn from other regions of the world and to broaden political support for transboundary cooperation at the global level.

The amendment entered into force on 6 February 2013, turning the Water Convention into a global legal framework for transboundary water cooperation. It is expected that countries outside the UNECE region will be able to join the Convention as of early 2014, after the amendments become operational.[2] The entry into force of the amendment is an important contribution to the International Year of Water Cooperation celebrated in 2013.

MAJOR OBLIGATIONS

The Water Convention is based on and fully in line with customary international law. It has a three-pillar normative structure: (1) the due diligence obligation to prevent, control and reduce significant transboundary impacts ("no-harm rule"); (2) the equitable and reasonable utilization principle; and (3) the principle of cooperation, as the catalyst for the establishment of the first two pillars.

The objectives of the Water Convention are to be achieved through a two-tiered approach, which envisages two main categories of obligations. The first set of obligations, contained in Part I of the Convention text, are more general and apply to all Parties to the Convention (e.g., to introduce prior licensing of wastewater discharges, to apply biological treatment or equivalent processes to municipal wastewater, and to apply en-

Fig. 1. Meeting of the Parties (Rome, 28-30 November 2012). Source: IISD.

vironmental impact assessment and other means of assessment). The second category of obligations, contained in Part II of the Convention, are more specific and must be implemented through the conclusion of further agreements by Riparian Parties sharing the same transboundary waters (e.g., to hold consultations, to establish warning and alarm systems, to organize joint monitoring and assessment, and to provide upon request mutual assistance in critical situations) (UNECE, 2013).

THE INSTITUTIONAL MECHANISM

The institutional mechanism of the Water Convention is directed by the Meeting of the Parties. The Meeting of the Parties is the governing body of the Convention where all important decisions are made, including those of a political nature. It holds its regular sessions every three years, at which it adopts the programme of work for the next three-year period. In between the sessions of the Meeting of the Parties, the decision-making is vested with the Bureau –an elected body comprising 11 Parties to the Convention from the various geographic regions under the Convention.

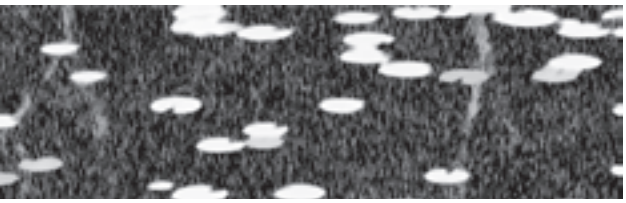
The Meeting of the Parties establishes subsidiary bodies to develop specific areas of work under the work programme. These include the Working Group on Integrated Water Resources Management, the Working Group on Monitoring and Assessment, the Implementation Committee, the Legal Board, the Joint Ad Hoc Expert Group on Water and Industrial Accidents, the International Water Assessment Centre and, currently, Task Forces on Water and Climate and on the Water-Food-Energy-Ecosystems Nexus.

Each body receives a clear mandate from the Meeting of the Parties and implements the activities in one or several areas of the programme of work. The exact set-up of the subsidiary bodies therefore changes depending on the work programme of the Convention –this ensures flexibility and responsiveness to changing needs. The subsidiary bodies are the main venue for the exchange of experience and where cooperation develops in specific areas.

The Convention's secretariat is hosted by UNECE. The secretariat is responsible for servicing the meetings under the Convention and assisting the Convention bodies in implementing the programme of work.

PROGRAMME OF WORK

The Water Convention's programme of work includes a variety of activities at different levels (multilateral, transboundary or basin, national) of both a technical and a political nature. Activities are usually led by leading Parties and overseen by the respective bodies, e.g. by the Working Group on Integrated Water Resources Management or a specific Task Force.



The programme of work for 2013-2015 includes:

— Support to implementation and accession, in particular through projects to facilitate the development and implementation of transboundary water agreements and joint institutions, for example, in the Aral Sea Basin, Chu and Talas River Basins, Drin River Basin, Dniester River Basin and Kura River Basin, as well as Afghan-Tajik cooperation on environment and hydrology;
— Development of a thematic assessment of the water-food-energy-ecosystems nexus in selected transboundary basins worldwide;
— Drawing up of a /guiding memorandum on the identification, quantification and communication of the benefits of transboundary water cooperation;
— Support to cooperation on adaptation of water resources to climate change in transboundary basins worldwide, through pilot projects, exchange of experience and the compilation of lessons learned;
— Support and advice for national water sector reforms through national policy dialogues in countries of Eastern Europe, the Caucasus and Central Asia;
— Activities to raise awareness of the Convention in other regions of the world through capacity-building and partnerships.

SUPPORT IN DEVELOPING TRANSBOUNDARY COOPERATION IN SPECIFIC BASINS

Since the 1990s, the Water Convention has supported the development of transboundary agreements, the establishment of joint institutions and the strengthening of cooperation at both political and technical levels in the pan-European region. For example, the Convention has contributed to or served as a model for the transboundary agreements on the Chu-Talas, Danube, Dniester, Drin, Rhine and Sava Rivers, as well as agreements on the Belarusian-Russian, Belarus-Ukrainian, Estonian-Russian, Kazakh-Russian, Mongolian-Russian, Russian-Ukrainian and many other transboundary waters. Three examples are highlighted below.

Case 1: Dniester Basin Treaty

The 1,362-kilometre-long Dniester River is one of the largest Eastern European rivers. It starts in the Carpathian Mountains in Ukraine, flows through the Republic of Moldova and then re-enters Ukraine, where it discharges into the Black Sea. In addition to supplying drinking water for a large part of the basin, including the major city of Odessa (Ukraine), hydropower generation and fisheries are other important sectors the river serves.

In 2004-2011, the UNECE Water Convention and the Organisation for Security and Cooperation in Europe (OSCE), as part of the Environment and Security Initiative (ENVSEC), provided support to strengthening cooperation between the Republic of Moldova and Ukraine in the Dniester River Basin.

Three projects –Dniester-I, -II and -III– have contributed to the development of the cooperation on the Dniester River Basin, including the involvement of institutions from the Transnistria region. The Dniester-I project (2004-2006), "Transboundary cooperation and sustainable management of the Dniester river", assisted the Riparian States in the development of a diagnostic study of the transboundary issues in the basin (OSCE and UNECE, 2005). The Dniester-II project (2006-2007), "Action Programme to improve transboundary cooperation and sustainable management of the Dniester river", focused on the development of a programme to improve transboundary cooperation (OSCE and UNECE, 2007). Finally, the Dniester-III project (2009-2011),

Fig. 2. Signature of the Dniester Treaty between the Republic of Moldova and Ukraine. Source: IISD.

"Transboundary cooperation and sustainable management in the Dniester River basin: Phase III - Implementation of the Action Programme", assisted the two Governments in the development and negotiation of the Dniester Treaty.

On 29 November 2012 the Minister of Environment of the Republic of Moldova and the Minister of Ecology and Natural Resources of Ukraine signed the bilateral Treaty on Cooperation on the Conservation and Sustainable Development of the Dniester River Basin. The signing ceremony took place at the sixth session of the Meeting of the Parties to the UNECE Water Convention in Rome.

The Treaty is a pioneering example for the post-Soviet region. It significantly broadens the existing cooperation arrangements to cover the entire river basin and all sectors important for the management and protection of the shared waters. The Treaty establishes the bilateral Dniester Commission to facilitate sustainable use and protection of the Basin. It provides a framework for cooperation on water pollution prevention and control, water flow regulation, conservation of biodiversity and protection of the Black Sea environment. It also addresses data exchange, public participation and cooperation in emergency situations. The Treaty is an important step in the implementation by the Republic of Moldova and Ukraine of their obligations under the UNECE Water Convention.

Case 2. Towards a regional agreement on dam safety in Central Asia

Safe exploitation of the ageing water infrastructure in Central Asia, in particular the hundreds of dams and reservoirs built 40 to 50 years ago, is crucial for the future of these countries. Dams and reservoirs are of major importance for the economy and future development of the subregion –they ensure drinking water supply by contributing to seasonal and long-term regulation of river flows; and they provide a reliable source of water for irrigation, industrial water uses and hydropower (UNECE, 2007). In 2010, the failure of the Kyzyl-Agash Dam in Kazakhstan caused the flooding of the nearby village, killing at least 43 people and leaving some 300 injured.

Dam safety in Central Asia is one of the main directions of the work

Fig. 3. Kirov dam in Kyrgyzstan. Source: Chu-Talas Commission secretariat.

programme of the UN Special Programme for the Economies of Central Asia (SPECA) and of the programme of work under the UNECE Water Convention. The "Capacity-building for cooperation on dam safety in Central Asia" project was initiated in 2006 and is implemented in cooperation with the International Fund for Saving the Aral Sea.

All five Central Asian countries –Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan– actively participate in the project. The project helps them to set up or revise national dam safety regulatory frameworks, to achieve their harmonization and to promote subregional cooperation on hydro-technical infrastructure. A regional agreement on cooperation on dam safety has been drafted with the participation of all Central Asian governments. It provides for the cooperation of national authorities involved in maintenance and operation of water infrastructure, exchange of information on the state of water infrastructure, joint inspections of water infrastructure, as well as cooperation in critical situations. The draft agreement is undergoing the approval procedures in the various countries. Moreover, the project helps countries to develop cooperation on individual dams. For example, Kazakhstan and Kyrgyzstan have developed cooperation with regard to the Kirov dam, which is situated on the Talas River on Kyrgyz territory, upstream of the major Kazakh city of Taraz.

Two of the five countries –Kyrgyzstan and Tajikistan– are not Parties to the Water Convention, but they appreciate the platform provided by the Convention for cooperation on dam safety in Central Asian region.

Case 3. Legal framework for the Drin River Basin

The Drin transboundary system (basin) demonstrates the interdependencies between different users as well as between uses in five inter-connected water bodies (Prespa, Ohrid and Skadar/Shkoder Lakes and the Drin and Buna/Bojana Rivers) and the Adriatic Sea. Transboundary cooperation was established earlier in the Lakes, but not at the basin level. That resulted in the basin being managed through different organisms with often conflicting national management approaches.

The UNECE Water Convention supported by Global Water Partnership Mediterranean (GWP-Med) organized consultation meetings on the integrated management of the extended Drin River Basin in 2008 and 2009. The meetings brought together governmental and non-governmental representatives from Albania, Greece, Montenegro, the former Yugoslav Republic of Macedonia and Kosovo (UN-administered territory under UN Security Council resolution 1244) as well as international organizations and donors. The meetings concluded that there was a need to develop cooperation for the whole basin.

In a further process, a shared vision for the management of the basin was developed by relevant ministries, agencies, joint institutions and other stakeholders. On 25 November 2011 in Tirana, the five Drin River riparians signed a Memorandum of Understanding (MoU) on a Shared Strategic Vision for the Sustainable Management of the Drin River Basin. The MoU established a structure for cooperation and defined short-, medium- and long-term objectives for the cooperation.

On 28 May 2013, the five Drin River riparians held the first Meeting of the Parties to the MoU. High-level representatives decided on an action programme to strengthen their cooperation and to address urgent issues, such as flood management and improved monitoring and exchange of information. They also outlined other priority steps to be taken, including raising public awareness and involving stakeholders in the management of the basin.

SUPPORT TO DEVELOPMENT OF NATIONAL WATER POLICY

Since 2006, Parties to the Water Convention have been implementing the programme of the National Policy Dialogues on Integrated Water Resources Management (IWRM). The National Policy Dialogues are the main operational instrument of the European Union Water Initiative in Eastern Europe, the Caucasus and Central Asia. Currently, the programme is implemented in nine countries –Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, the Republic of Moldova, Tajikistan, Turkmenistan and Ukraine.

The National Policy Dialogues provide practical assistance to water sector reforms in these countries, in particular by strengthening the application of IWRM in national water management. They are based on consultations with relevant ministries, agencies and institutions (including the scientific and academic), non-governmental organizations, parliamentary bodies and other national

Fig. 4. National Policy Dialogue in Kyrgyzstan (March 2013). Source: GIZ.

and international organizations. In the respective countries, national Steering Committees or Coordination Councils have been established to guide and steer the National Policy Dialogue process. In several countries the National Policy Dialogues and their Steering Committees have become national coordination mechanisms for water-related projects carried out under the auspices of international organizations and donor governments, contributing to a more efficient use of available funds for development assistance in the water sector.

Examples of achievements in the National Policy Dialogues include:

- Development of national water legislation in Georgia and Turkmenistan;
- Development of water sector strategies in Tajikistan and Azerbaijan;
- Establishment of the Chu River Basin council in Kyrgyzstan;
- Setting and/or implementing national targets on water and health in Armenia, Kyrgyzstan, the Republic of Moldova and Tajikistan.

SOFT LAW DEVELOPMENT

A number of soft-law instruments, such as guidelines, recommendations, model provisions, checklists and other tools, have been developed and adopted under the Water Convention to provide concrete guidance for and to facilitate the implementation of the Convention.[3] These include, for example:

- Recommendations on the prevention of water pollution from hazardous substances (1994).
- Guidelines on the prevention and control of water pollution from fertilizers and pesticides in agriculture (1995).
- Guidelines on licensing wastewater discharges from point sources into transboundary waters (1996).
- Guidelines on Monitoring and Assessment of Transboundary Rivers (1996, 2000) and Transboundary Groundwater (2000).
- Safety guidelines and good practices for pipelines (2006).
- Model Provisions on Transboundary Flood Management (2006).
- Recommendations on Payments for Ecosystem Services in Integrated Water Resources Management (2007).
- Safety Guidelines and Good Practices for Management of Tailings Facilities (2009).
- Guidance on Water and Adaptation to Climate Change (2009).
- Guide to Implementing the Water Convention (2009, updated in 2013).
- Model Provisions on Transboundary Groundwaters (2012).

At present, Parties to the Water Convention are developing a guidance note on the identification, quantification and communication of the benefits of transboundary water cooperation.

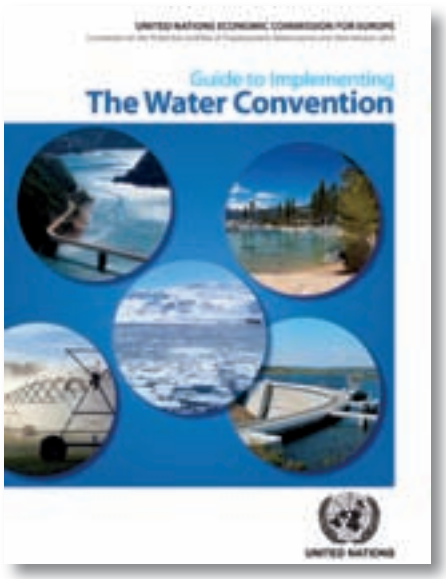


Fig. 5. Guide to Implementing the Water Convention, UNECE, 2013.

FOCUS ON IMPLEMENTATION AND COMPLIANCE

At its sixth session (Rome, 28-30 November 2012), the Convention's Meeting of the Parties established an Implementation Committee for the Convention to facilitate the implementation and application of, and compliance with, the Convention. The Committee consists of nine members serving in their personal capacity. The members of the Committee represent a good mix and balance of competences: the Committee's membership includes outstanding lawyers and water management experts with a strong background in transboundary issues.

In addition to traditional trigger mechanisms such as the submission by a Party having concerns about its own or another Party's compliance with the Convention, the Committee is equipped with a unique advisory procedure, which

distinguishes this body from other similar mechanisms. The advisory procedure enables the Committee to engage with countries seeking to resolve water issues in a non-confrontational manner, and also provides opportunities for the involvement of non-Parties in the procedure upon their consent. Moreover, where the Committee becomes aware of possible difficulties in the implementation by a Party of the Convention, or possible non-compliance with it, including from information received from the public, the Committee has the mandate to begin a Committee initiative on the matter.

Fig. 6. Implementation Committee at the Palais des Nations, Geneva, on 5 June 2013 (from left to right): Mr. Stephen McCaffrey (Member), Ms. Nataliya Nikiforova (secretariat), Mr. Attila Tanzi (Chair), Ms. Vanya Grigorova (Member), Mr. Nicholas Bonvoisin (Secretary), Ms. Anne Schulte-Wülwer-Leidig (Member), Mr. Kari Kinnunen (Member), Mr. Aliaksandr Stankevich (Member), Mr. Ivan Zavadsky (Member), Ms. Iulia Trombitcaia (secretariat), Mr. Saghit Ibatullin (Vice-Chair). Source: UNECE.

It is expected that the mechanism to support implementation and compliance will become a practical tool to address difficulties in implementation and provide assistance tailored to particular problems in specific basins. The Committee should also be able to facilitate external assistance, e.g., technology transfer and capacity-building, when the lack of these hinders implementation of the Convention.

PROTOCOL ON WATER AND HEALTH

The Convention's Protocol on Water and Health was adopted in 1999 and entered into force in 2005. The Protocol is the first international legal agreement adopted specifically to attain an adequate supply of safe drinking water and adequate sanitation for everyone, and to effectively protect water used as a source of drinking water. As of September 2013, the Protocol has 26 Parties in the UNECE region.[4]

The main aim of the Protocol is to protect human health and well-being by better water management, including the protection of water ecosystems, and by preventing, controlling and reducing water-related diseases. The Protocol is an important tool in the implementation of water-related Millennium Development Goals (MDGs). Moreover, with its obligation that *"…the Parties shall pursue the aims of … access to drinking water for everyone [and] … provision of sanitation for everyone…"*, the Protocol goes far beyond the MDG commitment to halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation.

The core obligations of the Parties to the Protocol –to set and implement targets with regard to the quality of drinking water, bathing water and wastewater, to establish and maintain national and/or local surveillance and early warning systems to prevent and respond to water-related disease, and to cooperate and assist each other in the implementation of the Protocol's provisions– serve to translate the human right to water into reality.

PROGRESS ACHIEVED AND CHALLENGES AHEAD

The Water Convention has provided the legal framework for developing transboundary water cooperation exactly when this was most needed. In the early 1990s, with the collapse of the Soviet Union, the decay of Yugoslavia and the dissolution of Czechoslovakia, when many formerly national rivers, lakes and groundwaters became transboundary, the Convention inspired a great number of transboundary water agreements both in the East and the West.

For two decades it has also provided a permanent forum to discuss transboundary water cooperation, share experience and identify good practices in many areas –from joint monitoring and exchange of information to the establishment of comprehensive warning and alarm systems. It has been a flexible instrument responding to the needs of the Parties and often of non-Parties. In many cases, the Convention has facilitated concrete legal, technical and practical assistance to establish transboundary water agreements or strengthen one or another aspect of transboundary water

cooperation (e.g. monitoring of river quality or safety of a specific dam).

The major successes of the Convention have also included the promotion of the integrated approach to transboundary water management, based on the basin (catchment area) approach. In this respect, the Convention has largely influenced the EU Water Framework Directive. It has been actively promoting not only the idea but also practical ways of cooperation on both surface and groundwaters, the involvement of all basin countries in cooperation and a broad understanding of the notion of transboundary impact.

There have also been challenges to the development of the Convention's regime. The Protocol on Civil Liability and Compensation for Damage Caused by the Transboundary Effects of Industrial Accidents on Transboundary Waters –a joint protocol to the Water Convention and the Convention on the Transboundary Effects of Industrial Accidents– was adopted in 2003 following the Baia Mare (Romania) cyanide spill into the Tisza River in 2000. Despite the negotiation process for the Protocol having involved governments, the private sector, including industry and insurance, intergovernmental and non-governmental organizations, the treaty remains far from entering into force.

Another challenge has been to bring into the Convention's family the remaining non-Parties from the UNECE region, in particular from the Caucasus and Central Asia. Parties to the Convention are actively working in these subregions, facilitating the strengthening of transboundary water cooperation and the conclusion of transboundary water agreements, as well as promoting the benefits of cooperation under the Convention's framework. For example, the UNECE Water Convention is working with Georgia and Azerbaijan to facilitate the signature to a bilateral agreement on the Kura River, and to show Georgia –a non-Party– the benefits of accession to the Convention. An impressive recent achievement has been the accession to the Convention by Turkmenistan in August 2012, which strengthens the role of the Convention for transboundary water cooperation in Central Asia.

The global opening of the Convention represents a major opportunity to advance transboundary cooperation at the global level. Moreover, by further consolidating the political role of the Convention, it will also contribute to better implementation of the Convention in the pan-European region. The global opening of the Convention offers the chance to engage in exchanges with other regions, share experience, learn from each other, and thereby further enrich the Convention's store of knowledge.

There will be more and more demands to strengthen cooperation and prevent conflicts at the transboundary level in the future. With the growing pressures on water, there are increasing challenges to resource availability, management and sustainability, which call for stronger cooperation to better use and protect the shared water resources and to prevent potential conflicts on water use. The UNECE Water Convention –in synergy with the 1997 United Nations Convention on the Law of the Non-navigational Uses of International Watercourses and the 2008 Draft Articles on the Law of Transboundary Aquifers– is ready to respond to these challenges, promoting cooperation on transboundary waters worldwide through its legal framework and intergovernmental platform for cooperation.

Iulia Trombitcaia
Environmental Affairs Officer
UNECE

Notes:

1. The UNECE region includes 56 countries located in the European Union (EU), non-EU Western Europe, South-East Europe, Eastern Europe, the Caucasus, Central Asia and North America. As of 30 September 2013, the following countries and organizations are Parties to the Water Convention: Albania, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Kazakhstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Republic of Moldova, Romania, Russian Federation, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkmenistan, Ukraine, Uzbekistan and the European Union. For the updated status of participation, see http://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-5&chapter=27&lang=en.
2. The amendment to the Water Convention will become operational when all Parties to the Convention that adopted it on 28 November 2003 ratify it. As of 1 October 2013, the amendment still has to be ratified by six Parties. See status of ratification at http://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-5-b&chapter=27&lang=en.
3. See all soft-law instruments and publications at http://www.unece.org/env/water/publications/pub.html.
4. As of 30 September 2013, the following countries and organizations are Parties to the Protocol on Water and Health: Albania, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Croatia, Czech Republic, Estonia, Finland, France, Germany, Hungary, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Portugal, Republic of Moldova, Romania, Russian Federation, Serbia, Slovakia, Spain, Switzerland and Ukraine. For the updated status of participation, see http://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-5-a&chapter=27&lang=en.

References:

– OSCE and UNECE, 2005: Transboundary Diagnostic Study for the Dniester River Basin.
– OSCE and UNECE, 2007: Action programme to improve transboundary cooperation and sustainable management of the Dniester River Basin.
– UNECE, 2007: Dam Safety in Central Asia: Capacity-Building and Regional Cooperation.
– UNECE, 2013: Guide to Implementing the Water Convention.

WATER, ENERGY AND WASTE:
CHALLENGES FOR COOPERATION

Blanca Jiménez-Cisneros

Keywords: water, energy, renewable energy, waste, pollution, management

INTRODUCTION

The year 2013 is dedicated to international cooperation in the water sector, according to a decision taken by the General Assembly of the United Nations. The aim is to raise awareness, spread mechanisms and create new methods for better water management through cooperation at all levels. In this context, the following paper describes some of the links created between the water and the energy sectors, and identifies existing and potential mechanisms for cooperation between the two sectors. It also covers waste management, an essential aspect for sustainability. Mexico, an essentially oil-producing country, is used as a case study. To contextualise the work, the first section will provide general information about the use of energy and water. Subsequently, we will analyse the interrelations between these two sectors and between them and waste management. In the last section, proposals will be made as to how to expand cooperation between the two sectors for their mutual benefit.

THE PRESENT SITUATION IN MEXICO

Mexico has an area of 2 million square miles and a population of 112 million people. Domestic product is at about $11,000 per capita, of which 7% comes from oil. The management of water (CONAGUA), electricity (CFE) and oil (PEMEX), is handled by state-owned companies, which factor enables centralised information on these issues and, in principle, an opportunity for cooperation. The yearly consumption of primary energy is 8,399 PJ, of which 90% comes from oil, natural gas and coal, 6% from nuclear, geothermal and hydraulics, and the rest from sugar-cane pulp (waste matter) and from firewood. 31% of the energy is used to generate electricity, 32% for transport, and the rest is used for industries with internal power supplies, residences, agriculture (2%) and trade (SENER, 2012).

The country employs 80.3 km^3 of water per year, 77% for irrigation, 14% for municipal use, 4% for industry and 5% for power plants (CONAGUA, 2012).

Water for energy production

Excluding hydropower, 3.2 km^3 of water per year (101 m^3/s) is used to generate power in Mexico, i.e. 5% of the total usage (CONAGUA, 2012). This water is distributed differently depending on the fuel type and stage of the power generation process. Some aspects about which there is information available are presented below.

Fossil Fuels

Water is used to extract and process oil and natural gas. For example, to make wells in perforation sludge, to increase production when injected into the subsoil, to liquefy bitumen sands or heavy oil before extraction, and to fracture the clay soil and allow the release of gas (Cohen, 2008). In 2011, 73% of the water used for these activities came from rivers and lakes, 27% from aquifers and 1% from wastewater. The lack of water in some regions has motivated the implementation of programmes to reduce water consumption by 15% between 2000 and 2011, even though energy production remained almost constant during the same period (SENER, 2012). Among the measures implemented, in addition to the reuse of water, are recycling of water in power plants and lower water usage per product (Fig. 1).

Thermo-electric Power Generation

Thermo-electric power plants produce 86% of the total energy generated in Mexico. For this purpose, they employ 4% of the country's water usage, which is a much lower figure, for example, than the United States, where it is 39% (DOE, 2008; CNA, 2012). This is in part due to the scarcity of water. Indeed, the first thermo-electric plants were built with open cooling cycles in which water is continuously extracted from the envi-

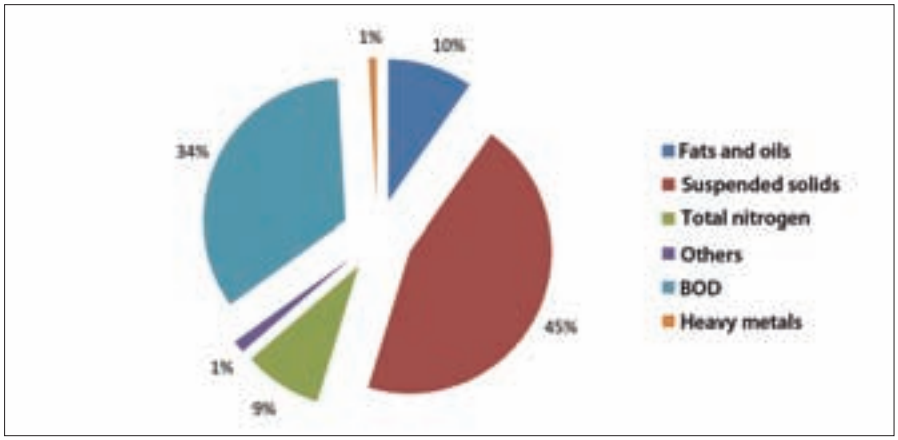
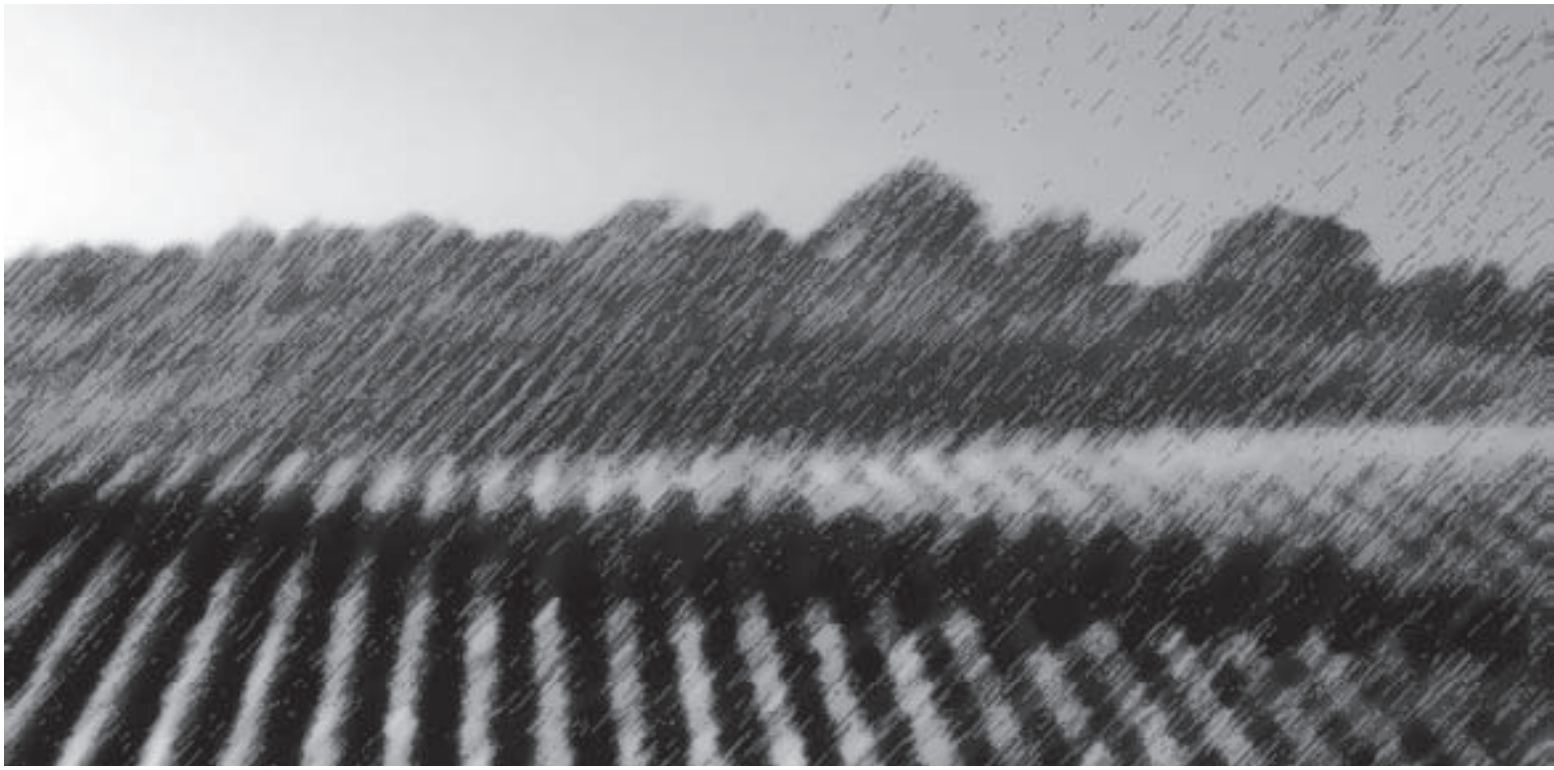


Fig. 1. Pollutants produced at different stages of the management of fossil fuels.
Source: CFE, 2008.



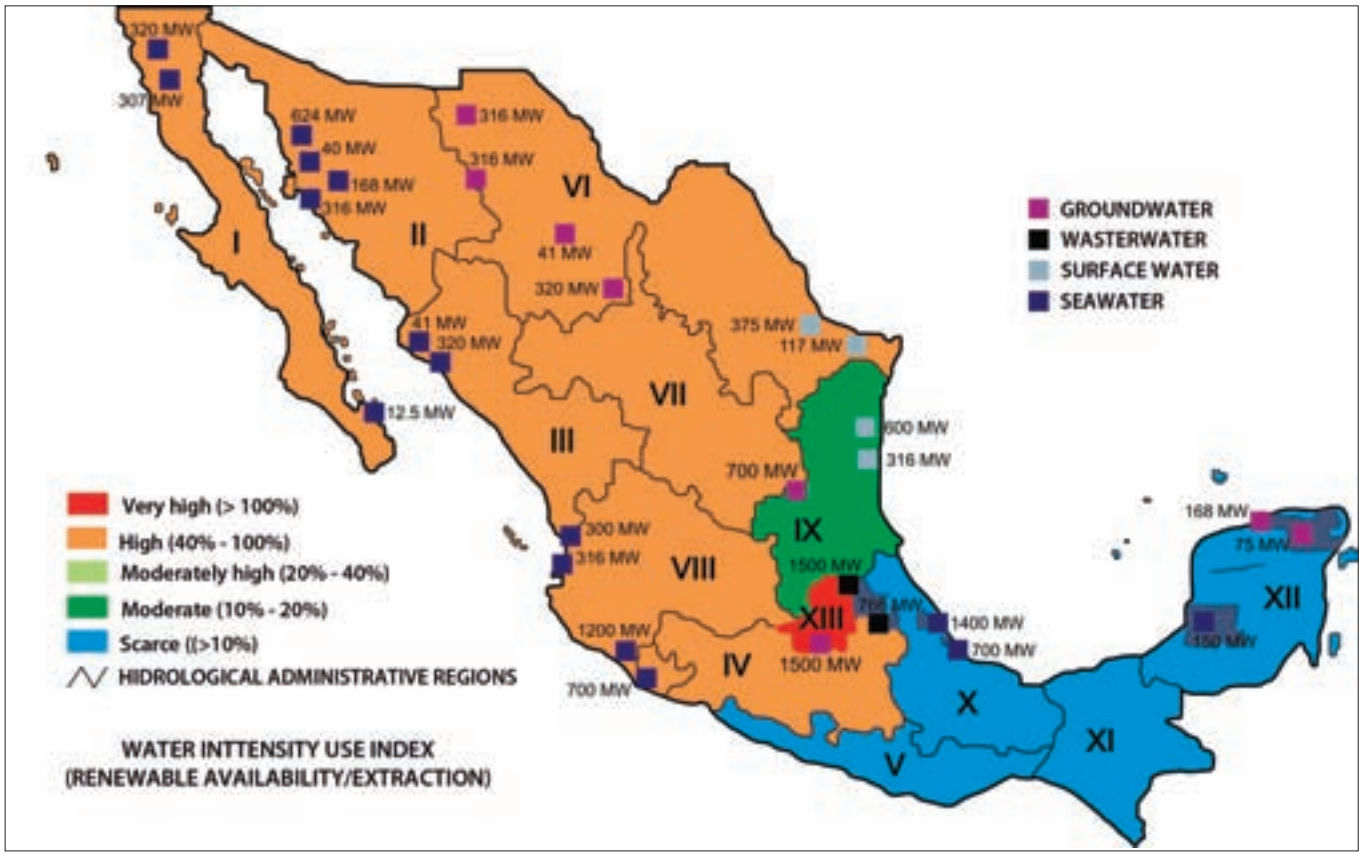


Fig. 2. Electric Power plants and water availability. Source: CFE, 2005 and CONAGUA, 2012.

ronment. By contrast, the more modern plants (Fig. 2) have a closed cycle in which the water is cooled and re-circulated to reduce consumption by 95%. In fact, 86% of all water used for cooling is found in a single coal power station, which operates with an open cycle and produces 13,4 TWh. In addition, 15 power plants use seawater, while in several other plants located in the centre of the country, they use treated municipal wastewater when there is water scarcity (CFE, 2005). Due to water reuse, over-exploitation of aquifers to generate energy was reduced by 70% between 1990 and 2004, and it actually now accounts for 21% of cooling water (Fig. 3, CFE, 2008).

On the other hand, the generation of electricity also produces water pollution, either by direct discharge, or by indirect discharge of pollutants that are released into the air and are then subsequently deposited in the water. The main pollutants are chemicals and heat. 90% of the connate water (the water

extracted from the subsoil, along with oil) is treated and/or re-injected, but the rest is discharged into the atmosphere untreated. In addition, there are often accidental spills affecting the soil and water bodies. 90% of the connate water contains high concentrations of salts, boron, hydrocarbons, sulphur, heavy metals and toxic organic compounds.

The wastewater from the oil refining process is partially treated to eliminate 70% of the pollution, but 1,622 tons are still discharged. Figure 5 shows the amount and type of pollutants discharged for the various stages of the processing of fossil fuels.

The thermo-electric generation plants produce 228 thousand km^3 of contaminated water per year, mainly heated water (CFE, 2008). There is little information on its effects. The regulatory framework restricts the maximum value of the discharge to 40°C, without establishing an associated flow, and rarely limits the presence of other pollutants such as biodegradable organic matter and suspended solids (SEMARNAT, 1996). As to the hydroelectric plants, although they modify ecosystems when their dams are built on rivers within their estates, and although they often suffer infestations of water lilies and other weeds, there is little quantitative information on their impact.

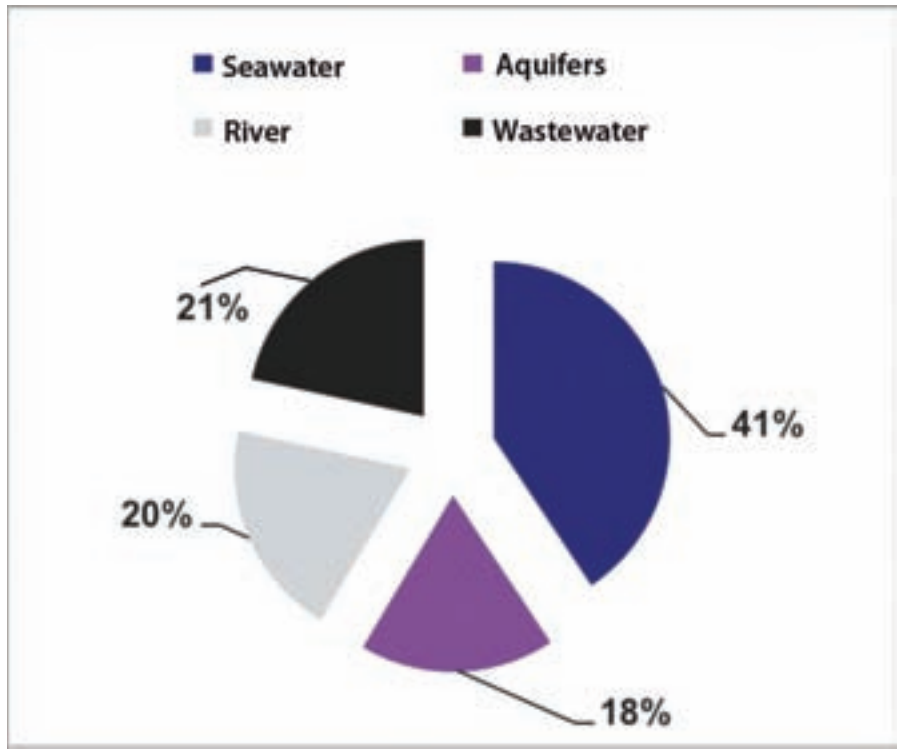


Fig. 3. Water sources used for cooling. Source: CFE, 2008.

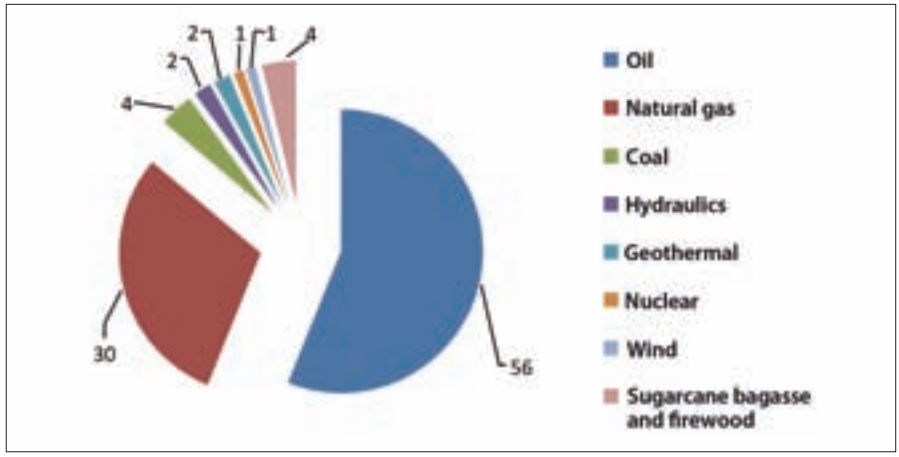


Fig. 4. Percentage contribution of pollutants by energy source.

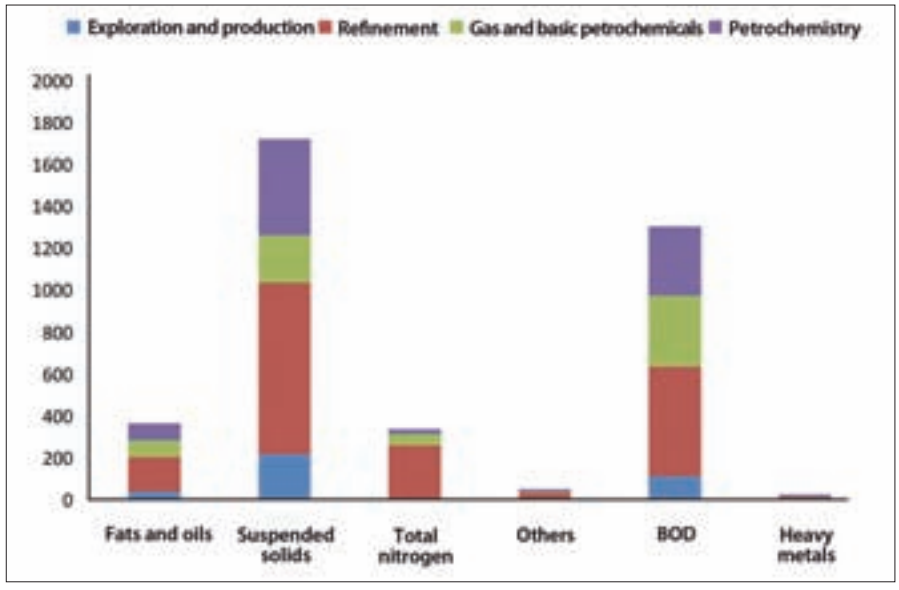
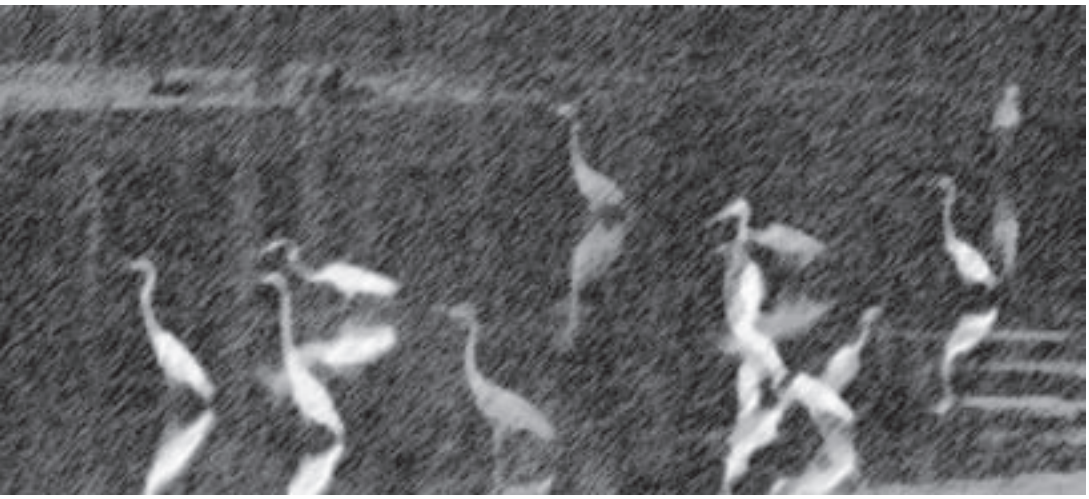


Fig. 5. DBO: Biochemical Oxygen Demand (organic biodegradable material).

Energy for water management

Agriculture

61.5 km^3 of water is used by over 120,000 users to irrigate 6.5 million hectares, one of the largest areas in the world (CNA, 2012). They use 10.972 GWh of electricity, which accounts for 5.5% of the national total (CFE, 2012). Irrigation is applied mainly where water is scarce, i.e. in the center and north of the country, which is where 80% of the population live and energy demand is high-



er. As for electricity, it is in the center of the country where sewage is used. In both cases, the wastewater comes from the City of Mexico, where 20% of the country's population live. Of the total irrigation water, one third comes from aquifers, and the majority of those located in central and northern Mexico are overexploited. Almost all the irrigation is performed by gravity, i.e. without power, but with a water efficiency of 40 to 60%. Pressurized irrigation with efficiencies of 75 to 95% consumes between 1,355 and 2,846 kWh/ha/year (Alfaro and Marín, 1991) and is very expensive for most farmers.

Alfaro and Marín highlight the use of windmills to pump water up to 30 m deep, and the use of solar-powered hydraulic pumps or hybrid systems through government-funded initiatives (Ecotourism and New Technologies, 2002, *Trust Fund for Shared Risk* - FIRCO). By 2008 there were 19 windmills with photovoltaic systems (CFE, 2008). In addition, gasoline –and diesel– fuelled hydraulic pumps are used for irrigation, but there is no information about the consumption.

To increase energy efficiency, there exist tariffs known as stimuli, which are about 3.8 cents USD/kWh, instead of 11 cents USD/kWh (CFE, 2012). These rates are for registered farmers who are committed to increasing productivity and energy efficiency, as well as to irrigating at night, when energy demand is lower. Although this and the use of renewable energy reduce the consumption of water to produce conventional energy, the protection of water resources is not their objective.

Municipal Use

11.4 km^3 of water per year is used for municipal supplies, 62% from aquifers and 38% from surface bodies. 3,200 GWh were consumed for this purpose, of which 1,95 GWh were used for the purification and supply of water, and 0,09 GWh for drainage and sanitation (CNA, 2012, SENER, 2011 and WEF, 2009).

It is worth noting that the quality of the power supply service is reflected in the quality of the water supply service, since instability in the former causes failures in the latter.

Industrial Use

Self-sufficient industry consumes 3.2 km^3 of water per year, 45% from aquifers and the rest from surface sources (CNA, 2012). 80% is used to produce sugar, in chemicals, oil, cellulose and paper, and soft drinks in some 1,400 industries. 50% is used for cooling, 35% for processing, 5% in boilers and 10% for services. The industry's energy consumption is 1,363.4 PJ, 37% of which is electricity (SENER, 2011). About 10 % of this consumption is to treat 2.0 km^3/year of wastewater (CONAGUA, 2012). The low coverage of purification (20% of the total) and of the level of industrial treatment, leads to the assertion that in the future there will be an increase in consumption of energy to control industrial water pollution.

Current cooperation

Energy Sector with Water

By reusing 7,2 m^3/s of municipal wastewater for landscape irrigation and cooling, thermoelectric power plants reduce competition in areas where the situation is critical (CFE, 2008). Although they do this for lack of water in the power plants, in practical terms they are also contributing to alleviating the water sector problems by releasing water for other uses. The same applies to the programmes for efficient water and energy use that they manage.

Water Sector with Energy

Hydroelectric plants use 150.7 km^3 of wastewater per year to generate 14% of the electricity produced by this means (Domínguez, 2001). On the other hand, two of the 150 municipal sewage treatment plants in the country use sludge treatment products via methanisation to generate the electricity consumed by the plant itself. While this effort is still very small in terms of energy volume, it is certainly already a beginning.

Waste with Energy and Water Sectors

4% of the country's energy is produced by burning cane and wood bagasse, which saves water consumption, but also saves water for conventional energy production.

Opportunities for cooperation

As noted, 5% of the water used in the country is used to produce energy (about 39 m^3/capita/year), and 7% of electricity (165 kWh/capita/year) to manage water use. Both consumptions could be reduced, thereby lessening the impact of the one on the other; but better still, it would result in higher profits. Because not only is energy required for water, and water for energy, but also, as mentioned, waste from the former affects the quality of the latter (and therefore its availability); just as waste from the latter can be used by the former to generate power. At the same time, waste from other industries can be used to generate energy and in turn save water. In addition to these points of connection, it should be noted that it is not possible to optimize service efficiency and quality in one sector without doing it in the other. Hence it is required that both sectors jointly analyze the impacts that the management of one exerts on the other. As in the case of Mexico, although motivated by other factors, there are opportunities for improvement with clear economic gains.

Theoretically, the joint management of water and energy could be simple in Mexico, because both sectors are handled centrally by the state. This calls for effective institutional coordination linking the objectives of each company with global sustainability goals for the country. However, this carries the special requirement of creating a true spirit of cooperation.

One case to highlight, as an example of the problems of non-cooperation, is the goal established in 2009 by the energy sector to use 40 million tons of sugar cane to produce ethanol for fuel combustion in 20% of the vehicles in major cities (Mexico City, Guadalajara and Monterrey), thus reducing greenhouse gas emissions. This target was set without taking into consideration that the demand for water was at least 182 m^3/ton, which is not feasible for the country (Haro *et al.,* publ. forthcoming).

Cooperation between the water and energy sectors could help address the following two challenges facing each sector, which are already evident:

- The overexploitation of aquifers in areas with greater population, water demand for irrigation and energy demand.
- The lack of water to produce energy where it is most needed.

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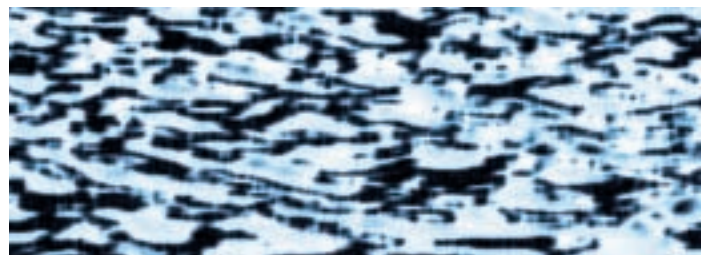
References

- Alfaro, J. and Marín, J. (1991). *Uso de agua y energía para riego en América Latina* (Water and energy uses for irrigation in Latin America). International Seminar on Efficient Water Use (21-25 October 1991) held in Mexico City, Mexico. Available at http://www.unesco.org.uy/phi/libros/uso_eficiente/indice.html#inaugura
- Haro M.E., Navarro I., Thompson R. and Jiménez B. (publ. forthcoming), "Estimation of the Water Footprint of Sugarcane in Mexico: is ethanol production an environmentally feasible fuel option?", *Journal of Water Climate.*
- CFE (2005). *Uso y aprovechamiento del agua para generación eléctrica* (Use and exploitation of water for power generation). Paper presented at the *IV Foro Mundial del Agua* (Fourth World Water Forum). Available at http://www.cepis.ops-oms.org/bvsacg/e/foro4/17marzo/water/uso.pdf
- CFE (2008). Sustainability Report. Available at http://www.cfe.gob.mx/es/LaEmpresa/queescfe/Publicaciones/
- CFE (2012). Sustainability Report. Available at http://www.cfe.gob.mx/es/LaEmpresa/queescfe/Publicaciones/
- CFE, Federal Electricity Commission (2009). *Tarifas eléctricas* (Electricity rates). Mexico. Website: http://www.cfe.gob.mx
- Federal Electricity Commission (CFE, 2005). Uso y aprovechamiento del agua para generación eléctrica, (Use and exploitation of water for power generation), in the *IV Foro Mundial del Agua*, (IV World Water Forum), 2005. Web site: http://www.cepis.ops-oms.org/bvsacg/e/foro4/17marzo/water/uso.pdf
- Cohen, D. M. (2008). *¿Quién dijo que el petróleo y el agua no se mezclan?* (Who said that oil and water do not mix?) World Oil, December 2008. Available at: http://mariobernardiconsultores.blogia.com/2009/021101--quien-dijo-que-el-petroleo-y-el-agua-no-se-mezclan-.php
- CONAGUA (2008). *Estadísticas del agua en México 2008,* (Water statistics in Mexico 2008). SEMARNAT, Mexico.
- CONAGUA (2012). *Estadísticas del agua en México 2012,* (Water statistics in Mexico 2012). SEMARNAT, Mexico.
- DOE, Department of Energy (2008). *Energy Demands on Water Resources. Report to Congress on the Interdependency of Energy and Water.* Available at: http://www.sandia.gov/energy-water/docs/121-RptToCongress-EWwEIAcomments-FINAL.pdf
- Ecotourism and New Technologies, S.A. de C.V. *Casos de estudio sistemas eólicos para bombeo de agua en México: Zacatecas y Oaxaca* (Case studies of wind systems for water pumping in Mexico: Zacatecas and Oaxaca). Texas University, 2002.
- U.S. Department of Energy (USDOE). *Energy Demands on Water Resources. Report to Congress on the Interdependency of Energy and Water, 2006.*
- Domínguez R., 2001. *El sistema principal de drenaje del Área Metropolitana del Valle de México*. (The main drainage system of the Metropolitan Area of the Valley of Mexico), Engineering Institute Series. CI-22, 34 p.
- Pemex. Sustainable Development Reports. Statistical Annex, 2009. Available at: http://desarrollosustentable.pemex.com/portal/index.cfm
- Pemex (2002-2009). *Informes de Desarrollo Sustentable. Anexo estadístico* (Sustainable Development Reports. Statistical Annex). Available at: http://desarrollosustentable.pemex.com/portal/index.cfm
- Sheinbaum C., Chávez C., Ruíz J., *Agua y Energía* (Water and Energy), in Jiménez B. (ed.). Water in Mexico. Mexican Academy of Sciences, 2010. Mexico DF.
- SENER, Energy Secretariat (2008). *Sistema de Información Energética* (Energy Information System). Mexico. Available at: http://www.sener.gob.mx
- SENER (2008). *Balance Nacional de Energía, 2007* (National Energy Balance, 2007). Available at: http://www.sener.gob.mx
- SENER (2012). *Balance Nacional de Energía, 2011.* (National Energy Balance, 2011). Available at: http://www.sener.gob.mx
- SEMARNAT (1996) NOM-001-SEMARNAT. *Límites máximos permisibles de contaminantes en las descargas de aguas residuales en aguas y bienes nacionales* (Maximum permissible limits of pollutants for wastewater discharges in water and domestic goods.) Official Journal of the Federation. December 24, 1996.
- World Economic Forum. Energy Vision, update 2009. *Thirsty Energy: Water and energy in the 21th century*. World Economic Forum in Partnership with Cambridge Energy Research Associates, 2009. Available at: http://www2.cera.com/docs/WEF_Fall2008_CERA.pdf

COOPERATION AND PLANNING IN THE REALIZATION OF THE HUMAN RIGHT TO WATER AND SANITATION FOR ALL WITHOUT DISCRIMINATION

Catarina de Albuquerque

Keywords: human rights, water, sanitation, human rights principles, non-discrimination, accountability



INTRODUCTION

In this article I want to highlight the importance of cooperation, and of the message conveyed by the International Year of Water Cooperation, for implementing the human right to water and sanitation. In my past five years of work as the United Nations Special Rapporteur on the human right to safe drinking water and sanitation, I have come to the realization that the engagement of the different stakeholders is the key to ensuring the realisation of these human rights. This becomes very clear to me when I go on country missions and realise that one of the most persistent obstacles I regularly identify when visiting a country is the lack of cooperation between different stakeholders –national and international, local and central, governmental and non-governmental– inside a country. The importance of cooperation for realising the rights to water and sanitation also became very clear to me when, in the first three years of my mandate, I was tasked with compiling good practices from different stakeholders in realising the human rights to water and sanitation. I subsequently published a book –*On The Right Track*– containing a wide variety of different practices, from small-scale sanitation service delivery in Malawi to urban water supply in Senegal and sector reform in Kenya, carried out by a range of different stakeholders, from local NGOs working to eradicate open defecation in Bangladesh to governments committed to realising the right to sanitation in South Asia. These stakeholders and practices have all been attempting to promote or deliver universal and full access to water and sanitation services, and in many, but not all cases, using the framework of the human rights to water and sanitation. What has been interesting to realise is that few of the practices submitted to me have been submitted by single organisations. The majority have been submitted on behalf of two or more stakeholders and almost all explicitly mention a wide range of different stakeholders involved in the practice. Hence the practices have also demonstrated how partnership is central for the delivery of water and sanitation, as well as for meeting human rights criteria, and specifically for ensuring participation and accountability.

Ensuring the realisation of the human right to water and sanitation for all, while progressively eliminating inequalities, requires political choices on the part of the State, coupled with well-considered planning, budgeting and financing, not just for capital costs, but also for operation and long-term, capital maintenance. The State bodies engaged in ensuring access to water and sanitation can include public works, health, housing, education, planning, finance, agriculture, urban ministries and departments, and local government, among others. Service providers can be large, medium or small-scale,

and managed either by the private or public sector, or a combination of the two. International stakeholders can include donor States, who have an obligation under human rights law to refrain from interfering in the ability of States to realize human rights, but also to provide international assistance and cooperation to States that cannot fulfil their responsibilities. Also included are international agencies (UNICEF, UNDP, UN-HABITAT, WHO etc.), NGOs and development banks (such as the World Bank or the regional development banks), which may provide funds, research and expertise. NGOs, civil society organisations, and indeed the consumers/users/communities themselves will also be engaged at all levels in ensuring the delivery of safe, affordable, culturally acceptable water and sanitation services for all, from planning and implementation to monitoring and maintaining the services. The success of any practice is dependent on the partnership between some and, in a few cases, all of the above actors. It is particularly dependent on the engagement of the users of the services themselves, not only to ensure that the services are appropriate and accessible to the groups that they are intended for, but also to ensure accountability –for transparency in contracts, for monitoring the provision of services and for holding governments and other stakeholders to account for failures to deliver these essential services. Civil society also has a role to play in ensuring that the policies and legislation are appropriate, meet human rights principles and are not driven by conditionalities that favour more powerful groups. This is critical, as sanitation in particular is not just a necessity for the individual, but also a social responsibility.

Hence for ensuring proper cooperation among different stakeholders at different levels, planning is an indispensable first step. To start planning for the implementation of the rights to water and to sanitation, Governments need to identify and designate the responsible ministry or ministries and department(s). Often, a range of institutions are responsible for different aspects, including the departments of health, infrastructure, environment, education, agriculture and water resources. Moreover, different entities may be involved in the regulation of the water and sanitation sectors. For instance, regulating water quality may rest with the department of health or environment, while responsibility for regulation of tariffs may lie elsewhere. Yet another ministry might be responsible for implementing the social policies necessary to ensure affordability for certain parts of the population. The plan should therefore clearly allocate responsibilities and spell out which actor is to undertake which activity as well as provide for coordination among ministries. Apart from the relevant line ministries, strengthening cooperation with planning and finance ministries is crucial. The experience of the Sanitation and Water for All (SWA) initiative has shown that the involvement of finance ministers makes a significant difference in ensuring adequate budgetary support to realizing the rights to water and to sanitation. For instance, in Chad, the initiative helped to bring together the Ministers of Finance and Water. Their discussions on the need for a sound sanitation strategy resulted in the disaggregation of the previously

consolidated budget line for water and sanitation in order to better track investments in sanitation.

To ensure coordination, Governments may wish to appoint a focal point or create a steering committee or task force. The Colombo Declaration, adopted at the fourth South Asian Conference on Sanitation in April 2011, explicitly calls on countries "to establish one national body with responsibility for coordinating sanitation and hygiene, involving all stakeholders including, but not limited to, those responsible for finance, health, public health, environment, water, education, gender and local government at national, subnational and local levels". Such a coordination body needs backing from the highest political levels as well as a clear mandate. To avoid a disjuncture between the different phases of planning, it is essential that the same institutions be involved throughout the entire planning cycle.

In the next section I will briefly highlight what planning for ensuring adequate access to water and sanitation for all from a human rights perspective entails.

PLANNING FOR THE HUMAN RIGHT TO WATER AND SANITATION

Having a vision and the corresponding political will to transform that vision into reality are fundamental first steps to the realization of the rights to water and to sanitation. As the United Nations Development Programme (UNDP) observed in the Human Development Report 2006 on water: "The obvious starting point for a drive towards universal access to water and sanitation is political will, broadly defined as the resolve to put the issue at the centre of the national agenda." The preparation and adoption of actionable strategies and plans is a manifestation of that vision and can set out how a State intends to realize the rights to water and to sanitation.

Planning processes in line with human rights contribute to ensuring a coherent approach that accords sufficient priority to water and sanitation, helps to ensure more sustainable results, and strengthens accountability. A clearly articulated vision has the advantage of serving as a firm foundation for prioritizing funding to the sector, both from within the domestic budget as well as through international assistance. This vision can inspire confidence that funds can be absorbed and spent in line with the stated goals. National planning provides opportunities to ensure more coordinated and consistent responses to broader concerns such as climate change and water scarcity.

Good planning will also identify and address incompatibilities with human rights, as well as overlaps and gaps in laws and policies. Successful planning is based on broad participation, which further contributes to effective implementation and sustainability. Effective national planning frequently leads to improved data on water and sanitation as well as to clarified responsibilities for more efficient and effective management of water and sanitation, thus contributing to enhanced accountability.

The rights to water and to sanitation are guaranteed under international human rights law and States must take measures towards the progressive realization of these rights. This requires concrete and targeted steps to the maximum of their available resources. States are required to move towards the goal of full realization as expeditiously and effectively as possible, within the framework of international cooperation and assistance, where needed. Certain aspects of these rights are immediate obligations, including the requirement to guarantee them without discrimination.

The normative content of the rights to water and to sanitation provides the standard to be achieved in terms of the following criteria:

(a) Availability. The human right to water is limited to personal and domestic uses and foresees a supply for each person that must be sufficient for these purposes. Likewise, a sufficient number of sanitation facilities must be available.

(b) Quality. Water must be safe for consumption and other uses and not threaten human health. Sanitation facilities must be hygienically and technically safe to use. To ensure hygiene, access to water for cleansing and hand washing after use is essential.

(c) Acceptability. Sanitation facilities, in particular, must be culturally acceptable. This will often require gender-specific facilities, constructed in a way that ensures privacy and dignity.

(d) Accessibility. Water and sanitation services must be accessible to everyone in the household or its vicinity on a continuous basis, as well as in schools, healthcare facilities and other public institutions and places. Physical security must not be threatened during access to facilities.

(e) Affordability. Access to sanitation and water must not compromise the ability to pay for other essential necessities guaranteed by human rights, such as food, housing and health care.

These criteria reflect the need for a holistic, comprehensive, and coherent approach to fully realize the rights to water and to sanitation for all.

In the context of water and sanitation specifically, a number of planning exercises are relevant, ranging from short to long-term planning. Here, the strategies are understood to set out the general framework, often covering development more broadly and setting the tone for policy development. Such strategies are longer term and should be in place before a plan of action is developed. In turn, the action plans are based on these strategies. They cover only water and/or sanitation, and are more specific, short term and action-oriented, including the detailed activities to implement the overall strategy. These are often developed at the national level.

Since water and sanitation service provision is often the responsibility of the local authorities, planning at the local level is equally relevant. In some States, subnational or local government is further responsible for policymaking in the field of water and sanitation. The exact determination of what proportion of planning is to take place at the national and local levels will depend on the country's legal and administrative system, in particular the extent of decentralization. In many cases, at a minimum, the overall strategy and framework will be set out at the national level, while the specific activities to implement this strategy will be planned locally.

Many countries already have a national strategy and/or plan of action specifically devoted to water and/or sanitation, although water is more often addressed than sanitation. Indeed, the Global Annual Assessment of Sanitation and Drinking-Water found that almost one third of the reporting countries did not have a sanitation policy in place covering urban and rural areas. The need for sound national planning processes is reiterated by the initiative entitled "Sustainable sanitation: the five-year drive to 2015". Similarly, the Sanitation and Water for All initiative, an international partnership of national Governments, donors, civil society organizations and others, emphasizes the critical role of national planning. It seeks to galvanize political commitment to increasing access to water and sanitation and, *inter alia*, provides capacity-building support for strong national processes that rely on improved data and analysis of the sanitation and water supply sectors for decision-making.

For example, this initiative catalysed the preparation of The Ghana Compact: Sanitation and Water for All –A Global Framework for Ac-

tion, in which Ghana commits to an annual allocation of $350 million towards water and sanitation improvements and up to 0.5 per cent of the Gross Domestic Product (GDP) for hygiene education, including hand washing and Community-Led Total Sanitation (CLTS).

Moreover, many developing countries have a development strategy, which is frequently based on the Millennium Development Goals or driven by poverty-reduction strategy processes. Water and sanitation should be accorded priority in these broader national development strategies. While development strategies have long been perceived as suffering from a "blind spot" with respect to water and, in particular, sanitation, more recent surveys indicate that many such strategies cover water and/or sanitation. Some countries, such as the Plurinational State of Bolivia, in its National Development Plan (2006-2011), have clearly made water and sanitation a national priority.

The realization of the human rights to water and to sanitation should be considered from the outset, in the planning exercise that determines the general framework at the national level. Hence, coherent planning will require integration of the human rights to water and to sanitation into existing strategies that cover the related policy fields and development more broadly. For instance, since the rights to water and to sanitation relate to all spheres of life, plans in the field of education or health should cover access to (sex-segregated) water and sanitation in schools and hospitals. Poverty reduction strategies and national development plans should also envisage specific action with regard to water and sanitation.

Specific strategies and plans for water and sanitation will often also be essential to ensure that these issues are accorded sufficient priority and that their specificities are taken into account. These will need to be linked to broader plans and strategies in related sectors to ensure a coherent approach. An exclusive focus on mainstreaming would carry the risk of diluting the issue and limiting it to rhetorical repackaging. Moreover, it has been found that strong sectoral planning influences donor prioritization and thus can help to increase funding to the sectors. Often overlooked, formulating a specific strategy on sanitation, as has been done in Bangladesh, has been shown in many cases to contribute significantly to prioritization of the issue.

Existing strong strategies and/or plans for the water and sanitation sectors should be re-examined, revised and fully aligned with human rights standards and principles. Often, such strategies, although not necessarily couched in the language of human rights, already implicitly include human rights principles such as non-discrimination, and can be built upon. Where no such planning exists, or where sanitation and water do not enjoy sufficient priority, the development of a new strategy and/or plan based on the human rights to water and to sanitation will be necessary.

PHASES OF PLANNING

A. Assessment and diagnosis

The development of a strategy and a plan for the implementation of the rights to water and to sanitation must be based on a robust situational analysis that enables States to know where they stand both in terms of outcomes as well as inputs to the sectors, including on the status of the realization of the rights to water and to sanitation, on access to safe and affordable water and sanitation, and on funding flows to existing activities, resources and institutional capacities.

The normative content of the rights to water and to sanitation is a good basis for such an assessment. Analysing the current situation will require a detailed understanding of

access, and will need to go beyond the information currently reported, for example, in the framework of the monitoring of the Millennium Development Goals. Often, existing information from censuses, demographic surveys and samples is not as detailed, targeted and disaggregated as would be required for a thorough assessment based on human rights criteria and indicators. Inadequate data can therefore be a serious constraint, underscoring the need for improvement and capacity-strengthening in that area.

However, better use could be made of the data already gathered. Non-discrimination is a core concept in human rights law, and in this regard, the assessment must pay particular attention to marginalized and vulnerable groups, to determine their levels of access and the specific barriers they may face. In terms of assessing inputs to the sectors, States should undertake a mapping of policies, programmes and activities already in place, determine what resources have been allocated, and identify the actors, including the different service providers, involved.

B. Target setting

National plans should set targets for progress in achieving access to water and sanitation, which provides the basis for accountability. Ultimately, international human rights law requires that States aim for universal coverage within time frames tailored to the country situation. Target setting must be undertaken with reference to an objective assessment of national priorities and resource constraints – but going to the maximum of a State's available resources. In this regard, some countries present notable examples.

The ultimate goal of universal coverage should be broken down into more specific time-bound targets and benchmarks to be achieved in shorter time periods. A firm time frame for the targets to be reached and the activities required to achieve these targets is essential in determining the concrete steps to be taken and enabling people to hold Governments accountable for these targets.

Progressive realization also implies that States must move beyond minimum standards towards the gradual achievement of higher levels of service. States must balance short-, medium- and long-term measures in order to ensure sustainable service provision at a universal level, while giving priority to the realization of a basic level of service for everyone, before improving service levels for those already served.

Targets must be ambitious, but realistic. Target setting is not just a technical or bureaucratic matter, but a political process related to the decision of whether resources to the sectors must be increased to meet human rights standards. Targets must be based on a realistic assessment of resources and capacity. It is essential to predict the costs of the requirements to meet a given target –that is, to calculate the necessary expenditures– as also to anticipate the revenue realistically. Moreover, planners should not only consider the availability of actual and potential financial resources, but also develop plans to ensure that there is capacity to absorb these resources and ensure proper expenditure.

C. Formulation and implementation of appropriate measures

States would then need to formulate and design the necessary measures in calculating what actions are required to meet these targets in terms of financial, human, institutional and other resources. Human rights law does not prescribe the specific measures that States should take, but provides a framework for formulation and implementation. It stipulates the goals to reach and the issues to be considered to ensure that service provision meets human rights standards, while the specific and most appropriate measures depend on the circumstances in each particular State.

States must ultimately ensure that all people under their jurisdiction have access to sufficient, safe, acceptable and affordable water and sanitation services. While a water and sanitation strategy may adopt the overall framework, plans should be action-oriented and should list the measures to be adopted as specifically as possible.

D. Monitoring and evaluation

From the outset, strategies and plans must include built-in arrangements for monitoring and evaluation. States must monitor whether the envisaged steps and activities have been taken and to what extent human rights have been integrated. They must assess progress and identify shortcomings and remaining challenges. Periodic reports on the progress in the implementation of a plan are one way to enable monitoring. Based on an evaluation of the steps taken, subsequent changes and corrections to the plan should be undertaken.

States should monitor whether the set targets have been reached within the envisaged time frame. To enable monitoring of the realization of the rights to water and to sanitation, States should develop relevant indicators, taking into account human rights criteria. These indicators can relate, for example, to reduction of the time spent in collecting water, improvement of water quality and increases in the percentage of treatment of wastewater. Such indicators should be designed not only to measure the outcome in terms of access, but also to reflect the progress made and Government efforts. Moreover, data must be disaggregated as regards prohibited grounds of discrimination, to reflect whether the specific targets set for marginalized and vulnerable populations have been reached.

Monitoring must be carried out by State institutions, but external actors should be able to examine critically public monitoring processes, reports and data sets, activities which require full transparency regarding these processes. Civil society organizations and the communities themselves should be involved in monitoring and evaluation activities related to their water and sanitation services.

SUCCESS FACTORS

The success of planning is as much about the process of the development of the plan as about the actual plan and the activities that flow from it.

Successful planning includes a number of factors, such as a sound legal framework structured towards human rights and access to justice, strong institutions, and a clear designation of responsibilities, to ensure adequate financing and provide for participation and transparency, integrating non-discrimination and equality and obviously coordination and cooperation to avoid fragmentation.

Hence the rationale behind the United Nations International Year of Water Cooperation to raise awareness, both on the potential for increased cooperation and on the challenges facing water management in the light of the increase in demand for water access, allocation and services, proves also to be crucial for realising the human right to water and sanitation. And as I have tried to demonstrate in this short article, national planning that incorporates the human right to water and sanitation and general human rights principles is a fundamental step to making sure the human right to water and sanitation transforms into reality and makes a difference in peoples' lives.

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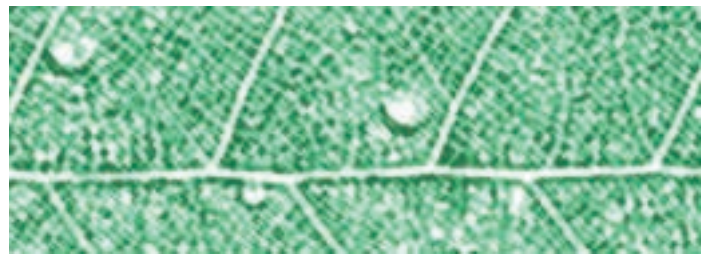
WATER COOPERATION ISSUES REQUIRE FURTHER DISCUSSIONS ON A REGULAR BASIS

Ambassador Sirodjidin Aslov

Keywords: dialogue, partnership, cooperation, government policies, sourcing, sustainable development, water resources, sanitation



To have a professional talk about water cooperation issues it is essential to look at the subject through the prism of the outcomes of the High Level International Conference on Water Cooperation (HLICWC), which was attended by high level delegations and representatives from over 100 states, and 60 international organizations and international financial institutions, as well as the representatives of local governments, non-governmental organizations, academic institutions and the private sector.

The HLICWC met in Dushanbe, Tajikistan, on 20-21 August 2013, in accordance with the UNGA Resolution A/67/204 "Implementation of the International Year of Water Cooperation, 2013", to promote dialogue and mutual understanding and to strengthen partnership and cooperation on water issues among all stakeholders at all levels.

The deliberations of the High-level Dialogue held on 22 March 2013 in New York and the Official World Water Day event on 22 March 2013 in The Hague and other international events on water cooperation, continued during the High-level International Conference in Dushanbe, on a broader scale.

The Conference focused on four major themes:

1. Water Cooperation for Human Development;
2. Water Cooperation for Economic Benefits;
3. Water Cooperation for Ecosystems;
4. Water Cooperation across Boundaries.

The Conference also focused on the following four cross-cutting issues:

A. Water Cooperation and Gender;
B. Water Cooperation and Capacity Building;
C. Water Cooperation and Sectoral Synergies;
D. Triggers and Catalysts for Water Cooperation.

H.E. Mr. Emomali Rahmon, President of Tajikistan, noted that the main challenge the international community is now facing is how to link declared commitments to actions and plans in the field of water cooperation, in order to ensure their full implementation in the name of improving the lives of everyone.

The same task was standing in front of us when we started our journey together under the "Water for Life" International Decade of Action, 2005-2015, which is inseparably linked with the Millennium Development Goals. As is known, water resources play a central role in the achievement of the Millennium Development Goals.

Fig.1. High-level International Conference on the Year of Water Cooperation, held in Dushanbe, chaired by the President of Tajikistan, H.E. Emomalii Rahmon.

The Dushanbe Conference fed into the political process related to the Sustainable Development Goals (SDGs), providing substantive inputs related to water and sustainable development.

Participants reaffirmed that water lies at the core of sustainable development and its three dimensions and is closely linked to a number of key global challenges, as is stated in the outcome document of the UN Conference on Sustainable Development (Rio+20).

The Conference reaffirmed the critical importance of water cooperation for the maintenance of peace and stability, and the achievement of sustainable development, including poverty and hunger eradication, public health, food security, energy security and environmental protection.

The existence of different tools of water cooperation, such as legal frameworks, institutional arrangements, information-sharing mechanisms, joint assessments and research, incentives for cooperation, mediation and dispute resolution mechanisms, cost and benefit sharing and financing, was recognized by several participants.

The importance of human resources development, including education and training, exchange of experiences and expertise, scientific development, knowledge transfer and technical assistance for water cooperation, involving also the strengthening of institutional capacity, such as through River Basin Organizations, including planning, water management and monitoring of water resources, was reiterated on many occasions.

The provision of adequate support and investment by local and regional stakeholders, national governments, international partners and the private sector was widely recognized as critical to advancing water cooperation.

It was acknowledged that governments play a key role in securing water for competing demands. However, the quest for a water-secure world is a responsibility we share in common and can only be achieved through water cooperation at the local, national, regional and global levels and through partnerships with a multitude of stakeholders ranging from citizens to policy-makers and the private sector.

The roles and responsibilities of different actors, including governments, regional and local authorities, international organizations, civil society, academic institutions, the private sector, local communities, indigenous peoples, women, elders, youth, families and individuals to ensure the sustainable management of water resources, were fully recognized.

Finally, participants to the Conference recalled the general principles

Fig. 2. "As populations grow, water scarcity and water pollution are likely to intensify", warned the UN Under-Secretary-General for Economic and Social Affairs, Mr. Wu Hongbo.

Fig. 3. 800 million people still lack access to clean water sources.

Fig. 4. "Water is at the heart of a daily crisis faced by millions of the most vulnerable people in the world", stated Rebeca Grynspan, Associate Administrator for the UN Development Programme.

of water cooperation, such as planning, sharing information, resolving disputes peacefully, etc.

Participants noted the important role of water cooperation among all stakeholders, particularly local community organizations, for achieving access to safe drinking water and sanitation for all, especially the most vulnerable and marginalized groups.

The importance of a timely achievement of the Millennium Development Goals and of other internationally agreed development goals, as well as of establishing ambitious and achievable targets and indicators for a Sustainable Development Goal on water as part of the post-2015 Development Agenda, was highlighted.

The following components of water-related SDGs were proposed:

1. Universal access to safe and sustainable water, sanitation and hygiene services;
2. Appropriate levels of treatment for used water and wastewater before it is returned to nature or reused in agriculture or other productive activities;
3. A significant improvement in the productivity and efficiency of water use in agriculture, industry, and at household level, and a significant reduction of water losses.

The recommendations and proposals made by the participants at all the Conference sessions were summed up in the 3 Outcome documents:

— Dushanbe Declaration;
— Dushanbe Framework for Action on Water Cooperation;
— Chair's Summary.

I would like to underscore the specific feature of the Dushanbe Framework for Action on Water Cooperation, namely, that it comprises the following four parts:

- Priority areas for action in water cooperation.
- Enabling mechanisms for action in water cooperation.
- Action across basin and sectoral boundaries.
- Specific proposals for action.

All of the recommendations and proposals of the HLICWC deserve special attention, and the issues of their realization in practice must be the focus of attention of governments, international and regional organizations and the private sector.

The Conference showed once again that many countries and regions are faced with a lack of mutual understanding and cooperation among water users, which hinders the achievements of the internationally agreed goals on water.

Given the above, we believe that these recommendations and proposals must be used in the strategies and programmes for improving water use in the countries and regions of the world.

Specific agreed measures must be developed on the basis the recommendations.

The above-mentioned and other recommendations of the events of the IYWC, 2013, must be used as a basis for development of further relevant measures within the UN and other international organizations.

Sirodjidin M. Aslov
Ambassador of Tajikistan
to the United Nations.

INTRODUCTION
COOPERATION BENEFITS IN THE WATER SECTOR. ROLE OF THE WCCE

Tomás A. Sancho Marco

Keywords: water, cooperation, benefits, integrated management, urban water cycle, climate change adaptation, regulations, transfers, water security

BY WAY OF EXAMPLE

Barcelona's Olympic Games, 1992. An indisputable success. Including the excellent tests conducted in the white water canal of La Seu d'Urgell. Few people know that there, in the upper Segre river, water (up to 15 m^3/s) that circulated at a very low level had been guaranteed by the Franco-Hispanic Commission of the Lanós Lake. The Ebro basin includes 948 km^2 in France and Andorra, whence flow some tributaries of the Segre and Irati. At the same time, the Ebro Hydrographic Confederation (CHE, the pioneer world basin organization, created in 1926) manages 578 km^2 of the basin of the Garonne, then entirely French. This body of water, situated at the head of the Rhone, has a reversible hydroelectric efficiency that captures, in addition to the resources of the French natural tributaries, the head waters of the Carol –a tributary of the Segre–, which end up being transferred to the River Ariege, a tributary of the Garonne. On the 12th of July 1958 was created the organ (constituted later that year, on September 6th,in Puigcerdà) which regulates the amount of water that France should send to Spain between May 1st and April 30th of the following year, as compensation for that which it diverts from 1st September to the 31st August. The establishment of this commission closed an international conflict between the two states back in 1957. The conflict began in 1950, when the EDF (Électricité de France) planned the diversion of waters from the Carol to be handled by turbines at the Lanós waterfall. They flow entirely on French territory, but their natural flow should take them to the Segre, which is a transboundary river; as a consequence of which, its use is subject to international law. Spain rejected the French proposal to offset the decrease and invoked the Treaty of Bayonne and its addenda, which since 1856 has regulated the use of transboundary waters. The differences between the two states ended up being resolved by a sentence –one of the existing few in the water sector– passed by the international arbitration tribunal. Opportunely agreed that year at the Lanós Lake Commission, the special restitution of the flow to the Segre, which at the time had been a stumbling block, became, once the problem was resolved in a civilized and peaceful r,manner, thanks to the cooperation between the two states and their representatives on water issues, a guarantee and a cause of satisfaction at having brought about an event of world importance.

River Jalón, 1983 and 1984. Drought plagues the fertile orchards of the most important tributary of the right bank of the Ebro, resulting in incipient public altercations between water users faced with the impossible challenge of getting water to everyone. Action by the law enforcement bodies seems inevitable. The matter is passed onto Operating Board nº 5, Jalón Basin, a branch of the CHE responsible for the user-participation. In an atmosphere of high tension, with the intermediation of the Operation Area's technicians, the users come to an agreement, which they will monitor with supervision from the CHE: the ditches on the right bank will open for 15 days and those on the left bank will remain closed (except for human supply needs). Then, for the following 15 days, the situation will be reversed: thrthe right bank closes and left bank opens. Each Irrigation Community thus receives the same allocation per hectare, from head to tail of the basin, owing to the meagre reserves still stored in the reservoir of La Tranquera, located on a tributary of the Jalón River, a reservoir managed by the CHE. Each Irrigation Community reports on the water that it uses daily to a "good man" with prestige in the area (Luís Navales, the then mayor of Figueruelas, as well as an irrigator) to adjust the surface water flows together with those on the river. The river Water Board controls the circulating flows that are captured by the scales placed for this purpose and the construction of gauging measures. Inevitable crop losses occur. But in equal measure for all. And they all accept the situation and are satisfied, collaborating in an exemplary manner. This collaboration between public officials (experts on integrated water management) and users, the (advantageously used) management branch of the CHE, and the work of the Irrigation Communities (which regulate and organise the use of the waters within every ditch, even with power to sanction) can minimize the damage. The Central Board of Users for the river will be born from this embryo a few years later. At the Jalón basin, the oldest historical dispute of the Ebro river, dating from 1522, between the Irrigation Communities of Calatorao and Salillas, ended in those years.

The Ebro river, January and December 1997. Heavy rains cause widespread flooding concentrated in the Ebro basin. Because of its configuration (shaped like a fishbone) water accumulates in the river's axis, so that the risk of flooding in its central and end sections is high. The Permanent Avenues Committee of the CHE, on the basis of the knowledge gathered and with a new critical technological partner, the SAIH (Automatic Hydrological Information System), recently entering service, manages the protection systems and discharges of the main basin reservoirs (both public and private) and succeeds in avoiding the accumulation of flood peaks, so that the situation is solved without notable incidents in Zaragoza, capital of the basin. Tortosa, the town downstream, remains with a steady flow, within inches of overflowing, for a week (on each occasion). The coordination between the CHE and the Civil Protection Services of the Autonomous Communities (there are 9 in the Ebro basin) work perfectly and takes all necessary precautionary measures concerning the population. The collaboration between the CHE, the water concessionaries who own

Fig. 1. White water Olympic channel in the River Segre, located in La Seu d'Urgell, Lleida (Spain)

Fig. 2. Lake Lanoux, in French Sardinia, whose utilization is regulated by a Franco-Spanish Commission and which provided water supply for the white water rafting competitions in the 1992 Olympics Games held in Barcelona.

the water reservoirs (mainly power companies), civil protection, and the use of technology (the result of the previous I+D+i) enable very delicate situations to be overcome, with very limited damage. The economic damages avoided by the SAIH recoup in the first year of its entry into service the investment for the SAIH in the Ebro basin.

Here are three experiences in the first person by the author of this article, which I think perfectly and clearly illustrate the benefits of the cooperation.

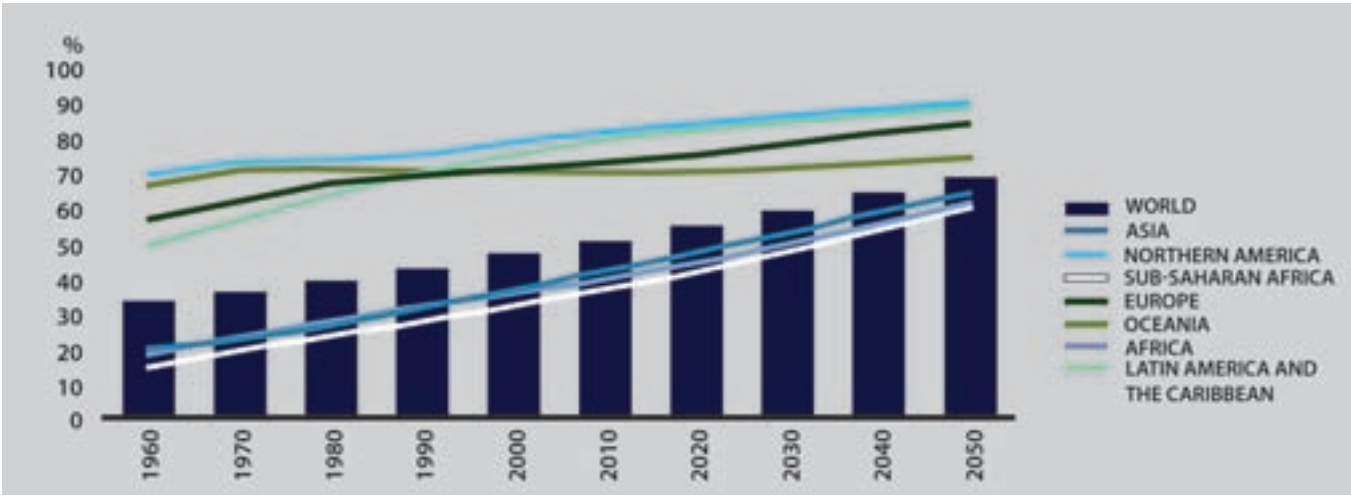


Fig. 3. Proportion of world population living in urban areas, 1960-2050. Source: based on data from UN-DESA (2010).

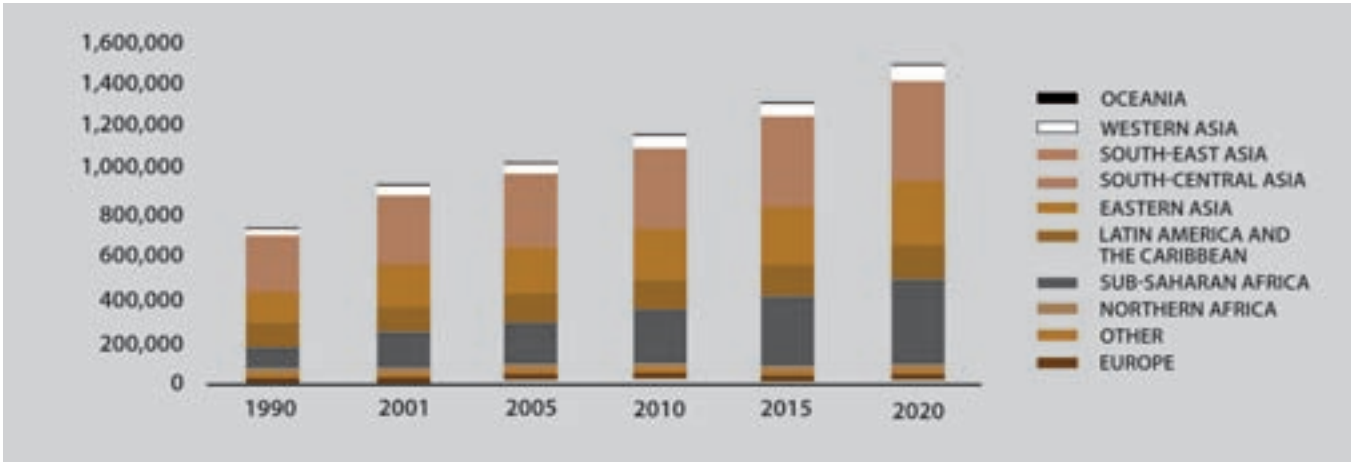


Fig. 4. Slum population by region, 1990-2020 (thousands). Source: produced by UN-Habitat based on data available at http://ww2.unhabitat.org/programmes/guo/documents/Table4.pdf (published in State of the World's Cities Report 2001).

REFLECTIONS ON WATER, TODAY

1. Human settlements: urbanization and population trends

As WWDR4 shows, between 2009 and 2050, the world population is expected to increase by 2.3 billion, from 6.8 to 9.1 billion (UNDESA, 2009). At the same time, urban populations are projected to increase by 2.9 billion, from 3.4 billion in 2009 to 6.3 billion total in 2050. Thus, the urban areas of the world are expected to absorb all of the population growth over the next four decades, while also drawing in some of the rural population. Furthermore, most of the population growth expected in urban areas will be concentrated in the cities and towns of less developed regions. Asia's population is projected to increase by 1.7 billion; Africa has a projected urban population gain of 0.8 billion; and Latin American and the Caribbean urban populations are projected to grow by 0.2 billion (Fig. 3).

Projections indicate a continuing increasing trend of urbanization in developing countries. By 2030, it is anticipated that the urban population in developing and developed countries will amount to 3.9 billion and 1 billion respectively. Population growth is therefore becoming largely an urban phenomenon concentrated in the developing world (UN-Habitat, 2006).

Migration from rural to urban areas poses a major challenge for city planners; extending basic drinking water and sanitation services to peri-urban and slum areas to reach the poorest people is of the utmost importance in preventing outbreaks of cholera and other water-related diseases in these often overcrowded places. (WHO/UNICEF, 2006)

Slums generally present a set of unique problems, including poor housing conditions, inadequate access to safe water and sanitation, overcrowding and insecure tenure; thus, the welfare of those living in these areas are seriously impacted (Sclar, Garau and Carolini, 2005). The relation between climate change and slum areas is cause for alarm in terms of disaster vulnerability result-

ing from meteorological phenomena. To complicate matters further, slums are usually built on dangerous land, unsuitable for human settlement. For example, shantytowns near Buenos Aires are built on flood-prone land, and residents are therefore forced to make a difficult choice between their safety and health and their need for shelter (Davis, 2006). In some cities, for example Mumbai, nearly half the urban population reside in slums and shantytowns (Stecko and Barber, 2007). As is evident from the Figure 4, not only is the slum population rising, it is also highly concentrated in developing countries, especially in sub-Saharan Africa, Southern Central and Eastern Asia. In Latin America and the Caribbean, a significant reduction is observed in the proportion of the urban population living in marginal areas –from 37% (110 million people) in 1990 to 25% (106 million) in 2005 (United Nations, 2010).

Cities in developing countries face enormous backlogs in shelter, infrastructure and services, as well as insufficient water supply, deteriorating sanitation and environmental pollution. Population growth and rapid urbanization will create an even greater demand for water while decreasing the ability of ecosystems to provide more regular and cleaner supplies.

Drivers to waterborne diseases are strongly linked to population growth, combined with migration to urban centres with a high population density. Lack of finances limits the possibilities to establish costly sewer and treatment systems to handle urban wastewaters. Natural disasters (floods, storm surges, hurricanes, earthquakes) often destroy safe water supplies, leaving the population with no alternative to using contaminated water for long periods.

2. The MDG's related with water

Since the adoption of the Millennium Development Goals, the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation has reported on progress towards achieving Target 7c: reducing by half the proportion of people without sustainable access to safe drinking water and basic sanitation. The 2012 Updated Report *Progress on drinking water and sanitation* contains the welcome announcement that, as of 2010, the target for drinking water has been met.

Since 1990, more than 2 billion people have gained access to improved drinking water sources. This achievement is a testament to the commitment of Government leaders, public and private sector entities, communities and individuals who saw the target not as a dream, but as a vital step towards improving health and well-being.

Of course, much work remains to be done. There are still 780 million people without access to an improved drinking water source. And even though 1.8 billion people have gained access to improved sanitation since 1990, the world remains off track for the sanitation target. It is essential to accelerate progress in the remaining time before the MDG deadline, and I commend those who are participating in the *Sustainable Sanitation: Five Year Drive to 2015.*

This report outlines the challenges that remain. Some regions, particularly sub- Saharan Africa, are lagging behind. Many rural dwellers and the poor often miss out on improvements to drinking water and sanitation. And the

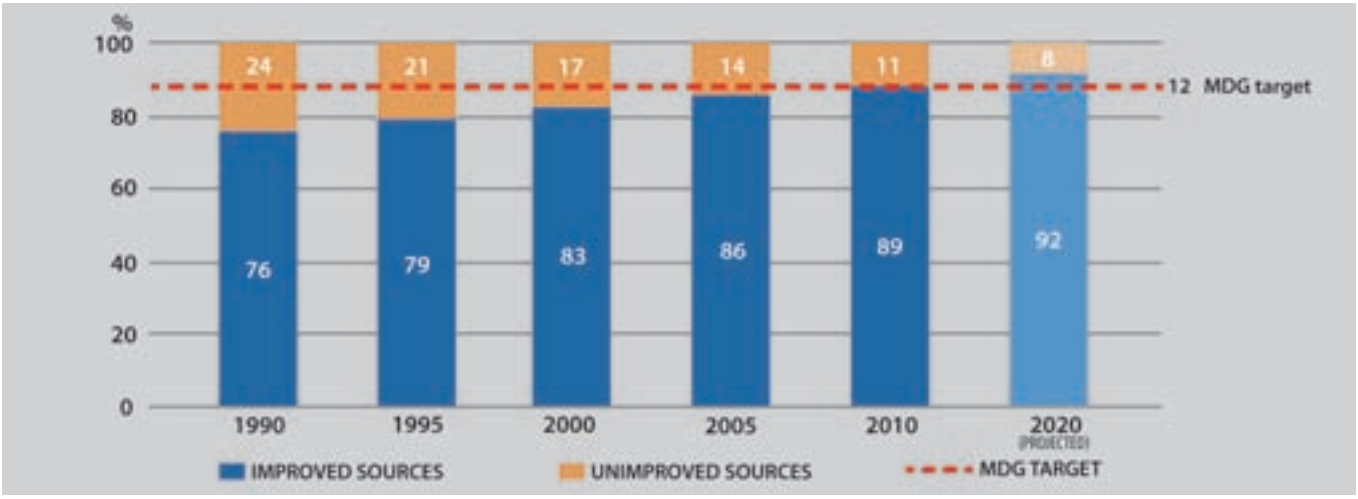


Fig. 5. The MDG drinking water target has been met. Trends in global drinking coverage 1990-2010, projected to 2020.

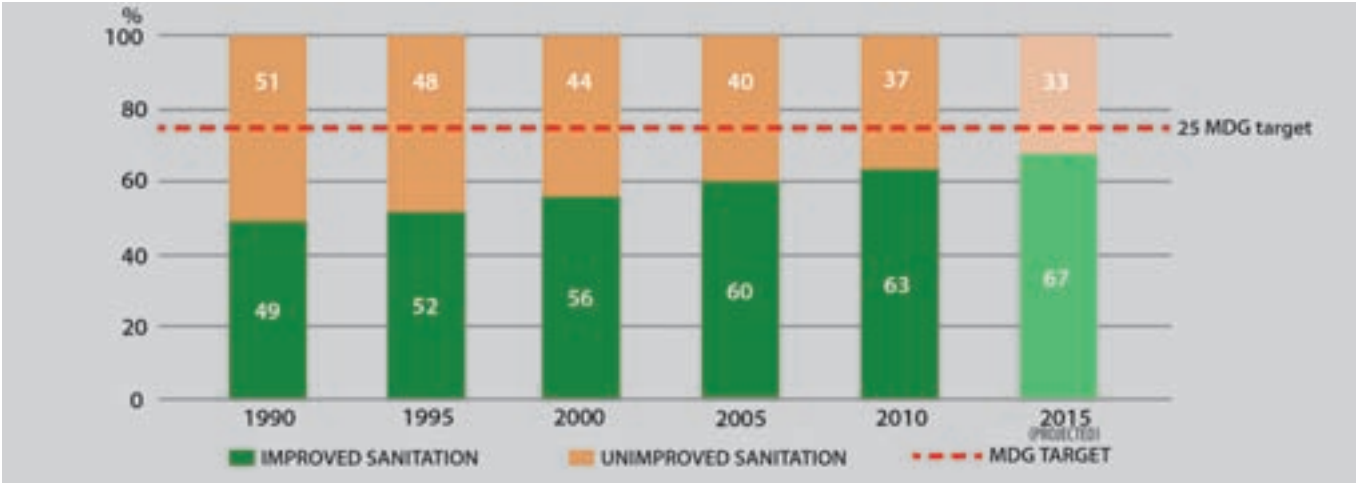


Fig. 6. If current trends continue, the world will not meet the MDG sanitation target.
Trends in global sanitation coverage 1990-2010, projected to 2015.

burden of poor water supply falls most heavily on girls and women. Reducing these disparities must be a priority.

The recognition by the UN General Assembly, in 2010, of water and sanitation as a human right provides additional political impetus towards the ultimate goal of providing everyone with access to these vital services. Many countries and agencies have joined hands in the Sanitation and Water for All partnership. Such collective efforts offer real promise and I urge all partners to contribute Fig. 5).

Globally, 63% of the population use improved sanitation facilities, an increase of almost 1.8 billion people since 1990 (Fig. 6). This means that we are within 10% of being 'on track'. At current rates of progress, we will reach 67% coverage in 2015, better than previous projections but still far from the 75% needed to reach the target. Unless the pace of change in the sanitation sector can be accelerated, the MDG target may not be reached until 2026. In 2010, an estimated 2.5 billion people were still without improved sanitation.

Reductions of human health risks are important local, national and global priorities, as expressed in the Millennium Development Goals (MDGs). Waterborne diseases are major global killers, taking millions of lives as a direct result of unsafe drinking water, and inadequate sanitation and hygiene.

Most waterborne diseases are related to contamination from untreated wastewater, or sewage (WSSCC, 2008). Sewage refers to liquid waste from private households as well as wastewater from non-industrial and industrial activities. In many parts of developing countries, sewage is dumped directly into local waterways. Untreated sewage contains waterborne pathogens that can cause serious human illness and even death.

Massive efforts have been made to reduce risks of waterborne contamination by establishing piped drinking water supplies in order to reach the MDGs. Diarrhoea is typically transmitted by the consumption of food or water contaminated with faecal bacteria from an infected person. Although a global issue, it is most extreme in sub-Saharan Africa and South Asia, killing over 2 million people annually

(WHO, 2008). Almost 1.5 million of these deaths are children under the age of five, accounting for 15% of all child deaths under the age of five, second only to pneumonia, and more than HIV/AIDS, measles, and malaria combined (Black *et al.,* 2010) (Chart 1, showed at WWDR4). Less common waterborne diseases include typhoid, cholera, and hepatitis A. While the number of deaths from these diseases is relatively low, the number of cases (17 million annually for typhoid) put a high burden on communities in developing countries. Moreover, it is significant that deaths in the world can be attributable to Water, Sanitation and Hygiene (Fig. 7, form GLAAS 2012 Report, UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water, The challenge of extending and sustaining services).

3. The necessary adaptation to climate change

Historical climatic and hydrological information often forms the starting point for water managers and extrapolations of the past are routinely conducted in order to simulate future hydrological conditions.

However, projected pressures on water resources lie outside the control of water managers. These can significantly affect the balance between water demand and supply –sometimes in uncertain ways– and thus create new risks for water managers and users. Such increasing uncertainties and risks necessitate a different approach to water management strategies.

Even more, as WWDR4 shows, climate change will affect the hydrological cycle and hence the availability of water for its users. It is expected that extreme water-related events such as floods and droughts will occur more frequently and with greater intensity (Bates *et al.,* 2008). Extrapolations using historical data are no longer valid for these events –as for the hydrological cycle as a whole– which increases uncertainty about the future.

Furthermore, the spatial resolution of global climate change models is relatively crude. As a result, conversion to the more detailed scale necessary for water managers can prove

Chart 1

Estimated deaths of children under the age of five (8,795 million in total)

68% (5,970 million) of deaths were from infectious diseases			
Pneumonia	18%	1,575 million	1,046-1,874 million [UR]
Diarrhoea	15%	1,336 million	0,822-2,004 million [UR]
Malaria	8%	0,732 million	0,601-0,851 million [UR]
41% (3,575 million) of deaths occurred in neonates			
PTB complications	12%	1,033 million	0,717-1,216 million [UR]
Birth asphyxia	9%	0,814 million	0,563-0,997 million [UR]
Sepsis	6%	0,521 million	0,356-0,735 million [UR]
Pneumonia	4%	0,386 million	0,264-0,545 million [UR]

Note: UR, uncertainty range.

Source: Black *et al.* (2010).

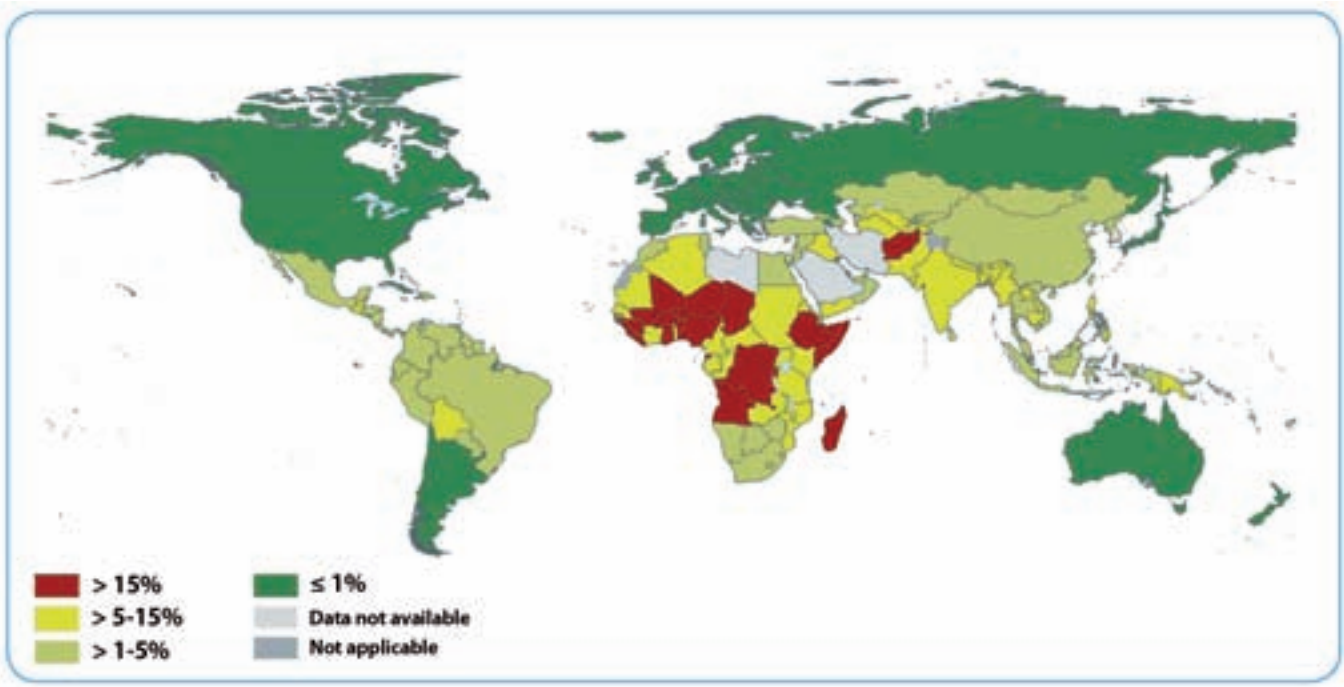


Fig. 7. Percentagge of deaths attributable to wash-related disease or injury. Source: Prüss-Üstün *et al.* (2008).

difficult. The problem is compounded by the fact that these projections are not available at the jurisdictional level (state and local), or at the river basin level where much of water resources planning takes place.

The important developments for this driver are related to water availability. The survey participants estimated that the number of people at risk from water stress was likely to reach 1.7 billion before 2030 (before 2020 at the earliest), and 2.0 billion by the beginning of the 2030s. This number was not likely to reach 3.2 billion before 2050. This is roughly consistent with, though possibly slightly ahead of, the IPCC SRES scenarios.

We must make a huge effort in this challenge (adaptation to climate change for water), as (Chart 2) World Bank studies show:

New, updated and expanded water resources infrastructure can reduce the risks associated with climate change, hydrological variability and their impacts on water resources and systems. Adding new infrastructure can potentially take advantage of new technology.

For example, while in some regions reservoirs are being removed to reduce the risks to ecosystems, including fish, the development of increased water storage capacity, particularly to reduce water scarcity risks and manage floods in other regions, appears inevitable in the light of highly likely water shortages.

There are various types of infrastructure that states can invest in to address the challenge of risk and uncertainty.

One response option for reducing the variability and uncertainties of natural stream and river flows is to construct reservoirs designed and operated to redistribute water over time and space in ways that better meet human and environmental needs in comparison to the natural flow regime. Reservoirs are controversial. Many are being planned and built in water-scarce or energy-deficient areas of the world, while in other areas they are being removed in an effort to restore ecosystems. Dams and reservoirs are essentially risk-avoidance tools, based on knowledge of current conditions and variability.

For example, the International Water Management Institute (IWMI) predicts that climate change will have dire consequences for feeding an ever-expanding global population, especially in areas of Africa and Asia where millions of farmers rely solely on rainwater for their crops. In Asia, 66% of cropland is rain-fed, while 94% of farmland in sub-Saharan Africa relies on rain alone, according to IWMI. These are the regions where water storage infrastructure is least developed and where nearly 500 million people are at risk of food shortages. IWMI suggests that the solution is to fund a diversity of water storage projects, from small-scale rainwater tanks and larger-scale dams to systems that artificially recharge groundwater aquifers, to improve the soil so it can hold more water. Stored water in times of drought can lead to increased food security. 'Just as modern consumers diversify their financial holdings to reduce risk, smallholder farmers need a wide array of 'water accounts' to provide a buffer against climate change impacts' (McCartney and Smakhtin, 2010; quotation from IWMI, 2010, p. 1).

An infrastructure approach thus has to examine all aspects of risk and of the functions of water. Only at that point can water managers make decisions with the most advantageous trade-off –with the best possible picture of uncertainty and risk.

Chart 2

Cost of adaptation to climate change for water

A World Bank study (see Chapter 24) has evaluated the impact of adapting the water sector to climate change in developing countries, over the period 2010-2050, based on a socio-economic baseline and two climate change scenarios, created by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Australia and the National Centre for Atmospheric Research (NCAR) in the United States of America.

The adaptive costs were defined in terms of hard options including building dams and dykes, and soft options such as the use of early warning systems, community preparedness programmes, watershed management, and urban and rural zoning.

The table below represents average annual water resource adaptations costs, combining riverine flood protection and industrial and municipal raw water supply. According to these estimates, measures to cope with the climate scenarios imply an annual increase in adaptation costs of US$ 13-17 billion for developing countries as a whole. This represents 3% of their GDPs. Africa is the wost affected region.

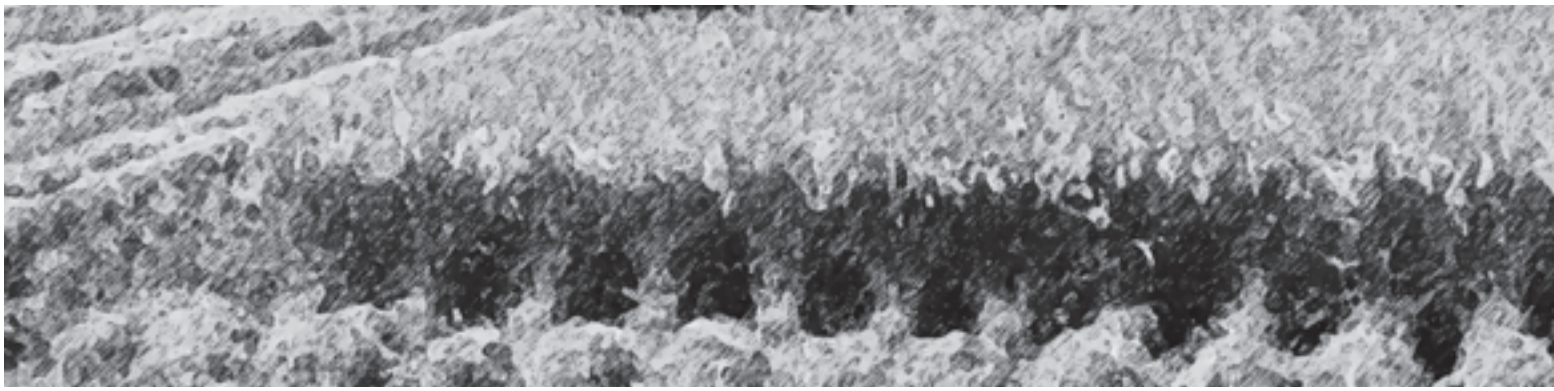
Average annual water resource adaptation costs (2010-2050) US$ (% GDP)			
	Baseline*	CC (net costs)**	
Region		CSIRO**	NCAR
East Asia and Pacific	29.4 (0.06)	2.1 (0.00)	1.0 (0.00)
Europe and Central Asia	15.8 (0.03)	0.3 (0.00)	2.3 (0.00)
Latin America and Caribbean	13.4 (0.03)	3.2 (0.01)	5.5 (0.01)
Middle East and North America	11.9 (0.02)	0.1 (0.00)	-0.3 (0.00)
South Asia	34.9 (0.07)	4.0 (0.01)	-1.4 (0.00)
Sub-Saharan Africa	9.8 (0.02)	7.2 (0.01)	6.2 (0.01)
Total: developing country	115.1 (0.22)	16.9 (0.03)	13.3 (0.03)
Total: non-developing country	56.2 (0.11)	7.4 (0.01)	13.3 (0.01)

* The baseline year is 2050. "Development baselines were crafted for each sector, essentially establishing a growth path in the absence of climate change that determines sector-level performance indicators… [using] a consistent set of GDP and population forecasts for 2010-2050."

** Figures of 0.00 are positive amounts, rounded to the nearest decimal point; they do not imply zero amounts.

Note: discount rate = 0%; negative values refer to net benefits.

Source: World Bank (2010d; 2011). Table data from World Bank (2010e, gráfico 5.4, p. 41).



THE ROLE AND CONTRIBUTION FROM THE WCCE

The WCCE - World Council of Civil Engineers is committed to improving humanity's living conditions. In the water sector specifically it aims to promote the role of the Civil Engineer in the global, national and regional debate on water and related land resources, to ensure universal access to water and to provide it for Sustainable Development.

Its main activities are:

1. To establish a forum for discussion on water-related issues through industrial organizations, governments, NGOs, other professions and civil engineers;
2. To promote the use of Integrated Water Resources Management;
3. To promote the use of technology and technology transfer;
4. To promote training and capacity development;
5. To promote transparency and participation as guiding principles for all aspects of water governance;
6. To promote fair competition and responsible implementation of water projects;
7. To collaborate in advancing the MDGs (Millennium Development Goals).

The WCCE picked the Legacy of the 2008 International "Water and Sustainable Development" Expo held in Zaragoza in order to provide a suitable vehicle to strengthen the chances that the said Legacy (Zaragoza Charter and Water Tribunal) contributes to improving the management of water and its sustainability in the world.

The WCCE has been working hard on these issues, with the collaboration of its partner organizations and various experts.

The lines of work –which refer to the Working Day dedicated to: *water: challenges facing urbanization and climate change*– focus today on two important issues:

— the water cycle in the cities,
— the role of regulations and water transfers in the adaptation to climate change.

Case 1: the water cycle in cities

The increasing degree of population concentration in large cities and the demand for improved water services impose an increased level of demand on engineering.

One has only to realize that when one turns on a simple water tap, a large engineering effort has been made before and after that turning on.

It is worth learning from the experiences and lessons acquired in developed countries, where in recent decades the urbanization process has already taken place, something that has yet to intensify in developing countries.

Historical evidence indicates that with increasing income per capita environmental quality deteriorates, until it reaches a turning point at which the citizens demand greater environmental quality. The dilemma is that engineers will have to confront the challenge of defining environmental levels compatible with the level of development possible in their communities.

It is then up to the engineers to transform this vicious circle of increasing scarcity of safe water, which accompanies great social deficits, into a virtuous circle of water, in which they ensure the quantity and quality of drinking water and the coverage of basic sanitation, while preserving and recovering water courses, and taking into account droughts and floods, with the full awareness and collaboration of the community. Likewise great efforts must be made to obtain peaceful solutions to possible disputes due to shared use of water resources.

To complete all these actions, engineering should take into account the need to integrate human waterways in cities, as a factor for their improvement, aimed at increasing the quality of life for its inhabitants.

As regards the treatment of effluent discharges, their design should take into account the minimizing of their impact as generators of greenhouse gases, either adopting a treatment system using less energy or by reusing such gases to generate electricity.

The increasing use of underwater outlets as structural solutions for dirty water discharges in conditions environmentally sustainable for the receptor courses, is a matter of growing interest to the professional community, as they are a suitable alternative, allowing the diffusion and dilution of the discharge into a large volume of water, therefore making better use of the natural purification effect in the course and in mass of the water.

Master plans should be designed for sewer and sanitary treatments, so as to avert the current negative process, since there are different countries where household sanitation services are not connected if they do not possess the corresponding treatment plants.

As for extreme hydroclimatic events, the poorest communities are the most vulnerable because of their location in the usual path of hurricanes, typhoons and tsunamis, on unstable slopes, in slums, in low areas and flood-prone river areas.

Due to the lack of an appropriate political, technological and institutional framework in many countries and areas of the world, we engineers must generate strategies to deal with the dangers and risks of floods and droughts, which mostly affect low-income sectors and a growing population that is located in areas most vulnerable to floods, landslides and droughts.

The task of engineering should aim to lead to the implementation of management plans for extreme events, thus helping communities and cities to organize themselves and to become more active in the prevention of natural disasters.

Moreover, the challenge for engineers is to optimize the knowledge of water resources, so that they can better understand the dynamic processes that occur in the soil's chemistry, and in climate changes and ecosystem responses.

All areas identified involve an ongoing activity on the part of engineers, with a special dedication and conscious commitment which means providing safe water and sanitation, which are the pillars of health and welfare for the population, and reducing the vulnerability of cities in the face of extreme hydrometeorological events.

Case 2: role of regulations and water transfers for adaptation to climate change

Adaptation to climate change requires the provision of water, both for human supply and economic activity.

Climate change affects all regions, but in different ways (some are facing rises in sea level, while others are facing drought). Faced with climate change, if mitigation means acting on power generation, adaptation is the course of action to be applied for both water and land.

Climate change accentuates all water-related problems (shortage of supply, food crisis, energy crisis…), and perhaps also significantly increases the risk of damage associated with floods and droughts, putting in reverse the progress achieved in many parts of the world, including the least developed countries (which are the most vulnerable). It also poses a real risk to people and property, causing not only the disruption of economic activity, which can be valued in billions of euros, but also significant loss of human lives.

Various international speakers / reporters(U.S., Brazil, Spain) have highlighted that to combat vulnerability and strengthen supply guarantees, resource storage and interconnection of water systems are essential.

CONCLUSIONS REACHED SO FAR

1. Common conlusions

- We have before us some important challenges to face regarding water, arising from global change:

a) Population growth, which leads to an increased need for food production (and the main global demand for water is irrigation);
b) The population concentration in cities, which will increase from 50% now to 70% of the world population in 2050;
c) The increase in standard of living, which leads to greater allocation of water per person, especially in developing countries;
d) The spatiotemporal irregularity of the resource, which is expected to increase as a result of the trend changes.

- To address these important challenges, we must act, applying appropriate solutions based on known success stories, and searching for new existing possibilities.

2. Conclusions on the water cycle in cities

From the reflections nurtured in the area of the WCCE and the World Council of Civil Engineers, and, specifically, having exposed the accumulated experience in Spain in the process of urbanization and population growth experienced during its

development in the past decades, we have extracted by way of summary, conclusions and recommendations that we offer to the professional community and the public in general, conclusions and recommendations that aim to achieve the following:

Virtuous urban water cycle

General aspects

• To meet basic water supply and sanitation:

a) Water represents, both now and in the foreseeable future, 13% of the total water demands worldwide (600 km^3 today, 900 km^3 in 2030);
b) Water must be considered a basic right of the individual, and as such should be guaranteed by public authorities;
c) Water must be integrated (and with even more reason, because of the growing gap between required and available resources) with the Integrated Water Resource Management –IWRM–, carrying out a strategic and adequate water planning that will:

1) Introduce precise prior restrictions on environmental grounds;
2) Reserve and protect the best quality sources to make human supply a priority.

d) For real availability of these resources in the cities , without negative conditions and with sustainable measures , what are required are:
— Rigorous pre-planning with a time span of 10 to 20 years;
— Stable funding and performance, medium and long term, with legal and financial security;
— A demanding engineering effort to build and manage infrastructure, before and after the use of water in the city;

— A capacity to intervene in territorial and urban planning;
— Acting in a suitable optimum dimension, as comprehensive as possible, superior to the local one, and encieswith a clearly defined competency, to obtain the necessary economies of scale and scope to cover the service efficiently.
• There is a lot of engineering in the water cycle: to enable the water to come out of citizens' taps there is great engineering activity, both before (to make it available in quantity and reliable quality) and after (to drain and treat it properly).

Technical aspects

• The water reserve in dams (or available in aquifers) is the indicator that relates to the guarantee of supply, and should be managed by foreseeing hyperannual drought cycles.
• Alternative resources (desalination, regeneration and reutilization) are more expensive and increase energy dependence, so they should be considered as complementary sources, not as replacement alternatives.
• It is necessary to control and monitor the resource in quantity and quality. There is no reliable information about either supply amounts or supply typologies in every city. There is even less reliable information about wastewater typologies (septic tanks, sewage, condominial sanitation and wastewater treatment plants).
• In developed countries, an average person uses 500-800 litres of water per day, which is 10 times more than the average in least developed countries.
• What stand out are the great benefits of *network sectorization* (for consumption control, leakage control and investment planning) and *connection and distribution rings.*
• Sanitation and wastewater treatment are as important as water supply, as they affect the sustainability of the resource and the health conditions of the population. They cannot be left to the future, or with out-dated supply systems, once the minimum level of subsistence level has been exceeded.
• The technification of systems is very important, as well as providing them with "intelligence" that enables better operation and management thereof, through I+D+I and the transfer of knowledge.

Management issues

• It is necessary to properly define both the scope and responsibilities of the various players, as well as defining their key competencies and roles.
• Demand management is the best and cheapest alternative resource to meet the supply.
• Knowledge management should be incorporated into the management and operation of the systems.
• On a broad scope we cannot adequately respond to droughts and

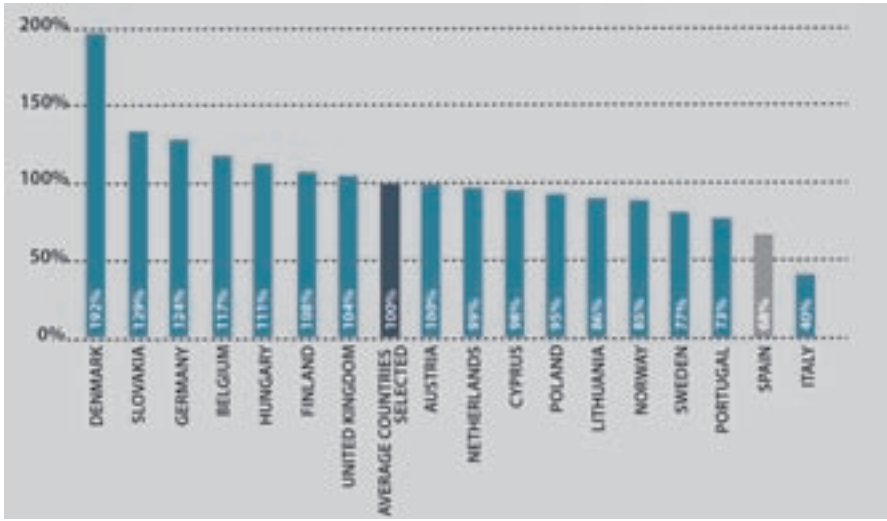


Fig. 8. For the purpose of making a better estimation of which country has more expensive water we can use this indicator which measures the effort that a user makes to obtain 1 m^3 of water. For this the Aqualogy Foundation on its AquaePaper proposes taking the per capita disposable income expressed in purchasing power standards (PPS). We consider this indicator to be appropriate given that it takes into account the distribution of income among the population and avoids the distortions caused by use of per capita GDP. The indicator of use effort to pay for the water service measures what part of per capita disposable is allocated to acquisition of 1 m^3 of water: Use effort = Water cycle price (€/m^3) / per capita disposable income PPS (€).

population growth if the necessary infrastructures and the efficient operators of facilities are not available, and if new resources are not mobilized via currently available technologies, unless this leads to an unaffordable increase in costs.
- The successful management models applicable (and applied) offer many possibilities, but in any case the presence of a public regulator is essential to ensure the service and foster improvement of the conditions under which it is supplied.

Financial and economic issues

- The water bill has to pay the water: no less, no more (avoiding the imposition of water surcharges or fees to finance other municipal services).
- To ensure universal access to the basic right to water, we sometimes have to subsidize access for those who need it. No one should lack access to this essential public service.
- We must advance in studies about the purchasing value of water in each city or region. The user effort indicator is a good way to objectify the availability margin of the population to absorb the water cycle funding (Fig. 8).
- The poor pay more. A slum dweller in Nairobi (Kenya) pays 5 to 7 times more for a litre of water than an average North American citizen.
- We must be able to apply pricing policies conducive to showing economic signs of responsible economic use of the resource. This is the case with progressive and block tariffs.
- It is advisable to apply the same rates in large geographic areas (so that solidarity and efficiency is introduced between urban areas and peri-urban or rural populations).
- Highly to be recommended are framework agreements with medium-term time horizons between regulator and operators. The remuneration to the latter is linked to the quality of service, as well as the investment and the maintenance of the infrastructure.
- For industrial purposes it should be cheaper to treat and discharge one's own wastewaters rather than paying the fees for polluting.
- It should be noted that these operations are profitable, but in the long term, not offering returns in the short term. This fact makes all the water cycle in the cities in need of stability and security operations and long-term planning. In these conditions it can provide attractive returns for long-term investors, such as pension funds.

Issues of governance

- Water service should be carried out with transparency and public communication to citizens, enabling them to participate, depending on the issue and their level of interest.
- You have to adapt yourself to local conditions, both in the management decision model, and in the endowment to provide, as well as in the method of financing and in training and knowledge management.
- The technicians (engineers and other disciplines) should make a didactic effort, including through the media, so that citizens can participate and interact on the basis of adequate information.
- We recommend the development of effective household demand management campaigns (e.g. Copenhagen, Denmark; Zaragoza, Spain).

3. Conclusions on the role of regulations and basin connections for adaptation to climate change

The main conclusions reached at this point are:

- Adaptation to climate change must be gradual, but should not be postponed *sine die*.
- In order to achieve this, technological inputs from the engineering sphere are of transcendent importance, but they are not the only way to provide solutions. As a matter of fact, globally, the regulation of worldwide water in dams represents 31% of the resources available to the demands (4,000 km^3 total 13,000 km^3). And in dry countries, such as Spain, this percentage increases dramatically, reaching 65%.

• It is imperative that all solutions, infrastructure, management, social, economic… are –IWRM– coordinated, that is the best defence strategy to address future water problems.
• We suggest that water planning and the study of systems of water resources exploitation should comprise:

a) developing an official series of contributions calculated and obtained by deducting trends by applying hydrological models and reliable climate models,
b) considering various scenarios,
c) carrying out their application through the recommendations made in the technical guidelines to be made available (resource tools offers series).
This is a field with a fast and huge improvement, but still with plenty of room for development.

• The effects of this global change are extending beyond the availability of resources, because it will also affect demands and extreme events (floods and droughts).
• The trend identified by the different models predicting climate change shows the need for increased regulation and the ability to mobilize water resources. So, it will increase the need and opportunity for regulations and basin connections.
• Referring to two specific cases of globally relevant basins –the Colorado River Basin in the United States and Mexico, and the San Francisco River Basin in Brazil–, and after analysing the existing reality in the first case and the current works being carried out in the second case:

A) We can see the large-scale effect of major regulations, which open the possibility of dealing with the demands (as they evolve) with flexibility and responsiveness.
B) This effect should be complemented with water pipelines, which in some cases can involve interbasin transfers.

• These large hydraulic infrastructures require a long gestation period and among the lessons learned are the following:

— The socio-economic context in which each case is to be found must be understood very well previously.
— Political agreements are required, and agreements between users, with deals made, and legal elements present which provide assurance to the operation.
— It requires wisdom and depth to estimate the capacity of the donor basin and the effects on the catchments, so that we do not endanger the future development of the donor basin or damage its socio-economic or environmental equilibrium; nor generate over expectation in the receiving basin.
— It should promote the development in the providing basin, not only in the receiving one.
— Once they are built, forums and bodies are required to manage these major infrastructures with good technical support and system management participation.

• Infrastructures are essential in order to match supply and demand through exchange of water (water markets). The reservoirs can store the resources assigned at the time that are not usable at the destination, and the basin connections can bring the water safely and effectively from donor areas to receptor areas.
• Hydrological infrastructures are the best defence to cope with the periods of drought, always in a GIRH context, and having agencies with executive ability, with real participation, even transnational, so as to distribute the sacrifices with justice and solidarity, from head to tail, for all of the uses involved.
• These facilities are complemented well with other resource

sources, such as groundwater or desalination plants.

- With a fewfew and adequate water dam reserves, considered as a strategic resource, and with a small percentage of water transferred, we achieve a very significant improvement of the management, increase in resilience and reduction of the vulnerability in operating systems.
- Concerning the environment, both regulation dams and basin connections have very significant effects, some positive, some negative, which must be very carefully appraised, with only a small percentage of the available resource being generally advisable.
- No regulation dams or transfers are good or bad… Either they are necessary or they are not, and if they are, they will be made (as evidenced by the Fountain of the Unbelievers in the Imperial Channel of Aragón, in Zaragoza, Spain), even long they after were conceived (Fig. 9).

Fig. 9. The inscription on the source itself reads: "To convince unbelievers and relieve travellers" *("Incredulorum convictioni et viatorum commodo." Anno MDCCLXXXVI).* Thus, the source was proof of the success of the task and an irony directed at those who did not believe in it.

THE WCCE AND COOPERATION IN THE WATER SECTOR

In 2013, declared the International Year of Water Cooperation by the United Nations, the WCCE has specifically done the following:

a) It has had the pleasure to see the inauguration of a project it has sponsored and encouraged, regarding water supply to rural communities in Monte Plata (Dominican Republic). The Spanish Fund for Cooperation in Water and Sanitation has financed 80% of the project. The remaining 20% has been provided by the CEZOPAS (also the implementing agency), which has relied on the donations made by a Spanish company to partially meet the funding requirements Fig. 10). The WCCE is determined to be the main actor when it comes to providing technical support to the cooperation organs and institutions (especially NGOs) in water matters directed towards developing countries.

Fig. 10. Inauguration of a supply source in Monte Plata (Dominican Republic). Action sponsored by the WCCE and developed by CEZOPAS and the Spanish Cooperation Fund for Water and Sanitation (FCAS).

b) It has had the satisfaction to be confirmed as a partner of UN Water, which will allow us to look forward to working together and furthering collaboration. The common trajectory developed until now has been very positive and stimulating, especially through the UN office in Zaragoza (Spain).
c) It has signed a Joint Declaration on Water Security (Chengdu, China, 9th September 2013) alongside six other global organizations:
International Association for Hydro-Environment Engineering and Research (IAHR).
International Association of Hydrological Sciences (IAHS).
International Commission on Irrigation and Drainage (ICID).
International Commission on Large Dams (ICOLD).
International Water Resources Association (IWRA).
World Association on Sedimentation and Erosion Research (WASER).
It has also been integrated in the Working Group constituted by these associations to work on this matter, under the auspices of UN Water.
d) It has signed a Protocol with the Office of the UN International 'Water for Life' Decade for Action (2005-2015), sponsored by the Aqualogy Foundation, for the edition of annual monographic studies in the field of water, whose first fruit is this publication.
e) It has published the JAWER magazine (Journal of Applied Water Engineering and Research) in collaboration with the IAHR, to bridge the gap between the world of science and research and the world of the practitioners of water engineering.

CONCLUSIONS

Cooperation in the water sector has obvious benefits, which can be illustrated with real, practical experiences.

We are facing important challenges in water matters which, provided we accept a change of paradigm, require the adoption of active policies and concrete solutions, under the premises of the integral management of water resources and cooperation, in their different facets (Fig. 11).

Through the WCCE, civil engineers are undertaking an intense and decisive task in the water sector, in a professional and proactive manner. We are aware that we are only a part of a part of a larger picture –but an important part, nevertheless. We are determined to assume the role we must play in open and sincere collaboration with the other actors.

Fig. 11. Inauguration of a supply source in Monte Plata (Dominican Republic).
Action sponsored by the World Council of Civil Engineers (WCCE)
and developed by CEZOPAS and the Spanish Cooperation Fund for Water and Sanitation (FCAS).

The first results have already begun to arrive, which renews our commitment and stimulates us to serve the future.

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Bibliography

- Aquae Papers 1, 2013. *Study on the Price of Water in Spain*. Coordinator: Josep Bagué Prats. Authors: Carmen Albiol, Antoni Brun. Fundación Aqualogy. Madrid.
- Bates, B. C., Kundzewicz, Z. W., Wu, S. and Palutikof, J. P. (eds.) 2008. *Climate Change and Water*. Technical Paper of the Intergovernmental Panel on Climate Change (IPCC).
- Geneva, IPCC Secretariat.
- Jouravlev, A. 2004. *Drinking Water Supply and Sanitation Services on the Threshold of the XXI Century*. LC/L.2169-P. Santiago, United Nations Economic Commission for Latin America and the Caribbean (ECLAC). http://www.eclac.cl/publicaciones/xml/9/19539/lcl2169i.pdf
- NWC (National Water Commission). 2011. *Urban Water in Australia: Future Directions*. Canberra, NWC. http://www.nwc.gov.au/resources/documents/Future_directions.pdf
- Olson, E. 2003. *What's on Tap? Grading Drinking Water in U.S. Cities*. New York, Natural Resources Defense Council (NRDC). http://www.nrdc.org/water/drinking/uscities/pdf/whatsontap.pdf
- UNDESA (United Nations Department of Economic and Social Affairs, Population Division). 2009. *World Population Prospects: The 2008 Revision, Highlights,* Working Paper No. ESA/P/WP.210. New York, UN.
- Vahala, R. 2004. European Vision for Water Supply and Sanitation in 2030. *Water Supply and Sanitation Technology Platform*.
- Vairavamoorthy, K. 2008. *Cities of the Future and Urban Water Management*. Paper presented on 27 June 2008 during Thematic Week 2 of the Zaragoza International Exhibition, 2008.
- WHO/UNICEF. 2006. *Meeting the MDG Drinking Water and Sanitation Target: the Urban and Rural Challenge of the Decade*. Geneva/New York, WHO/UNICEF. http://www.who.int/water_sanitation_health/monitoring/jmpfinal.pdf
- 2010. Joint Monitoring Programme for Water Supply and Sanitation. *Progress on Sanitation and Drinking-Water: 2010 Update*. Geneva/New York, WHO/UNICEF.
- 2012. Joint Monitoring Programme for Water Supply and Sanitation. *Progress on Sanitation and Drinking-Water: 2010 Update*. Geneva/New York, WHO/UNICEF.
- WWAP (World Water Assessment Programme). 2009. *United Nations World Water Development Report 3: Water in a Changing World*. Paris/London, UNESCO Publishing/ Earthscan.
- WWAP (World Water Assessment Programme). 2009. *United Nations World Water Development Report 4: Managing Water under Uncertainty and Risk*. Paris, UNESCO Publishing/ Imprimerie Centrale S. A.
- World Bank. 2008. *Economic Impact of Sanitation in Indonesia: A Five-country Study Conducted in Cambodia, Indonesia, Lao PDR, the Philippines, and Vietnam Under the Economics of Sanitation Initiative*. Water and Sanitation Program. Washington DC, The World Bank.
- OECD (Organisation for Economic Co-operation and Development). 2010. *Financing Water and Sanitation in Developing Countries: The Contribution of External Aid*. Paris, OECD.
- World Bank. 2010*a*. *The Cost to Developing Countries of Adapting to Climate Change. New Methods and Estimates*. The Global Report of the Economics of Adaptation to Climate Change Study. Consultation Draft. Washington DC, The World Bank.
- 2010b. The Economics of Adaptation to Climate Change. Background Papers: Costs of Adaptation Related to Industrial and Municipal Water Supply and Riverine Flood Protection (P. J. Ward, P. Pauw, L. M. Brander, Jeroen, C. J. H. Aerts and K. M. Strzepek) Discussion Paper No. 6. Washington DC, The World Bank. http://siteresources.worldbank.org/EXTCC/Resources/407863-1229101582229/DCCDP_6Riverine.pdf
- 2012. *Achieving financial sustainability and recovering costs in bank financed water supply and sanitation and irrigation projects*. Alexander McPhail, Alain R. Locussol, Chris Perry.
- SIWI (Stockholm International Water Institute). 2005. *Making Water a Part of Economic Development: The Economic Benefits of Improved Water Management and Services*. Stockholm, SIWI. http://www.siwi.org/documents/ Resources/Reports/CSD_Making_water_part_of_economic_development_2005.pdf
- WHO (World Health Organization). 2004. *Evaluation of the Costs and Benefits of Water and Sanitation Improvements at the Global Level*. Geneva, WHO.
- 2008. *The Global Burden of Disease: 2004 Update*. Geneva, WHO.
- United Nations Office to support the International Decade for Action 'Water for Life' 2005-2015/UN-Water Decade. 2011. *Water and cities in the green economy, Zaragoza. UN Water Decade.*
- 2010. *Sustainable Water Management in Cities: Engaging Stakeholders for Effective Change and Action*. Zaragoza. *UN Water Decade.*

BASIN ORGANIZATIONS: FRAMEWORK FOR WATER MANAGEMENT AND COOPERATION. EXPERIENCE IN SPAIN

Francisco José Hijós Bitrián

Keywords: river basin, management, users, governance, water, Ebro.

INTRODUCTION

The year 2013 will be remembered for having been declared the year of International Water Cooperation by the United Nations. This event seeks to highlight the fact that water is the common denominator for more than 7,000 million souls in aspects that are essential to their existence: health, food, energy and even peace and stability on Earth.

Throughout the year, numerous initiatives, conferences and meetings around the world have tried to showcase the advantages of sharing this precious resource and using it as a binding tool between individuals, communities and countries. This article aims at contributing the experience that integral water management by riverbasin organizations can offer a model of collaboration and participation, using a middle-sized country such as Spain, both in extension and population, almost ninety years after it was first implemented.

It is universally acknowledged that water is indispensable for life, progress and environmental conservation, which is why efficient local, regional and global management are necessary for sustainable development and the welfare of societies. One of the tools that allows such management to develop in a manner that is participatory and that emphasizes the integrated view of all water resources is the one implemented by River Basin Organizations that have demonstrated its validity, and it seems will continue to demonstrate it throughout the 21st century.

This integral management not only requires the application of knowledge and the best techniques, but also the application of the principles of participation, transparency and cooperation. The first *World Water Development Report* (UNESCO 2003) already established that the greatest obstacle to the balanced share of water around the world is its governance.

In the areas where water is abundant and its demand is moderate, its management seems to be resolved locally. A region or territory can store and use water without any serious impact on its resources. However, when its demand increases due to intensified consumption, population growth, droughts or competition for water with neighboring zones, a fair reconciliation of the needs of everybody is required.

In this sense, the generation of wastewater, the use of certain fertilizers in crops and waste discharges from industrial facilities may affect the communities that are located downstream. Additionally, it seems clear that the larger and more complex these societies are, the more pressing it is to establish a framework for cooperation that aims at securing agreements on when, how and who has a right to water, as well as to avoid or mitigate controversies through clear and enforceable rules and regulations.

From a global perspective, River Basin Organizations and integral water management are a fundamental contributing element both in the achievement of the Millennium Development Goals to help the poorest people in the world and in the administration of water in developed and developing countries.

In The Dublin Statement on Water and Sustainable Development in the *International Conference on Water and the Environment* (ICWE) in 1992, prior to the *Conference in Rio de Janeiro,* it was pointed out that an integral focus that enabled economic and social development, as well as environmental conservation, is a necessary requisite for effective water management. It was also added that the terrain that is best suited for planning and administration purposes is the river basin, including both surface and ground waters.

a) River Basin Organizations and the Millennium Development Goals

The Millennium Development Goals are contained in the Declaration 55/2 approved by the United Nations general assembly on September 8th, 2000. Among these objectives, a numbe r of them mention that an integral and unified water management may provide effective assistance in reducing hunger and extreme poverty. The availability of water as a fundamental element for the production of food and energy in underprivileged areas is subject to the uncertainties of a nature especially vulnerable to floods and droughts that destroy crops and properties, while also decreasing the community's revenues. Lack of access to safe drinking water and proper sanitation is thus one of the intrinsic indicators of poverty.

A second Millennium Development Goal is that the integral management of water resources promoted by the River Basin Organizations is also effective in reducing the mortality rate among children under five years of age. Safe access to drinking water and its adequate supply prevent illnesses like diarrhoea and intestinal parasites. It must not be forgotten that the former is the cause of death of more than 1.5 million children around the world every year, thus exceeding other diseases such as AIDS and malaria.

On this same subject, improving water supply and sanitation services will contribute to the achievement of additional Millennium Goals such as stopping and diminishing the incidence of serious diseases like malaria and dengue fever on the one hand and, on the other, reducing maternal mortality. Having access to clean water before and after childbirth is a measure that helps to improve family hygiene and reduces the likelihood of contracting deadly infections. Moreover, if this is complemented with further measures that might lessen the female burden of fetching water on a daily basis, vulnerability to anemia and other sicknesses can be significantly curtailed.

On the other hand, there are two objectives among the Millennium Development Goals in which the integral management of resources and the cooperative strategy developed by River Basin Organizations have proved to be especially effective. The first is related to ensuring environmental sustainability. In many different parts of the world, the worst environmental problems of erosion, desertification, the effects of climate change and the loss of biodiversity are associated with water, just as human welfare and existence depend upon it. Consequently, failure to care for and provide adequate protection to this most precious resource means that human communities cannot be sustained. Integral management may help to reach a balance between environmental sustainability and economic objectives, particularly in the field of wastewater treatment and water supply guarantees, especially in drought situations.

The second goal is the ambitious objective to construct a world association for development that aims at achieving an open financial and com-

Fig. 1. Meeting of the Governing Board of the Ebro Hydrographic Confederation.

mercial system with good governance, which directly concerns water. Water is a resource that knows no political frontiers and incorporates an unquestionable development value. An integral management of water facilitates regional cohesion in a country and provides the natural tool to extend this cooperative principle to different states, particularly neighbouring ones that share one or more watersheds.

b) River Basin Organizations in Water Administration

The model followed by River Basin Organizations and its implementation in areas where it still does not exist has been the object of study and comparative analysis on the part of multiple institutions. It is significant that the World Bank has dedicated special attention to the process of administrative decentralization entailed by river basin management, and has therefore carried out econometric studies in 83 out of 200 different organizations of this type from all five continents. The results, presented in May 2005 as part of the *Global River Basin Management Research Project,* revealed some conclusions worthy of interest.

The first crucial factor for the development of river basin agencies is the successful formation of user organizations. The involvement of such entities requires time and patience, and makes the formation process longer, yet much more solid. The second factor is the economic co-responsibility of these users on the expenditure incurred in the river basin, alongside the financial autonomy of the river basin agency, so that the cost recovery of water services remains in the area, with the support of the central government, thus bringing about a positive impact on its development.

The decentralization posed by River Basin Organizations is not in itself a guarantee of efficiency and fairness in terms of management. However, it tends to promote co-responsibility, flexibility and the proximity of the decision-making centers to the inhabitants of the different territories.

Fig. 2. Election of the users' representatives on a basin utilization committee.

EXPANSION OF THE ROLE OF BASIN ORGANIZATIONS

The need for an integral management of water resources has not only led to the consolidation of river basins in the international legal framework for fresh water, but has also brought about wider concepts of planning and management, including those of river basins. The main concepts are the ones that involve river basin districts, defined in the Directive 2000/60/CE of the European Parliament as "... the area of land and sea, made up of one or more neighbouring river basins together with their associated groundwaters and coastal waters".

The linkage of fresh water and sea water located near the outlet is also included in the *Second United Nations World Water Development Report,* which points to the necessity to go beyond the concept of the river basin when it comes to establishing the legal framework for the use of water resources, so that it not only encompasses the activities carried out on the landside of the river basin, which may have an impact on the same water resources, but also takes into account that this interdependence applies to the coastal regions as well.

Fig. 3. Voting at the Ebro Basin Water Council.

Furthermore, authors and theories such as cosmopolitanism convincingly advocate that the political and sociopolitical logic of the nation state is insufficient to face global, security and environmental risks. Climate change constitutes the best example, though not the only one. The rise of oil prices and agricultural products have recently demonstrated that the purely national dimension is gradually losing relevance and, scientifically speaking, probably constitutes a wrong path. Migratory flows are another example: if

a state applies a policy unilaterally, its impacts are felt in other states. This is exactly what happens with water. The appropriate management of cross-border rivers evidences that frontiers do not equate with absolute state sovereignty and that from the Nile to the Mekong or the Danube, there are technical secretariats that, regardless of their lack of executive and administrative powers, safeguard the compliance of border agreements. The Danube quality inspection network has a checkpoint in every frontier so that all states along the coast have access to the quality indicators for the water that crosses the border. This attests to the existence of a body that, without any jurisdiction, is responsible for the coordination of state actions.

BASIN ORGANIZATIONS IN SPAIN

Some of the aforementioned issues were raised intuitively already quite a few years ago in Spain, where access to water has always been a territorial and social objective of spiritual and material redemption. Being a middle-sized country in extension and population, and subject to the circumstance of weather irregularity, Spain, in order to reach its goals, has had no other option but to adopt a participative strategy that might prove useful for other peoples and territories.

In that context, and according to the Spanish legislation, the river basin is the area of land from which all surface run-off flows through a sequence of streams, rivers and sometimes lakes into the sea at a single water mouth, estuary or delta. The river basin concept as a large-scale management unit of water resources appeared in Spain in 1926, when the hydrographical confederations were created. It was around the time when the Tennessee Valley Authority was created in the United States, with somewhat different purposes but a similar philosophy. The earliest confederations conceived the river basin as the domain in which to plan and construct hydraulic works with the aid of the users who participated and actively collaborated in both processes and would then benefit from the results.

The original objective of such a strategy was the creation of irrigation systems in order to increase food production in a country that had very low yields due to frequent and severe droughts (a hectare of irrigation yields as much as 6.5 hectares of rain-fed produce). In those founding days, Spain had an illiteracy rate of 50%, life expectancy was 50 years, and economic progress was essential to modernize the country. The confederations pledged ambitious projects to build dozens of dams and millions of hectares of irrigation to contribute to the objective. In some cases, the works progressed rapidly, while in others, the constructions advanced slowly due to the effects of the great depression, the civil war and the period of autarchy that immediately followed. Towards the second half of the 20th century, economic progress based on industry and urbanization oriented the development of hydraulic works to the development of hydroelectric projects and the construction of supply and sewerage infrastructures.

Today, almost ninety years after the foundation of the River Basin Organizations, the previously mentioned policy is the basis of water administration in the country, the territorial scope of hydrological planning and the decisive element in water management.

In the last decades, River Basin Organizations have markedly evolved owing to increased decentralization and participation in integral management, encouraging and expanding the organizations and associations interested in the field of water. In theory, the protagonists have been those who have obtained an administrative concession for the private utilization of surface as well as groundwater since, according to the Spanish legislation, practically all water bodies are public, with the exception of fossil groundwater.

The main consumer use in Spanish river basins is irrigation, where important works have been carried out for generations. This effort has been complemented by the development and maintenance of updated censuses of the surfaces and proprietors of the areas of land under irrigation, as well as by the oversight and approval of the River Basin Organizations that, according to the legislation, allow the beneficiaries of the same water rights, the same infrastructures and water from the same source to organize themselves in a user community with the objective of achieving the most efficient management of their concession and co-responsibility.

These user communities are public law corporations and each one has its own norms to regulate the use of water in the community's territorial area. Moreover, their concessionary rights, which are recognized in a general registry also under the guardianship of the River Basin Organization, enable them to directly and democratically elect their leaders, including the representatives who are then selected to play an active part in the governing bodies of the Confederation. Their current

constitution has required decades of evolution since their foundation and they have brought about an important cultural revolution. They have finally become stable institutions, indispensable at present. They have secured great internal autonomy and the capacity to make decisions of great overall importance, especially in drought situations, when they respect the agreements in order to apportion restrictions –and the resulting crop losses– in a spirit of solidarity.

The number of user communities in Spain amounts to tens of thousands and, for example, just in one river basin, the Ebro, which constitutes 18% of the country's territory, there are more than 3,000 irrigation communities in an irrigated surface of 800,000 hectares, that is almost 10% of the total river basin area.

Despite the great degree of participation of water users grouped in communities, in the future it will be necessary to strengthen and widen riverbasin water management participation and association. The new challenge is to procure a major incorporation of groundwater resources in each aquifer, which are highly atomized in similar communities to those of surface water, in order to accomplish the most rational exploitation of resources.

The second challenge is to fully incorporate all interests involving water, notwithstanding the fact that they do not fulfill the strict requirement of being users, since they lack an administrative concession. This is the case of leisure activities featuring water –for instance sailing, canoeing and rafting– since they require maximum water availability during the peak season, which coincides with the period of maximum agricultural need of irrigation or with scheduled turbination in the dam stations upstream. This implies a potential management conflict due to the demand for water release from the most flexible dams in order to reconcile all interests.

Thirdly, non-governmental organizations of a conservationist nature formulate proposals and defend equally legitimate interests related to the flora and fauna of the aquatic ecosystems that require appropriate use, conservation and representation in the government bodies of the River Basin Organization, regardless of the fact that they are not actual users and have no right to water. Having the opportunity to access relevant information and to debate potentially controversial issues in a peaceable forum that is periodically convened tends to enable agreements and to diminish possible litigations in ordinary courts of law.

Fig. 4. Hydroelectric users' infrastructure. Arias canal (River Cinca).

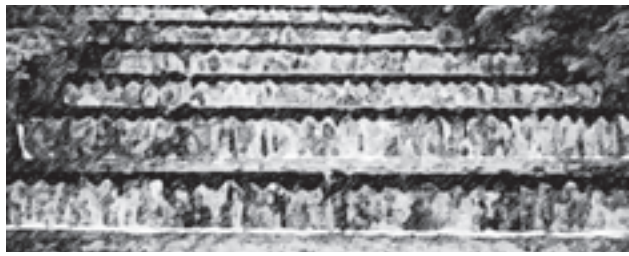
Finally, accurate planning is essential and imperative in order to attain successful integral water management. The planning must include the river basin as a whole, and the legislation establishes that it shall be binding and have active public participation. The objectives of river basin planning must correspond to those ones stipulated in the legislation, that is: good environmental status of water bodies, balanced development in the region and the various economic sectors involved, and meeting the water demand.

Nevertheless, it is not easy for users, local and regional political powers, and the civil society in general to share and assume responsibility for the objectives of the River Basin Hydrological Plan. The first primary rule is that the plan must rise from the territories; it must be constructed from the bottom upwards, instead of top-down, with an investment of as much time and effort as are necessary to find a path of conciliation and to understand citizens' problems with regard to water. An additional difficulty in this process is to fully integrate into the Plan the different regions holding territory in the basin, given that many competences are involved, especially as regards the ordering of the territory, and many interests also, at times in a contradictory fashion.

The principle of riverbasin unity for efficient resource management is committed to formulae of alliance and cooperation between the different agents involved in the administration, given the need to integrate sectoral plannings as disparate as those concerning drainage and water treatment, droughts and floods, supply and sewage, regional competencies, urban development plans, irrigation and rural development plans, in addition to all sectoral policies for the protection of natural resources and adaptation to cli-

mate change. It is a difficult task to incorporate and bring together so many varied plans with such diverse degrees of concretion and development, as well as different time horizons. Hence, for the planning to be credible, riverbasin organizations must be primarily concerned in generating trust and providing coordination and collaboration between the different administrations.

However, in the Spanish context of quasi-federal state organization, there are controversial aspects requiring solutions that exceed the competencies of riverbasin organizations. One instance is the case of interbasin transfer or diversion, which is usually lacking in unanimous support on the part of regional authorities. This probably happens because the profits of the donorriver basin are enjoyed exclusively by the water rights-holders, while in the recipient riverbasin the earnings come from theoretically indiscriminate labor and capital incomes. This is the reason why new transfers are a source of controversy, and some of the existing transfer limits might even be reassessed. Nevertheless, globally –and in the absence of better and more sustainable alternatives– the exchanges can be beneficial and the distribution of gains may be more favorable for the recipient area. Regarding the doubts about profit-sharing, difficulties may arise concerning water transfer between jurisdictions, since they are ultimately seen as discriminatory. The lesson implied is that riverbasin fragmentation does not lead to better management of shortages in areas where water is scarce.



One of the basic principles to be assumed by River Basin Organizations is that they cannot be mere appendages that simply transmit central state orders relative to hydrological planning or depend on circumstantial political decisions. River Basin Hydrological Plans must be coordinated and subordinated to a national hydrological plan approved by the law enacted by the legislative authority, and they must invest financially in their own proposals, to address the priority objectives and the actions they are intended to establish.

STRUCTURE OF SPANISH BASIN ORGANIZATIONS

The integration of different user associations into the Confederation bodies guarantees representativeness and participation in the administration, planning and management in four types of collegiate bodies. A balance of power exists among the members of the Confederation, so that, to put it in a simplified fashion, it can be asserted that users have one third of the power, regional communities have another third, and the rest belongs to different departments of the central government.

The four types of bodies are:

Fig. 5. Water supply and irrigation infrastructure in the Mediterranean. Interior of the Águilas desalination plant.

a) The Governing Board

This is the executive body. Besides the users' representatives, the different regional communities and the central government administration are also represented. Its core task is to approve the plan of action of the institution, the estimates and the possible financing strategies of their proceedings, in case they are deemed necessary. The Board's sanctioning role must also be foregrounded, since it proposes both the penalties in particularly serious cases such as contamination of water bodies, and the compensation for damages caused to the public hydraulic domain.

The Governing Board is also empowered to suspend the exploitation of aquifers in case of a severe drop in their water levels. Additionally, it can implement protective measures for the conservation of wetlands, among other areas.

The Governing Board is customarily summoned every six months, unless an exceptional situation requires its assembly. Its president –who is at the same time the president of the

Confederation– is appointed by the Ministry of the Environment, and is assisted by two vice-presidents: one is elected as the users' representative, while the second is chosen by the regional communities.

b) Management bodies based on the principle of participation

There are four types, the most prominent and numerous being the so-called User Assembly, the pillar of the remaining three. The different riverbasin users who hold concessionary rights are represented in the Assembly. For this purpose, a number of representatives are elected according to their importance under four categories: first, the supply representatives who furnish large cities and consortia as well as smaller municipalities; second, the representatives of irrigated areas, both large and modest; third, those who represent hydroelectric power plants; followed by a generic fourth group which comprises industrial users, fish farms, etc. The competences of this body include electing one of the Confederation vice-presidents, in addition to one third of the representatives of the Governing Board, as well as proposing the members of the dam water release commissions. In the case that we have been following, which is that of the Ebro Confederation, the assembly is integrated by 397 members, amongst whom representatives are elected for the following management bodies, which are more functional and affiliated to the day-to-day-routine:

b.1) Exploitation Committees

They represent water users from part of the river basin area. The criteria for its definition are geographical and functional: the totality of interrelated water resources for exploitation, including surface water from one or more rivers as well as ground waters, are integrated in order to coordinate the operation of the hydraulic infrastructures (dams, canals, pumping stations and power plants), and to foster respect for the concessionary rights of every user. The number of committees is variable, but normally coincides with the territorial domain of a main river, a particularly significant river stretch or important tributaries of the former. In the Ebro river basin there are a total of seventeen: nine tributaries on the right riverbank, six on the left and two at the axis of the river. As has been previously mentioned, the importance of water consumption for irrigation, and the number and significance of the dams that satisfy this intent, motivate extensive analysis and discussions in the committees regarding the programming to fill up the dams, as well as the schedule and arrangements of the water discharges necessary to ensure that all demands are met. The resulting proposals will then be submitted to the Commission for Dam Water Release. The committees assemble at least twice a year, in early spring and autumn, to programme and make a hydrological assessment and to take stock of the measures adopted. A second relevant aspect also decided by the committees is the annual fee users must pay to the organization. In compliance with the allocation criteria for the different types of users based on the profits derived from their activity, the committees approve the total amount that irrigators, municipalities and electricity companies must pay for the water services provided. These quantities include three main items: the repayment installment for the hydraulic infrastructures constructed by the state administration, their upkeep and maintenance expenses, and the expenditure involved in the operation of the River Basin Organization. The entire sum is spent on the river basin, where it exclusively remains.

Fig. 6. Irrigation facilities. Navarra canal.

b.2) Commission on Dam Water release

Its mission is to formulate the proposals for the monthly filling and emptying of private and publicly owned dams. Due to the importance of irrigation in many Spanish river basins and the fact that without dams their water availability amounts to less than 10% of the average contribution, it is understandable that their role is of the utmost significance. Meetings are convened every six months, once the Exploitation Committees have assembled, and only when extreme flood situations require the evacuation of the dams, do they relinquish all decision-making in favour of a permanent emergency committee that subsequently informs them of the decisions adopted.

In ordinary situations, in case of lack of unanimous consensus among its members in relation to proposals, the ultimate decision lies with the president of the Confederation.

b.3) Infrastructures Committee

This committee is integrated by the future beneficiaries of hydraulic infrastructures currently under construction by the state administration. The committee informs about technical and economic matters of the work and any related incidents, and is convened at the request of the beneficiaries.

c) River Basin Water Council

This is the river basin planning entity. Its mission is to propose the River Basin Hydrological Plan to the central government, along with any emendations necessary for its approval. At present, the Councils include users' representatives as well as the regional and central administrations, in addition to some non-governmental organizations.

d) Committee of Competent Authorities

This entity is responsible for the coordination and cooperation at all levels of public administrations with jurisdiction in the implementation of the objectives set by the European Union as regards the Water Framework Directive, and particularly the River Basin Hydrological Plan. Therefore, the regional communities and the local and central administrations are represented in the Committee.

As has been mentioned earlier, the democratic and participative nature of decision-making is real, not rhetorical. In Spain, riverbasin organizations' users have a decisive role in their management and financing, developed in a regulated and regular manner. In cases where controversies arise, the Confederation acts as a moderator, so that the users themselves try to reach agreements and establish forums and mechanisms that enable them to collaborate in meeting the commonly agreed goal of optimizing river basin management.

Nevertheless, despite sharp administrative decentralization, the country's evolution towards a quasi-federal state has not managed to avoid dysfunctions and controversies concerning the role and competencies of River Basin Organizations, even leading to lawsuits in the country's highest courts of justice. However, the Confederations' model is of great value to Spain: for almost ninety years they have been able to adapt and survive all historical convulsions. Additionally, their help has effectively contributed to integral water management, providing a democratic vision of their administration on the part of the principal players, and of great significance in that the search of agreements, collaboration and furthering of social concord in regard to water are objectives shared by all the users. The Confederation provides an opportunity for all users to know each other, to reach a better understanding of specific problems, and to share common experiences, which has resulted in the institution of federations and large-scale professional associations by the multiple water users who for years had interacted in the management sectors of the organization.

This model has also contributed to differences, disputes and infringement penalties to be resolved internally by the users themselves or by the River Basin Organization, causing a severe decrement in the number of lawsuits, which has proved to be a further advantage that might be exported to other countries. The River Basin Organizations' constant pledge to encourage collaboration between different entities and to pacify all water-related management –especially when situations such as droughts test the spirit of compromise of all parties involved–, can certainly be regarded as worthy of interest and value for other countries, regions or river basins around the world.

CONCLUSION

Water governance, linked to the natural region of the river basin and based on its integral management, is an undertaking that has gained widespread global acceptance in recent years. The creation of an authority in each riverbasin with the capacity for governance, autonomy and decentralized decision-making constitutes the framework in which the values of the participation and cooperation of all users and interested parties can flourish, rather than being confined to rhetorical statements.

One of the cases that best illustrate this philosophy is the Organization of Hydrographic Confederations in Spain, a country where historically a great investing effort has been necessary to develop hydraulic infrastructures and to organize and coordinate their users. Notwithstanding their need to improve and evolve, for ninety years and despite the shifting circumstances, Confederations have been capable of generating enough trust and credibility so that they still continue to be institutions that most people want to maintain, albeit with adjustments. This attests to the fact that they provide an added value to the immense challenge that efficient water and environmental management represents for territories and for human development.

We hope that this might be useful, however minimally, for those who have had the patience to read until the end. If that is the case, the dissemination of this experience will have been worthwhile.

Francisco José Hijós Bitrián
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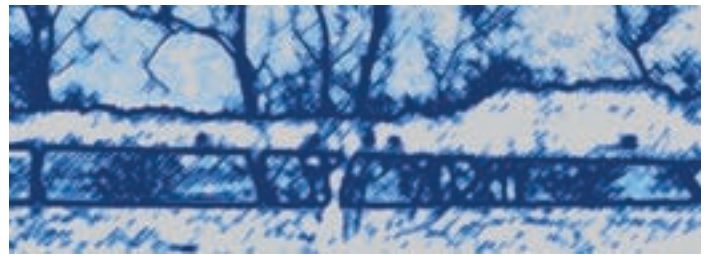
THE ALBUFEIRA CONVENTION
BETWEEN SPAIN AND PORTUGAL FOR THE SUSTAINABLE UTILIZATION OF SHARED BASINS

Pedro da Cunha Serra and Carlos M. Escartín Hernández

Keywords: water, cooperation, management, transboundary impact, environment, water quality, water flow patterns, information, planning



HISTORICAL BACKGROUND

Spain and Portugal share the territory of the Iberian Peninsula whose geomorphic characteristics determine the fact that a great part of the territory flows towards the Atlantic coast. In fact, both countries have different Atlantic river basins in common, such as Miño, Limia, Duero, Tajo and Guadiana.

The Figure 1 illustrates the importance of the shared basins for both countries.

The main characteristics of these shared basins and their relative importance as regards their surface and contribution to both countries are detailed in the Chart 1.

Historically, water relations between Spain and Portugal date back to the *Treaty of Boundaries of September 29th, 1864,* and more recently to the *Conventions of July 16th 1964* and *May 29th 1968*, in addition to other less relevant agreements.

The *Treaty of Boundaries of 1864* takes account of border rivers for the first time, although this is merely owing to their function as frontiers, and therefore it only points out that the existing resources in these stretches should be used for mutual benefits and in ways that do not harm the other stakeholder.

For their part, the "*Convention of July 16th, 1964 between Spain and Portugal for the regulation of the hydroelectric utilization of the international stretches of the Duero river and its tributaries*" and the "*Convention and additional Protocol between Spain and Portugal of May 29th, 1968 for the regulation of the hydraulic usage and utilization of the international stretches of the Miño, Limia, Tajo, Guadiana and Chanza rivers and their tributaries*" have undoubtedly enabled great progress in the utilization of water resources in the border stretches of the previously mentioned rivers and the ensuing generation of wealth for both countries. However, these agreements are merely a framework to encourage industrial progress or, more specifically, hydroelectric development. In fact, the 1964 and 1968 Conventions introduce a detailed distribution of cross-border stretches between both nations, establishing the principle of assigning 50% of the hydroelectric potential to each country through the identification of specific substretches and uneven areas for their hydroelectric utilization, the

Fig. 1. Luso-Spanish river basins in the Iberian Peninsula.

following particular characteristics of the allocation being highlighted:

— The utilization of the international stretch of the Duero river was apportioned between both countries.
— The utilization of the Tajo river was assigned exclusively to Spain.
— The upper middle stretch of the Guadiana river was assigned to Portugal, since it would be affected by the Portuguese hydraulic utilization of Alqueva; the international lower stretch of the river was left unassigned, since it was considered irrelevant for hydroelectric purposes.
— The Chanza river –a tributary of the Guadiana river– wasassigned to Spain.
— Spain was empowered to divert water from the Túa river basin –a tributary of the Duero river– towards the Miño river basin.

Chart 1

Characteristics of river basins in the peninsula

Basin	Surface (km²)			Contribution (hm³/year)		
	Spain*	Portugal**	Total	Spain*	Portugal**	Total
North II and North III	23.050	0	23.050	19.218	0	19.218
Galician Coast	13.130	0	13.130	12.250	0	12.250
Miño / Minho	16.347	818	17.165	11.877	1.059	12.936
Limia / Lima, Cávado, Ave, Leça	1.253	4.960	6.213	812	5.060	5.872
Duero / Douro	78.972	18.854	97.826	13.660	9.192	22.852
Vouga, Mondego, Lis, Ribeiras do Oeste	0	13.988	13.988	0	5.898	5.898
Tajo / Tejo	55.769	25.161	80.930	10.883	6.164	17.047
Sado, Mira y Ribeiras do Algarve	0	13.899	13.899	0	1.516	1.516
Guadiana	55.597	11.601	67.198	4.726	1.887	6.613
Tinto, Odiel and Piedras	4.613	0	4.613	749	0	749
Guadalquivir	63.240	0	63.240	8.601	0	8.601
Sur, Segura and Júcar	79.970	0	79.970	6.586	0	6.586
Ebro	85.560	0	85.560	17.967	0	17.967
Catalonia's inland basins	16.490	0	16.490	2.787	0	2.787
Total	**493.991**	**89.281**	**583.272**	**110.116**	**30.776**	**140.892**
Total of shared basins	**205.521**	**61.394**	**266.915**	**41.646**	**23.362**	**65.008**

* Source: Libro Blanco del Agua en España, 2000.

** Fuente: Plano Nacional da Água de Portugal, 2001.

The 1964 and 1968 Conventions set forth in detail those aspects relative to concessions, easements, expropriations, temporary tenures, public utility declarations, project processing and approval, etc. But most importantly, both Conventions serve to bolster the "*Hispanic-Portuguese Commission for the regulation of the usage and utilization of international rivers along border areas*", which has provided the framework to authorize proceedings, works and concessions, to solve problems concerning easements, expropriations, issues affecting other uses and incidents, and to implement water law enforcement, work inspection and operational control, etc. A significant feature is that the 1968 Convention also incorporates references to subjects other than hydroelectric matters, such as the need to guarantee minimum water flow in dry periods or matters related to fish conservation, in accordance with the pertinent national legislation. Additionally, it authorizes utilization of water for irrigation from the Guadiana river in Portugal and the Chanza river in Spain.

THE NEED FOR A NEW FRAMEWORK FOR COOPERATION

There are three types of reasons that in the early 1990s led both parties to propound the need for a new Convention: objective, substantive and cyclical.

The most substantive reason was related to the profound political, economic and social changes that Spain and Portugal experienced in the last third of the 20th century. This situation brought about the intensification of water uses and the consequent modification of the rivers regime, simultaneously with an increase of cross-sector and even interterritorial competition with reference to the use and availability of water, as well as a progressive decline in water quality. These features, characteristic of a mature water economy, were reinforced by a change of perspective in the international arena regarding water resources: water is no longer considered to be simply one more economic factor in the fields of industry, energy, agriculture or supply, but, additionally to its importance in matters of sanitation and hygiene, it is also considered to be a natural resource which is scarce and fragile and must therefore be protected. This has led to an awareness of both the crucial role that water performs in the environment and the fact that its management ought to be developed within a framework of sustainable development. Moreover, the accession of Spain and Portugal to the European Community (now Union) on January 1st 1986, entailed a new normative framework in environmental matters and more specifically in water matters, regarding not only the compliance with established provisions but also the necessary coordination between both countries.

Fig. 2. National Water Plan Proposal (1993).

Nevertheless, it was unquestionably Spanish and Portuguese political trends that ultimately conditioned the timing of the onset of negotiations as well as their subsequent development and final outcome. In fact, the entry into force of the Water Law 29/1985, passed on August 2nd, marked the beginning of the process of hydrological planning in Spain stipulated by it as one of the fundamental pillars of the new water management policies. In this process, the Basic Documentation and Draft Guidelines for River Basin Management Plans began to be drawn up and in April 1993, the Spanish Government presented a National Water Plan Proposal. This initiative was perceived very negatively by Portuguese public opinion, which was very sensitive when it came to water issues involving Spain, and which saw it as a *fait accompli* policy that ignored Portugal; since, in their view, the proposals of the Spanish Water Plan –particularly the expectations of new irrigations in the Duero, Tajo and Guadiana river basins and the anticipation of additional water transfers from the Duero and Tajo rivers to the southwest– risked throttling the Portuguese hydraulic policy. This situation was further complicated by the serious droughts that had plagued Spain for years and whose effects began to be noticed in Portugal.

NEGOTIATION PROCESS

As of autumn 1993, when the Summit between the Spanish and Portuguese governments took place in Palma de Majorca, the formal negotiation process began to broaden the scope of the Conventions in force at the time, with the objective of regulating the protection and sustainable utilization of water resources in shared basins. The Porto Summit in November 1994 gave fresh impetus to the negotiation process, with the work focusing on a wider technical, legal and political framework, and finally leading to the signing of the *Porto Declaration of November 19th 1994*. This Declaration introduced a new approach to the negotiations on the following bases:

— Creation of suitable conditions for the optimum utilization of water resources in shared basins, within the framework for protection of the environment and water quality.
— Cooperation between both countries for the defence of their respective interests through a systematic exchange of information.
— Prior evaluation of the impact that significant actions by one or other party might cause in Spain or Portugal.
— Coordination of the planning and management of water resources in shared basins from the perspective of their sustainable utilization by both States.
— Concluding a Spanish-Portuguese agreement on water resources in the shortest timeframe possible, based on:

- The principles of Community and International Law.
- The recognition of the equal and reasonable rights that both countries have to water resources in shared basins.
- A cooperation mechanism that ensures a regular and systematic exchange of information.
- A bilateral institutional model that enables the evaluation of hydrological situations of common concern.

Both countries recognised the new environmental awareness that is deeply rooted in their societies and incorporated it into their mutual water policy. In order to implement this, they decided to abandon a merely techno-economic framework for the utilization of boundary waters in favour of a much broader framework that, firstly, encompassed the whole territorial area of shared basins, instead of only the river stretches that constitute a frontier between the two countries; secondly, paid special attention to the balance between environmental protection and the necessary utilization of water resources for the sustainable development of both countries; and thirdly, prevented the risks that could affect the water basins or be caused by them, in addition to protecting the aquatic and terrestrial ecosystems that depend upon them.

In 1995, the drafting of the new Water Framework Directive within the fold of the European Commission conditioned the rhythm of the negotiations and caused the new Spanish-Portuguese Convention –mostly negotiated in 1997 and 1998– to work on a draft that interacted with the aforementioned Directive in order to incorporate its main features, as the existence of divergences between the bilateral text and the European framework that both countries would be committed in the near future was considered unacceptable. The Convention was signed at the Spanish-Portuguese Summit held in Albufeira on November 30th 1998, and it entered into force on January 17th 2000, the date of the last exchange of notes between the interested Parties, communicating their compliance with the respective internal procedures, as established in Article 35 of the Albufeira Convention.

THE UNDERLYING PRINCIPLES OF THE CONVENTION

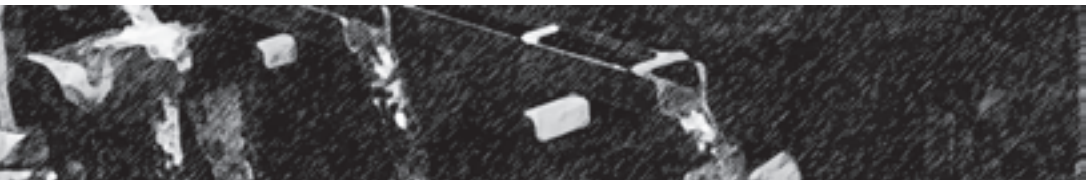
The Convention's underlying principles were established, as previously mentioned, in the Porto Summit Declaration, and they can be synthesized as follows:

1. Broadening the reference framework of previous Conventions

This broadening comprises different aspects. On the one hand, the purely geographic and hydrological aspects, encompassing the whole of the shared basins in agreement with the current tendencies that contemplate the basin as a unit of reference for the study of water-related topics. Therefore, it covers surface waters, ground waters and the ecosystems related to the aquatic environment. Moreover, this supposes a substantial widening, since all activities concerning the utilization of water resources must be taken into consideration –including those that refer to water quality protection–, thus going beyond the sectorial approach of the preceding Conventions.

2. Cooperation between Parties

The management of transnational water resources, considering the word management in its widest possible sense, can only be fully achieved from a perspective of cooperation.



This cooperation is articulated around three fundamental elements:

— The regular and systematic exchange of information.
— Consultations and joint activities, to be developed under the wing of the bodies established by the Convention, although obviously not restricted to this sphere.
— The adoption of measures to ensure the effectiveness of the Convention, first place being given to those measures that enable the homologation of the administrative and legal systems of both countries.

3. Coordination of planning and management of water resources in basins

This is a subject of particular relevance. The adopted solution is compatible with the principle of basin unity, and it follows the standards defined in the Water Framework Directive. It involves both hydraulic administrations coordinating in the attainment of the objectives, while allowing for the existence of each nation's freedom to establish and execute a programme of measures that facilitate the fulfilment of the objectives. Evidently, this modus operandi does not exclude taking concrete joint action when desirable and viable.

4. Respect for and compatibility with existing situations derived from previous Conventions

There is a compendium of rules of International Law which must be taken into account, especially those within the scope of the Community Law recognised by both Parties, adapting them to the specific hydrological and social conditions of Luso-Spanish river basins.

Experience has demonstrated that the International River Commission has been an effective coordination tool, and it is consequently necessary to maintain the essence of its functional principles and adapt them to the new responsibilities specified in the Convention, clearly disentangling political issues –which are subject to a new organ (the Conference of the Parties)– from legal, technical and organisational issues, responsibility for which falls to a renewed Commission characterised by its bilateral nature, unlike other existing cases in the international context.

Finally, it is necessary to reassess the existing situation, which arose from the 1964 and 1968 Conventions. In this respect, it is mandatory to define the situation of the actions that were planned but remained undeveloped, the preferred points of interest for both countries, the previously established water transfers or those situations brought about by an imprecise interpretation of preceding arrangements, though perfectly compatible with the regime established by the Conventions.

CONVENTION CONTENTS

The formal scheme of the Convention contains a Preamble, six operative Parts, a total of 35 Articles, two Annexes and an Additional Protocol with its own Annex.

Regarding the Preamble, which summarizes the political intentionality of the document, two sentences should be noted, given that they epitomize its spirit and synthesize the bases of the agreement:

— The search for a balance between environmental protection and the utilization of the water resources necessary for the sustainable development of both countries.
— The need to coordinate the respective efforts in order to achieve better knowledge and management of river basin water in Spain and Portugal.

1. Institutional Regime (Articles 20 to 23)

The Convention appoints two joint bodies that are responsible for the cooperation process: The *Conference of the Parties* at a high political level and the *Commission for the Development and Application of the Convention* (CADC), henceforth referred to as the *Commission*.

There is no organizational formula specified for the Conference or the Commission, except for their egalitarian nature. From some of the Commission's duties enumerated in the Convention, it can be deduced that it could have a markedly technical and legal character. However, without prejudicing this part of its function, it is primarily a decision-making body for a large number of issues. At the same time, the Convention incorporates mechanisms that enable the rigorous treatment of subjects that have technical, legal or any other kind of specificities, resorting to the creation of sub-commissions and working groups with specialists in the field.

2. Exchange of information (Articles 5, 6 and 7 and Annex I)

It must not be forgotten that the Convention is first and foremost an instrument for cooperation between two countries, and hence the availability of reliable information on the matters it regulates is a necessary requirement for cooperation to be effective.

The Convention institutionalizes access to information for both countries, in conformity with the Directive 90/313/CEE regarding freedom of access to information concerning the environment, as well as the Aarhus Convention[1] on access to information and citizens' participation in environmental matters, signed on June 24th 1998.

3. Transboundary impacts (Articles 8 and 9 and Annex II)

This is a particularly sensitive aspect. The adopted solution rests on the European Directives with regard to the evaluation of environmental impact, and the international legislation endorsed by both countries in the Espoo Convention[2] on environmental impact assessment in a transboundary context, signed on February 25th 1991.

The envisaged system does not unbalance relations between countries, thanks precisely to its bilateralism. Firstly, because it defines the river basin as the unit where transboundary impacts derived from any project or activity may occur, though this is toned down somewhat in Annex II, by taking into consideration the distance between such activities and the frontier. Secondly, because the assessment procedures must be in line with the applicable norms set by the Community legislation. Thirdly, because the consultations – that is, the qualification of projects or activities as being or not being potential causes of transboundary impact – are performed within the fold of the Commission, which is the body that must determine *a priori* which projects or activities should be subject to impact assessment.

4. Water quality and flow regime (Articles 13 to 16 and Additional Protocol and Annex)

When the two peninsular States gathered at the negotiating table, they were aware of the need to create a new framework for bilateral relations capable of implementing the new European Union law, which at that point was still in its initial stage, and to clarify the issues that could not be resolved by the Framework Directive due to constitutional limitations –for instance, the issues concerning the distribution of water flows in Luso-Spanish river basins. Consequently, the new Convention had to build on the new Directive, and its objectives, basic concepts and substantive obligations articulated in conjunction with it, as well as regulating procedural matters related to any omissions –on the grounds of the application of the subsidiarity principle– on the part of that Directive.

These reasons, along with those antecedent, explain the importance that the Albufeira Convention accords to water quality issues and transboundary impact assessment. In addition to this qualitative aspect, matters of volume or river flow were conveniently addressed.

Several solutions were considered for the definition of the flow regime in the new Convention:

— Distributing the annual mean flow rates of each basin between the Parties.
— Consolidating the utilization rights projected by each of the Parties, either through direct allocation or relating them to the consumptions that they generated and which were accepted.
— Determining guaranteed water flows in sections of reference, basin by basin.

The first solution, supported by several participants in the negotiation, had a number of disadvantages and was ultimately rejected. An important drawback that strongly advised against resorting to it was the unfriendly nature of this policy towards the environment: the very concept of flow distribution seems to entail the notion of stakeholder ownership of water, a developmental rather than conservationist concept that at the time was already obsolete, owing to the evolution undergone by International Environmental Law in the last decade.

Also, there is an efficiency factor with respect to this criterion, in the light of what we know about the hydrological regime of peninsular rivers and the extreme irregularity of their flows. If this solution had been adopted (and due to the fact that it cannot be verified directly), it would have led to endless debates regarding the calculation model employed and its adequacy for the purpose intended, the representativeness of the selected pluviometric stations, as well as the series used in the calibration of the model.

The second option –that is, the consolidation of rights to certain utilizations that would translate into a balance of interests between the Parties, along the lines of the 1964 and 1968 Conventions– had several disadvantages that discouraged its endorsement. Once again, it was environmentally unfriendly, since the consolidation of rights would have tempted the Parties to elaborate a list of projects that would not taken sustainability into account, which they would have been unable to appreci-

ate at that time. To use the accepted terminology, the adoption of such a solution in the Convention would have represented the implementation of a "supply-led" water management policy, that both Parties were withdrawing from in the interest of sustainability.

The adopted solution consists in, among other provisions with regard to flows, the establishment of a regime that guarantees minimum water flows in sections of reference for each of the main Luso-Spanish rivers. This solution has the following advantages: (i) its enforcement can be easily and directly verified by measuring the rivers' circulating flows; (ii) it has the ability to adapt to the growing concern regarding so-called environmental flows, one of the criteria used to define the flow regime; and (iii)

it grants great freedom to the Parties for the implementation of ordinary proceedings that are essential to water management in their territory and which do not adversely affect the state of basin waters significantly.

Under the "Flows" heading, Article 16 (1) of the Convention states that "*the Parties, under the auspices of the Commission, will define for every river basin, employing methods that are suitable to the specificities of each basin, the flow regime necessary to guarantee the satisfactory conditions of the waters and their current and future uses*". This fundamental provision does not seem to have been grasped to its fullest extent, given its great importance for the equity of the Albufeira Convention.

Firstly, the flow regime, to be defined by the Commission, must accommodate the environmental concerns of the Parties and adhere to European Community law, which they are bound to enforce. Hence, the very definition of *the satisfactory conditions of the waters* as explained in Article 1 (2) of the Convention remits to Community law. According to the definition of the water flow regime, the Commission must attend to current and foreseeable uses. In other words, to determine the regime, the parties should agree on their intended water uses, which also means that once it is established, it will work as a rule to which all projects must demonstrate their hydraulic viability, a crucial matter for the future application of the Convention. Lastly, both Parties will abide by the regimes set in the 1964 and 1968 Conventions, which guarantee the rights consolidated by the Parties.

The second paragraph in Article 16 establishes the mechanism to define the flow regime. It is proposed by the technical body, the *Commission*, and approved by the managerial political and diplomatic body, the *Conference*. The third paragraph of the same Article states that "*each Party will manage the hydraulic infrastructures in its territory, ensuring compliance with the flows decided upon*." Therefore, the Parties must not only abstain from using waters but, if necessary, they must mobilize the regulation reservoirs lying within their national territory in order to achieve the desired outcome, that is, the established flow regime. Consequently, a demanding obligation of means and results is produced, without which the norm would be significantly weakened. With this obligation, the regulation reservoirs that might be part of the problem become part of the solution, provided that the Convention is properly implemented.

The fourth paragraph of Article 16 stipulates that "*any exercising of water rights, regardless of its use and geographical destination, shall result in compliance with the flow regime and other terms of this Convention*". This provision establishes that all exercising of water rights must meet all the Convention's requirements, which comprise, among others, those concerning quality (including environmental quality, a concept introduced by the Water Framework Directive, and which has an associated quantitative component), transboundary impact assessment and consultation (within the reference framework established in Articles 8 and 9 in relation to the procedures, and in Annex II in relation to the nature, localization and dimension of the uses), and the agreed programmes of measures for floods, droughts and shortages, in accordance with Articles 18 and 19 respectively. Through the combined reading of Articles 16 (4) with 17, which confirm the validity of the 1964 and 1968 Conventions, the rights bestowed by those Conventions with respect to flows are also warranted "*inasmuch as they do not conflict with the enforcement of the norms contained in this Convention*".

The Additional Protocol of the Convention stipulates a provisional flow regime and the circumstances exempting the Parties from its compliance with it, on the grounds of exceptional hydrological conditions.

The defined limits, both to declarations of the onset and the ending of periods of exception, have been determined so that the period of exception would only last for a reduced number of years, compatible with the actual situation. Furthermore, it

Chart 2		
Régimen de caudales (detalle de caudal mínimo del Guadiana)		
a) Q integral anual en el Azud de Badajoz (hm^3 / año)		
Volumen en embalses de referencia (hm^3)	% Precipitación acumulada sobre la media a 1º de marzo	
	>65%	<65%
>4.000	600	400
entre 3.150 y 4.000	500	300
entre 2.650 y 3.150	400	Excepción
<2.650	Excepción	Excepción

is important to establish the point in time when such a decision must be adopted, to be determined by the climatic characteristics and the forms of water use in the basins, thereby allowing for management modifications to include water demands throughout the period of exception – otherwise it would be pointless. In all cases, the demand of water supply for populations and social uses must be attended to, in addition to maintaining environmental conditions in rivers, albeit taking due account of the natural regime that would have derived from the hydrometeorological situation (Chart 2).

5. Exceptional situations (Articles 17, 18 and 19)

It is interesting to address this subject separately from the flow regime for two reasons. First, because it is concerned with qualitative aspects and cooperation in problems derived from accidental contamination incidents, which must be addressed with due expeditiousness, information and collaboration. Second, because the reference articles provide guidelines on how to proceed in the event of drought or floods. Their practical importance exceeds the strict declaration of exception, the latter being nothing more than a one-off occurrence.

The situation of alert caused by drought is not only automatically activated at the request of the Party concerned, but any of the Parties may act if it considers that an existing situation is liable to cause a drought.

With regard to droughts, the Parties are obligated to adopt measures immediately after an exceptional situation in verified. These measures are oriented towards an increasingly rigorous management of the water resources available, and they cover infrastructure management, water saving and reduction of water consumption. Moreover, greater control of wastewater discharges will be required in order to sustain acceptable quality standards.

6. Guarantee scheme (Articles 24 to 26 and 31 to 33)

The main guarantors of the appropriate implementation of the cooperation principle regulated by the Convention are its bodies: The Conference of the Parties and the Commission described in section 1 (Institutional regime).

The guarantee scheme is enhanced by a system for the resolution of conflicts that have not been settled through specific Party negotiations or within the Commission or the Conference of the Parties. The rules of procedure rely on those established in the Espoo Convention, further reinforcing the bilateral nature of the relationship, without interference from international organizations other than the International Court of Justice, as with the 1964 and 1986 Conventions.

It was decided that the Convention should remain in force for seven years, automatically extendable in three-year periods, unless express notice is given up to ten months prior to the end of each period of validity. Amendments by mutual consent may be adopted at any time.

It is worth noting that the Convention does not represent the end of a process but a point of departure, and the framework of reference where issues concerning basin waters shared by Spain and Portugal must be regulated. These issues, by their very nature, change over time, hence the need for a flexible tool that enables adaptation. Its development and refinement must provide platforms that promote awareness of problems and common needs and become a meeting place for the encounter of the two peoples. Water should never constitute a barrier that separates; it should be instead a vehicle for integration. The Albufeira Convention might serve this purpose.

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Notes:

1. Signed by Spain in 1998. The General Parliament approved its ratification in May 2001.
2. Ratified by Spain on September 1st, 1992.

THE FUND FOR COOPERATION IN WATER AND SANITATION SOME THOUGHTS

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Keywords: FCAS, sectoral and geographical concentration, human right to water, Paris Declaration, IDB, Centre for Hydrographical Studies, donor coordination

In 2007, during the Ibero-American Summit that took place in Santiago de Chile, the Spanish President committed to creating a Cooperation Fund for Water and Sanitation (FCAS), with a budget of 1,500 million dollars to be invested in water and sanitation projects in Latin America over a four-year span. Notwithstanding the economic crisis suffered in the years that followed the Summit, Spain has organized teams and procedures and, to this date, it has destined more than 800 million euros for projects that include almost all Latin American countries.

The aim of this article is not to present an overview of specific projects that have been carried out thanks to the Fund resources. Such information can be found on the Spanish Agency for International Development and Cooperation (AECID) web page. This is rather a compilation of thoughts and lessons learnt during the implementation of the Fund.

¿WHY IS A FUND FOR COOPERATION IN WATER AND SANITATION NECESSARY IN LATIN AMERICA?

The importance of water and sanitation

Water and sanitation are part of a sector that affects the rest of the Millennium Development Goals. In countries where a large degree of development has been achieved, it is often said that, "Water is Health". I remember, when I repeated that phrase in a country of Central America, people used to say, "For us, water is everything!"

And so it is: water dignifies life. Water also means education, since it gives children back the time that otherwise they would spend fetching water – or even worse, the time they would waste in bed, suffering from water-related illnesses.

Water contributes to gender equality, since girls and their mothers are usually responsible for fetching water. Mothers are also the ones who dedicate time to looking after their sick children. And when girls reach puberty, they often miss school if they lack access to proper sanitation.

Water helps to improve the economy, since it allows dedicating more time to work and reduces the intake of medicines.

Water benefits the environment, since it constitutes the framework wherein sustainable supply and sanitation infrastructures can be established.

Water keeps people on their land, because it improves and dignifies the living conditions of citizens in rural areas.

All in all, water changes life.

Spain and water

The Spanish people have a special sensitivity when it comes to water. Rainfall is irregular, both in time and space, on the Iberian Peninsula: the north is humid, while the other regions are dry and, regardless of the fact that it hardly ever rains during the summer, severe flooding often occurs in the Mediterranean. This has led to the development of infrastructures as well as procedures and institutions that are able to efficiently manage water, which is such a precious and scarce resource.

In fact, since the dawn of time, the peoples that have populated the Iberian Peninsula have built and managed hydraulic works. The Romans looked for springs and constructed large aqueducts and sanitation systems, some of which are still standing The Arabs brought their mastery of water administration, especially for irrigation and excavation of galleries for water supply. But on this occasion I would like to highlight something which I consider equally important: water management. I will give you two examples. First, Spain has the oldest justice institution in Europe: the Water Tribunal in Valencia, which assembles on a weekly basis and has settled quarrels between irrigators for more than a thousand years. Second, I cannot fail to mention the ingenious creation of the hydrographical confederations in 1926, a universally accepted model that takes the river basin as the basic management unit, and which has since been adopted by numerous countries.

Additionally, it is worth noting the quantity and quality of professionals who work in water-related sectors, public institutions that set an example in the area of water management (hydrographical confederations), engineering enterprises, and companies in charge of water supply, technology and construction, along with NGOs, etc. There is, indeed, great development in this sector, which, furthermore, has the potential to contribute to development in water matters.

Spanish cooperation

The Fund for Cooperation in Water and Sanitation is far from being the first experience in the water sector.

Since 1998, there have been some antecedents that have preceded the Fund and which are worth citing, such as the Araucaria Programme, which comprised projects related to environmental protection as well as social and economic development, and included interventions in water supply and sanitation. And, of course, we must not forget the large number of projects carried out by different NGOs.

The Master Plan for Spanish Cooperation 2013-2016 established the following actions:

- Assisting the administration of water resources by supporting the implementation of the policies of the Integral Management of Water Resources.
- Upgrading access to sustainable water services and sanitation, essential for basic occupancy, paying particular

attention to vulnerable groups such as children, improving habits in hygiene and encouraging women's access to water use and management.
- Promoting governance in this sector as well as the acknowledgement and enforcement of the human right to water and sanitation.

The Spanish Agency for International Cooperation –which is celebrating its 25th anniversary– has always had a Latin American vocation. Its best-equipped offices are to be found in Latin America and count on a team of professionals with extensive experience in the field of cooperation and unrivalled knowledge and understanding of the institutions of their respective countries.

The necessary sectoral concentration

In 2007, the European Union approved a guidance document entitled the EU Code of Conduct on Complementarity and Division of Labour in Development Policy. It concludes that the donors' resources must be focalized on a reduced number of countries and/or sectors, so that each one can have greater comparative advantages, thus obtaining better development results. The objective is to progress in the division of labour and complementarity, reducing the fragmentation of assistance.

As a consequence, it seems logical to aim at sectoral concentration in water and sanitation in a continent where, for historical, cultural and implementary reasons, Spanish cooperation has a comparative advantage: America.

ANNOUNCEMENT AND COMMITMENT

At the Ibero-American Summit held in Montevideo in 2006, the creation of an Ibero-American Fund for Access to Drinking Water had already been proposed. But finally, at the Summit held in Chile in 2007, Spain announced the creation of the Fund for Cooperation in Water and Sanitation, with an estimate of 1,500 million dollars over four years. The areas for action would be rural and peri-urban zones, with the dedication of more than 85% of the resources to the less developed countries.

FROM THE ANNOUNCEMENT TO THE REALITY: THE IMPLEMENTATION OF THE FUND

From the very beginning, there was a commitment to a Development Fund; hence the resources were managed by the AECID. However, since the Agency lacked a specialized department, a specific office was devised as part of its structure, in order to meet the challenge.

Lack of experience in large water and sanitation programmes on the part of the AECID

The initiative was such that it was unprecedented in national development agencies. For this reason, one of the first adopted measures was the signing of an agreement with the Inter-American Development Bank (IDB), so that it would collaborate in the management of a part of the Fund. The IDB has not only developed action plans in water matters for more than fifty years, but also has a specific Division for Water and Sanitation, staffed with over fifty professionals.

The collaboration with the Bank has been fruitful, since it has contributed with its experience to the projects as well as to the technicians of the AECID. Moreover, the technicians have shared their knowledge and experience in cooperation in matters such as gender, cultural diversity, etc.

Currently, about 50% of the Fund's portfolio is managed in collaboration with the IBD.

Parallel to this, the AECID has had to elaborate specific procedures for large water infrastructure programmes. These are inspired by the European Union procedures and their requirements are similar to those of the IBD. It is ultimately about projects being able to meet homogeneous requirements, regardless of the fact of whether or not they are managed in collaboration with the IBD. The working group of the Fund's Advisory Council, comprised of experts in development, water and sanitation, NGOs and public administrations with responsibilities in water matters, has participated in the development of the procedures. And it has not stopped there; this group prepares legal opinions on the operations carried out by the Fund, and is kept informed of the evolution of the programmes and tenders.

Need for technical reinforcement in the AECID

The team responsible for the Fund must have a highly technical approach. Cooperation in the sphere of water has suffered big defeats, due to inadequate designs or to the fact that it did not take into account the maintenance of the facilities.

Aside from the collaboration with the IBD and the drafting of procedures, there was a need for technical reinforcement in the field and at headquarters. So an agreement with the P4R was signed; up to twenty specialised technicians have been sent to Madrid and into the field. Particular emphasis has been placed on the latter: these technicians not only do follow-up work, but they also provide support to the executing agencies and push forward the necessary tasks for the favourable development and quick enforcement of the programmes.

A particularly relevant aspect is the support provided to the tender processes undertaken by each country. Assistance in the drawing-up of the specifications is provided, and, furthermore, in agreement with the Paris Declaration, the need for the international corporations to be unencumbered has been heavily stressed. Contrary to the opinion that the work must lie with local companies in order to generate development in partner countries, we firmly believe that the presence of well-developed international companies fosters the transfer of knowledge to the institutions of the partner country and consequently strengthens them.

The allocation of a large amount of resources in a short period of time

On the one hand, the instruction received by the Fund's Department was to assign 600 million euros in 2009. On the other hand, there were no defined projects or programmes, especially in less developed countries, precisely those where the Fund should be working, when a good selection and definition of programmes is necessary to achieve the greatest impact on people's life standards.

For this reason, it was decided to select large programmes with a certain degree of flexibility, which, through dialogue with the Spanish cooperation, would allow:

- Taking into account the AECID Sectoral Action Plan regarding water, with its three lines of strategy: Integral Management of Water Resources, Access to Water and Sanitation, Governance and the Human Right to Water.
- Considering transversal aspects such as gender, cultural diversity, rural development, etc.
- Agreeing upon criteria for the selection of concrete projects, in line with the cooperation agreements concluded between Spain and the partner country: combating poverty, cultural diversity, synergies with other actions of Spanish cooperation, etc.

Obviously, the aim was that the programmes were not simply a sum of projects but real coordinated actions that allowed for the following advantages:

- Enabling economies of some scale, both in the acquisition of materials and construction, and in the design and supervision of works.

- Facilitating planning and distribution of water resources.
- Envisaging sustainability on a global scale and promoting coordination with municipalities and higher entities.

In 2010, in view of the substantial volume of committed resources, which in some cases overwhelmed the executive capacity of the institutions in the partner country, it was decided to reduce the annual budget (from 300 to 150 million euros) and choose projects that were strategic in nature and complemented other previously selected projects.

The initial situation of the programmes

The first selection of programmes by the Fund revealed that, with a few exceptions, countries did not present defined programmes, but simply a statement of their needs, some of which had been addressed by the IBD and the partner countries for quite a long time; therefore, the programmes approved for their management –in collaboration with the IBD– were, in general, at a more advanced stage of preparation.

After completing the first studies, the outreach planned for certain programmes was reduced significantly.

Other programmes did not include sanitation, only supply. However, preliminary studies revealed the lack of suitable sanitation systems for water discharge, and consequently the plan of action had to be reconsidered in order to incorporate sanitation solutions.

Peri-urban sanitation projects require the construction of wastewater treatment plants. In many countries, prior visits to the existing plants, some of them very recent –revealed that, in general, they malfunctioned owing to insufficient maintenance. Hence, there was a need for treatment plants to be well-designed and built. Institutional strengthening was also necessary to ensure the maintenance of new and existing plants.

It became apparent that a prior and rigorous formulation of projects before beginning the works was essential. It was equally obvious that it was imperative to work on the scope of the project and evaluate similar actions –including their successes and failures– and the general situation of the sector, to take them into consideration when deciding upon the investments required. It was particularly important to analyze possible institutional strengthening, in a sector where structural weakness in poor management is a recurrent problem.

Responsibility towards taxpayers and the underprivileged

In line with what has been previously mentioned, certain criteria must be established for formulating programmes. It was also necessary to establish criteria to decide what should be required of any Fund programme.

From the very beginning, it was agreed that the projects were development actions and the tasks on the ground were only one of their stages. And they needed to integrate not only access, but also the concept of service, sustainable in the long run.

Firstly, actions must be pertinent and in agreement with the partners' proposals, the principles of Spanish cooperation and particularly with the Fund. It is worth highlighting the AECID Sectoral Plan of Action for Water and Sanitation, which establishes the actions that must be undertaken by the Agency in this sector.

Secondly, the main problem of water projects is usually the sustainability of the actions. We must guarantee, as far as possible, that they will stand the test of time.

Thus, a partner's projects must be sustainable from the following points of view:

- Environmental. In accordance with national legislation, AECID environmental policies and the IBD (in the case of multilateral projects).
- Social. In the case of rural aqueducts, society must come to play an active role through the water board (which comprises community members); but involvement on the part of the municipalities must also be aimed at. In the case of actions in peri-urban areas, the entity in charge of providing services must be strengthened, so that it is able to optimise use and maintain the services in question.
- Economic. An exhaustive assessment of fees must be made before any construction work is carried out. This does not mean that the expenses incurred will be fully

assumed by the users; but if this is not to be the case, clear commitments must be outlined in the subsidy scheme.

- Technical. The projects must be clearly defined and appropriately worded prior to any call for tenders.

The Paris Declaration on Aid Effectiveness and Development comprises the principles of appropriation of the implementation of the aid on the part of recipient countries, and the alignment of donor countries with the strategies of the recipient states. From the point of view of the donor, this has occasionally motivated a "waiver strategy" on the part of the recipient country. Nevertheless, we must remember that the Declaration also includes the principles of an approach based on development results and mutual accountability.

The Department of the Fund has always advocated for the same –or even greater– strictness in the use of public funds for cooperation as in the rest of the Spanish national budgets. The co-responsibility of the AECID in the sound use of funds has always been considered, as well as accountability to taxpayers.

Hence, it is fundamental to conduct a comprehensive research of alternatives before carrying out any work, to include variables such as the costs of implementation and maintenance, flexibility (in case of future expansion), effects on the environment, reliability, etc.

The concept of efficiency must be introduced. With the aim of maximizing impact on development, a maximum value ("cut-off value") per undertaking must be established, both in supply and sanitation. This does not mean that, if providing water to a certain community requires a larger investment than the established cut-off value, the community will be denied the right to access water. In such cases, cheaper options must be adopted. If there are no alternatives, due to the fact that funds are limited, the money must be invested in communities where they might have greater developmental impact (that is, of course, in case of equal conditions of vulnerability).

"Active" monitoring and technical support for partner countries

Cooperation must not be limited to allocating resources and "passively" keeping track. In the majority of countries, intense technical support is needed, as well as actions for the transference of knowledge. This is precisely one of the comparative advantages of Spain and one of the reasons for the commitment to cooperation in the water sector.

The implementation must be carried out by the administrations of the partner countries, and they must have consultancy companies under the guidance of public institutions of the recipient country.

However, the entirety of the work cannot be undertaken by consultancy firms. The planning and direction of the tasks carried out by the consultants are essential. In many instances, it is necessary to collaborate technically and provide support to ensure that the works assigned to consultants are duly executed. It often occurs that technicians in the recipient country have never managed large programmes. Sometimes they lack experience in the field (for instance, in issues related to hydrological planning or specific purification technologies).

Poor work management has negative effects both on the final outcome and the consulting company, which works inefficiently. Delays in document inspection or changes in criteria cause the expatriate personnel –which already involves considerable costs– to remain on site longer than expected, thus incurring substantial additional expenses.

Unfortunately, we have noticed that some multinational companies might "take it easy" when working in a country that is not expected to become a permanent client, or when they perceive weakness in leadership.

At the same time, experience has taught us that if executive entities are not supported as far as possible in promoting the proper execution of the tasks, the probability of failure –or at least delay– is quite high.

For the Spanish Administration to provide support to such entities, the AECID can count on on-site technicians who belong to the P4R organization, in addition to the IBD professionals. But the organization that, to my mind, merits special mention as one of the comparative advantages of Spanish cooperation, is the Centre for Hydrographical Studies, the benchmark public institution in the field of water, which has had decades of experience in Spain and Latin America. Its contributions are essential in aspects such as hydrological planning or wastewater treatment. It is, without a doubt, one of the major assets of the Fund –alongside the staff of the technical offices for cooperation.

Water projects require time

Development must always be devised for the long-term. And to optimise impact on the development of infrastructures, these must be properly planned, adequately designed, well-constructed and maintained to the extent that the organisation in charge of operating and preserving the service is equipped to do so.

On the other hand, in line with the Paris Declaration, the institutions of the recipient country are responsible for developing the works.

The AECID (the IBD) supports countries so that the projects are carried out, but this has never led to overlooking the minimum requirements needed for successful investments.

Some sectors –usually those that lack experience in large infrastructures or knowledge of the field– have not understood the need to adequately prepare a programme when money has already been allocated and there are urgent needs. From these sectors have come denunciations of an alleged sluggishness in the execution.

The aforementioned fact is somewhat paradoxical, since in Spain all hydraulic structures (water pipes, treatment plants, dams, etc.) take years to be planned, designed and built –and all that, under a strong administration. In countries where institutions are weaker, it is not surprising that deadlines are often postponed, especially in underprivileged areas.

Coordination with other donors

Coordination is extraordinarily favourable to the development of programmes. There have been instances in which some countries have tried to execute procedures within the Fund's bilateral projects but with no minimum guarantees. Having criteria homogeneous with the IBD has eased the relationship on such occasions. Moreover, the agreement

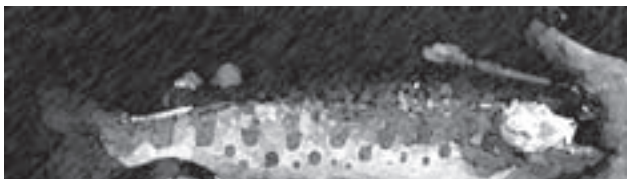
to share with the IBD the indicators for results and common products has also advanced the process.

Regarding other donors, the experience in Nicaragua is worth mentioning. The European Union has commissioned Spain to manage the 50 million euros of the LAIF (Latin America Investment Facility) initiative for a large-scale operation of more than 250 million euros, along with loans from the European Investment Bank and the Central American Bank for Economic Integration (CABEI). But, additionally, the AECID holds coordination meetings with the German agency GIZ, the German bank KfW, the World Bank, etc. They all work in Nicaragua and provide extensive experience. The Fund has served as a catalyst to combine efforts and to achieve a radical change in the state of water and sanitation in Nicaraguan cities.

The management of knowledge

The legacy of the Fund must not be limited to the construction of works. This is the reason why impact assessment for certain projects is under way, so that they may enable better future investments in the field of water. A guide to gender and water has been written. Sustainability indicators are being explored…

Another goal is to disseminate condominial sewerage, a sanitation solution that provides the same service as regular sewerage but saves up to 30% of the cost, which has been included in a number of projects and has constituted the subject matter of several workshops. Moreover, low-cost purification technologies, the improvement of water management and the strengthening of operating companies are also being promoted.

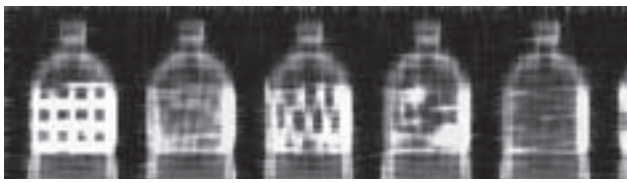


CONCLUSIONS

The Fund has been a remarkable effort on the part of a country (Spain) to work in a sector (water) and in a continent (Latin America). In order to do this, it has had to reinforce its Agency for Cooperation and look for collaboration with entities that have experience in managing funds of similar characteristics, such as the Inter-American Development Bank –with agencies that supply technicians and tenders experts – the State Society P4R– and benchmark technical institutions such as the centre for Hydrographical Studies. It has invested 800 million euros since 2009.

Development projects in general and particularly in the field of water must consider their long-term sustainability. Insistence on well-defined projects, monitoring and active technical support to the executive agencies is essential to accomplish this objective.

Providing extensive technical support is the key to the development of the projects, from their formulation until their completion. A team of experienced engineers is needed both on location and at headquarters. And finally, collaboration with the IBD, the participation of the best experts in the Spanish administration in the area of planning and purification, coming from the Centre for Hydrological Studies, and the work and knowledge of the country on the part of the staff that work in the AECID on-site offices are key components of the Fund.



Lastly, the Fund also studies the management of knowledge in depth, as a tool to promote the best definition and realization of investments in water.

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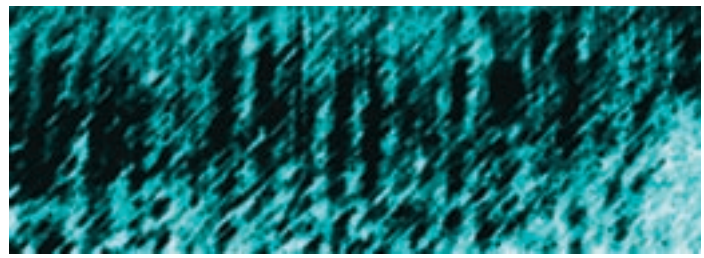
(January 2009 – May 2013)

TOWARDS A POLITICS OF COOPERATION AND NOT OF WAR

IF WATER IS LIFE, EFFICIENT CHANNELS OF DISTRIBUTION ARE NEEDED

Eliseo Bayo Poblador

Keywords: transformation of the territory, war, international cooperation, radical environmentalism, Africa, The Americas



The legitimacy of a government does not proceed from its origin alone, but from its ability to foster policies that have a great impact on the transformation of the territory, with the objective of meeting the needs that arise from the increase in the population, the renovation and also expansion of infrastructures, in order to adapt to the new circumstances. Among all the large infrastructures, the hydraulic, energy and transport systems are the ones that most benefit the population. At the same time, the legitimacy of international politics is based on the predisposition on the part of governments to establish cooperation programmes for the development of projects for the benefit of the citizens of their countries and for mankind in general. Consequently, the governments that adopt policies which are diametrically opposed to the interests of the citizens, as expressed by the majority, and in doing so impose austerity measures that paralyze necessary infrastructure projects, are delegitimized. Even more delegitimized are governments which put war before international cooperation.

What I have just said might sound like an "old discourse", since the development of infrastructures has been wiped away by the austerity measures, as a consequence –a false consequence– of the economic crisis. The "new discourse" –which is not so new anymore– popularised the quick and suspicious dissemination of radical environmentalism, which arose as a response against the generation of electric energy through fossil and nuclear sources, found its next victim in hydroelectricity, and from there turned against the construction of dams. A neo-Malthusian policy quickly became popular, demanding at the same time deindustrialisation, zero growth and population decrease. It took only a step from these measures to justifying wars of aggression, which have resulted in a chain of failed states.

Radical environmental movements, in alliance with neoliberal governments –or inspired by them– actively plotted to cancel large transformation projects in the most sensitive areas of the Planet. I will mention some of them:

THE MITSUBISHI PLAN AND OTHER PLANS FOR THE DESERTS

In 1993, the Japanese government proposed to Europe and the United States a collaboration in a global development plan, with an investment of 500 billion dollars over 20 years. Tokyo was eager to carry out the Global Infrastructure Plan, developed by the Mitsubishi Research Corporation in 1978 and submitted by the then Prime Minister Takeo Fukuda, to establish agriculture in the Sahara, Sinai and Arabian deserts.

The plan emphasised the development of infrastructures in the fields of agriculture and energy. Toshio Doko, former president of the Nippon Keidanren (Japan Business Federation), pointed out that the intention of the government of Suzuki when they launched the plan was to find an alternative to the project of Japan and other countries of intensifying the production of weaponry.

Around that time, other projects were launched for the hydraulic recovery of African territories where water was usually scarce: the Horn of Africa, the Nile Valley, the Sahara and sub-Saharan Africa. There was much talk about the utilization of rivers such as the River Zaire (Congo), which is second to the Amazon in terms of volume, through the construction of a Central African Lake to foster irrigation works and water transport to the dry regions north and south of the Zaire. Nothing was done and the projects were cancelled because of neoliberal policies and the plans to keep Africa in a permanent state of underdevelopment until final extinction.

In 1984, infrared cameras and satellites confirmed the existence of substantial groundwater bodies in the Middle East and the north of Africa, which was already known or at least suspected. The satellite information provided the localization, but the depth, quality and size of the underground aquifers has to be determined by *in situ* hydrological measures.

Subsequent tests revealed quantities of groundwater in the western Egyptian desert, enough to supply water for agriculture for a period of 50 years. There was a proposal to construct an oasis network, creating agricultural and colonization corridors that could transform the desert sands into green meadows.

The location and archaeological characteristics of these underground aquifers point to the previous existence of rivers heading north, towards the Mediterranean, from the hills of Central Africa.

In the western area of the Sahara desert, there are large water flows whose quantity and direction should be programmed for use in the greening of the desert.

MAJOR HYDRAULIC PROJECTS FOR AFRICA

Increasing the capacity of the Nile by 5% through the construction of the Jonglei Canal was considered. Jonglei is the most populated State of the south of Sudan. The project, formulated in the mid-'70s, was to build a large canal (360 kilometres) between Bor and the place where the River Sobat joins the White Nile; the project's execution began in 1978 but, for political reasons, it was halted in 1984. If supported by a channel system, it could have lead to the regulation of the marshes in the south of Sudan, where large quantities of water are lost due to evaporation. Most of the lost water could have been preserved, increasing the volume of the White Nile and releasing hundreds of thousands of hectares of fertile land for agriculture in Sudan. But it was decided, partially owing to the media coverage of radical environmentalism, that the marshes had to be protected. In 1979, the Wild Life Foundation Clubs were established to organize a campaign against the construction of the canal, under the pretext that it would harm the breeders of rained

livestock. The reality was that this area was also designated to be a war zone, which culminated in the independence of South Sudan in 2011.

In the region to the south of the Sahara desert, it is necessary to reconstruct Lake Chad, ravaged by droughts, to prevent the desert from expanding further. It is located in an area strategic for all of Africa, at the intersection of the main railways between west and east (from Dakar to Djibouti) and north and south (from Tunisia to the Cape of Good Hope).

If Lake Chad is expanded, a canal could be derived from it crossing the Sahara to arrive at the Mediterranean. Lake Chad has lost more than 90% of its open water surface, owing to continuous droughts: before 1970, it contained 22,000 km, currently, it contains less than 2,000 km. The result is devastating: a sharp decrease of arable land, the inability to feed livestock, soil erosion and hunger that decimates the population. This calamity was not sent down from heaven; it comes from the back-rooms where the decisions are made to wage wars and exterminate people who, because of their poverty, "pollute" the planet.

Studies of the flows of the rivers Chari and Logone, as well as current rainfall, show that the lake could recover its previous surface, provided that there is an increase of 50 billion cubic meters of water, which could be easily achieved by diverting no more than a third of the mighty Ubangui river, whose flow –most of it– is lost in the sea. This would be feasible with the aid of pumping stations alongside the 200 kilometres that separates the Chari-Logone and Zaire river basins, and the construction of one or several dams upstream from Bangui (Central African Republic), equipped with motorized pumping groups. Once again, radical environmentalists, the spokespersons of neoimperialist politics, voiced their rejection of these projects, including the recovery of Lake Chad.

There were other ambitious projects, proposed by the Central African Republic, to take water from the Obangui river –the main tributary of the Congo river–, fill the lake and restock it with fish. The great dam envisaged would serve to produce electricity. However, the radical environmentalists from the World Wild Life Fund's Freshwater Programme, owners of the wetlands that surround the Lake Chad, strongly opposed this.

THE AMERICAS FROM NORTH TO SOUTH:

Three large projects for large hydraulic and transport infrastructures

The NAWAPA (North American Water and Power Alliance) is an engineering project designed in the 60's by the engineering agency Ralph M. Parsons Co., which recommends diverting part of the water that is currently lost in the Arctic ocean, taking it to the south by means of a canal, through the Rocky Mountains, in order to provide daily a further 135 billion gallons of drinking water to the Canadian and American plains, the Great Lakes, the southwest of the USA and Mexico. At the same time, it includes the generation of hydroelectric energy. This plan would have resulted in the greatest development in the history of North America (Canada, the USA and Mexico): it would have duplicated the surface of irrigated land for agriculture, provided substantial energy supply, balanced water distribution in the continent and created no less than seven million highly qualified jobs, in industry and agriculture.

But the NAWAPA, which was initially supported by the US and Canadian governments and sponsored by Senator Robert Kennedy, was never put into operation. It was superseded by the requirements of the war in Vietnam, after the assassination of President Kennedy. The regional hydraulic works were also halted and it was the end of desalination research. This has resulted in water shortage and environmental destruction, both caused by mankind. Today, water supply problems in California are worse, as in other western regions: Florida and the southeast; the upper area of the Missouri river basin; and the coastal

zones of New Jersey, Virginia and the Gulf of Mexico.

The damage caused by droughts and floods in the 1990s have provided palpable evidence of the need and advantages of these works, paralyzed for 25 or 30 years. A large part of the American population suffers the consequences of water shortage for agriculture, food processing, manufacturing, transport and power generation.

The NAWAPA plan is based on the fact that the American Northwest region is the least populated, while it receives a fourth of the snow and rain that fall in the whole continent. Fifteen percent of that flow (which now heads north) would be diverted towards a natural reservoir: the Rocky Mountains dam in British Columbia. The work includes three phases, in such a way that the benefits of the first revert to the one that follows.

Phase 1: The transportation of water towards the east crosses the Canadian planes, supplies water for irrigation and creates navigational channels that would reach the Great Lakes, allowing, for the first time, the regulation of their levels and of the important channel of the San Lorenzo river.

Phase 2: The transport of water towards the southeast crosses Montana and both the -Dakotas before going south, where it would replenish the now empty Ogaliala aquifer under the Northern Great Plains; it would also increase the flow of the Missouri and Mississippi rivers and connect the Canadian plains with the Mississippi river through a navigational channel.

Phase 3: Canalization of water in the dry region of the southwest of the USA and Mexico.

Besides creating new water supplies and new navigational routes and improving large-scale hydraulic works, the NAWAPA would complete the works that were abandoned decades ago and resolve the inadequate control system of the waters in the upper Missouri and Mississippi rivers. Millions of people suffered the Great Flood of 1993, since the dikes, dams, soil preservation and other necessary infrastructures were never finished. On the other hand, the flooding had minimum impact on the Mississippi river basin, because the majority of the infrastructures in that area had been completed.

The River Bravo (or Grande) basin is also in urgent need of improvements. According to the United States Geological Survey Office (USGS), the Río Grande had already reached its capacity per capita and per square kilometre in the 70's. When that basin, the frontier between Mexico and the United States, became a "free trade" model area with its maquiladora plants, no new hydroelectric infrastructure was ever built. Hundreds of thousands of people survive with a high incidence of illness, without clean water or wastewater treatment. Aquifers are dying out, thus increasing water supply problems in some states and numerous cities. This is an additional solid proof of the disastrous consequences of the lack of international cooperation.

Mexico: a matter of homeland security

The Mexican government has reconsidered water management as being an issue of national security, on account of the enormous complexity of facing the daunting problems that arise from water availability, extraction, purification, municipal administration, the diverse treatments of urban and industrial wastewaters and the water imbalances that require the transportation of water from one territory to another by means of water transfers and large infrastructures.

To solve these problems, the legislative initiative intends to elaborate a new operational framework for basin management, which has been severely handicapped by the simultaneous opposition of municipal, state and federal interests. This constitutes another kind of call –a domestic call– for cooperation.

The great demand for water in Mexico arises from particular challenges. Currently, 78.4 billion cubic meters are needed, supplying which requires 11.5 billion cubic meters of unsustainable volume. This gap will double over a 20-year span. Ensuring a sustainable supply for the water demand will require the investment of 306 billion pesos over the period leading up to 2030 –a sum which must be provided by the different actors that participate in water management.

The main problem of the water sector in Mexico is the result of the imbalance of water availability across the national territory, conditioned by population dynamics such as unrelenting city growth and unplanned urban settlements, as well as by basin degradation, overexploitation of aquifers and the effects of droughts and floods. Water is, indeed, a matter of homeland security. The average natural availability of water per capita has been drastically reduced in recent years, decreasing from 18,000 cubic meters per person per annum in 1950 to 4,411 square meters per person per annum in 2010. Average annual rainfall is 760 millimetres across the country, but this figure hides large regional differences, since states such as Baja California receive a rainfall of barely 176 millimetres a year, while the precipitation in Tabasco amounts to more than 2,100 millimetres. Moreover, the vast majority of precipitations occur between July and September, often in the form of torrential rain; and cyclones cause extensive damage every year.

Achieving universal water coverage for the population requires large-scale action. The challenge is to incorporate 36.8 million citizens into drinking water coverage and 40.5 million people into sanitation coverage.

The federal states that face the greatest challenges in matters of drinking water and sewerage are Baja California, Chiapas, the State of Mexico, Jalisco, Puebla and Veracruz. Achieving universal coverage by 2030 will require the investment of 215 billion pesos and the implementation of far-reaching initiatives.

Additional issues concerning domestic cooperation arise. Innovating management models are needed in order to have balanced basins, clean rivers, universal coverage and safe settlements that can withstand floods of catastrophic proportions. Historically, floods have mainly affected hydro-administrative regions in the Valley of Mexico and Frontera Sur, where investments are concentrated. Other regions, such as Golfo Centro and the Yucatan Peninsula also require increased investments. The investments are allocated to the construction of storm drainage systems (57%) and flood control (45%). The investments already under consideration reach 107 billion pesos.

Large urban concentrations, extremely intense industrial production –which comprises highly polluting sectors (steel, automotive, pharmaceutical, petrochemical…)– and intensive farming and monoculture, such as the sugar mills that are spread across 15 states, create a colossal problem of river pollution. Basins from the Lerma River, the Valley of Mexico and Balsas have reached their limit of sustainability. According to data from 2010, 6.7 billion cubic metres of wastewaters are generated: and this volume is expected to increase up to 9.2 billion cubic metres by 2030, of which only 38% will be treated according to the level required by law. Reversing this situation will require an investment of 114 billion pesos during the period up to 2030. And, most importantly, it is essential that the contamination perpetrators understand the need for cooperation in order to solve the problem they have created.

Water, which is a public good, not, strictly speaking, a business, is a national priority resource that requires large investments to make the activities of the country viable, sustainable and profitable. Water is at the core of life and it operates

through the whole cycle of physical nature; it goes beyond individual needs and circulates through the entire fabric of productive activity –food and industry– and of the sustainability of social interaction.

Internal navigation in the American continent

In 1986, the Schilier Institute published the book *Ibero-American Integration: 100 Million New Jobs by the Year 2000*. The book provides details of the railroad, hydraulic and energy works that are necessary to pull Ibero-America out of its backwardness. The special need to carry out railway and hydraulic works is specifically highlighted.

There is a desperate need for a Pan-American Railroad (North-South), with a number of critical branches crossing the Andes. Without it, national industrialization and serious regional integration are impossible. The proposed route follows the path of the Pan-American Highway towards Central America; it crosses the Darien Gap.

The expansion and widening of the Panama Canal is hampered by environmental drawbacks, first in Darien and then in different parks in Ecuador, Peru and Bolivia, which are located on the route proposed in the eastern region of the Andes. And, finally, the two proposed trans-Andean branches would cross protected areas.

The preferred route (known as Route 10) would go precisely through the west of the existing canal. A second option is the Atrato-Truando canal in Colombia (known as Route 25), which would make use of the existing lakes and rivers. Both routes are blocked by proposed or already existing protected areas. Route 10 intersects the Path of the Panther, designed to elongate the Central American branch that goes from Guatemala on the west, to the frontier between Colombia and Panama on the east. Route 25 is located in the Colombian part of the Darien Gap, previously mentioned, and the envisaged route crosses dozens of parks and protected areas. An efficient system of international cooperation –one that seeks balance instead of irrational exploitation– could find the balance between respect for the environment and the implementation of appropriate works.

Integration of the large rivers would have very positive effects on the population. The most important work of infrastructure for the inland regions of South America to achieve development and balance in the population is the integration of the zone that is home to the three great rivers: the Orinoco, Amazon and River Plate. Once it is completed, ships could navigate directly to any country in South America, except Chile.

Around 68% of the envisaged route, which would be 10,000 kilometres long, is already open for navigation to barges and boats. A further 28% requires dredging and minor hydraulic works to make it navigable, such as the ones that are under construction in the Tiete-Paraná-Paraguay inland waterway. The remaining 4% requires large-scale works of which two canal systems are an essential part: one that connects the Orinoco and Amazon rivers, in the south of Venezuela, and another that links the Amazon with the tributary of the Paraná river in the system of the River Plate, west of Brazil.

Almost four decades have passed since great actions and interventions were devised to integrate social life into an environment modified in the interest of the populations. The projects were to be carried out by means of international cooperation and they were an alternative to war; they were analysed in an atmosphere of cultural optimism that promised major changes. However, the offices and cabinets that protect and speak on behalf of the large corporations and alter the frontiers between peoples, dictating the bankruptcy of states and the annihilation of populations, decided to employ armies instead of engineers. The results of this policy are evident. The citizens are demanding to return towards cooperation and to bury war. The rulers are to be judged by their deeds, which legitimize or delegitimize them.

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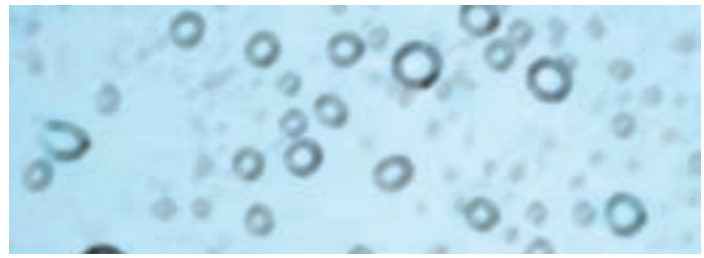
THE ROLE OF WATER COMPANIES IN DEVELOPMENT COOPERATION

José Luis González Vallvé

Keywords: homeostasis, development cooperation, water potential, spanish water miracle



INTRODUCTION

Europe: 7% of the world population, 25% of global GDP, 50% of global social expenditure, and consumption estimates of 20% of the world's fresh water –but, yes, purifying 40% of the grey water that gets dirty every day worldwide.

Apart from the purifying, the figures show a huge and unsustainable imbalance, which most likely is the root cause of the crisis we are in, because, as is to be expected, the global system is rebalancing itself.

But the homeostasis of the system is slow, especially for those imbalances whose correction requires above all a good governance which, in the long term, not only produces the important and costly precise actions needed, as in the case of water, but also leads to, develops or introduces the complex organizations needed for the effective and efficient management of the services. In fact, the organizations that best fulfil these tasks tend to be water companies.

For one billion people in the world it is still a daily miracle to have good water, nice and cheap, in their homes. The best prayer for them would be: "Give us each day our daily water", for the lack of water forces them (more the women than the men) to walk several miles every day, and waste a good portion of their time in trying to get water to cook, clean, wash and drink; in addition, lack of water is also the leading cause of many diseases and of economic underdevelopment.

So, every time we turn on a tap and are fortunate enough to have a splendid jet of drinkable good quality water come out, without much economic effort –especially compared with other public services, because it costs one thousand times less than bottled water–, the miracle of having water come to our home every day should continue to amaze us, especially because that miracle does not happen for everyone.

And, what is more, in Europe we conduct the used water in an orderly manner to the sewers to be purified, to the point where much of it can be reused for irrigation and other purposes, and we return it to the river or sea in a condition good enough to avoid a further deterioration of the environment. And that is an even greater miracle, because 2,5 billion people in the world do not have sanitation, a major cause of disease and misery. Some of the proud countries that have been overwhelming us with their amazing economic growth figures have not yet managed to keep millions of their people from having to relieve themselves in the street.

DEVELOPMENT IN WATER COOPERATION

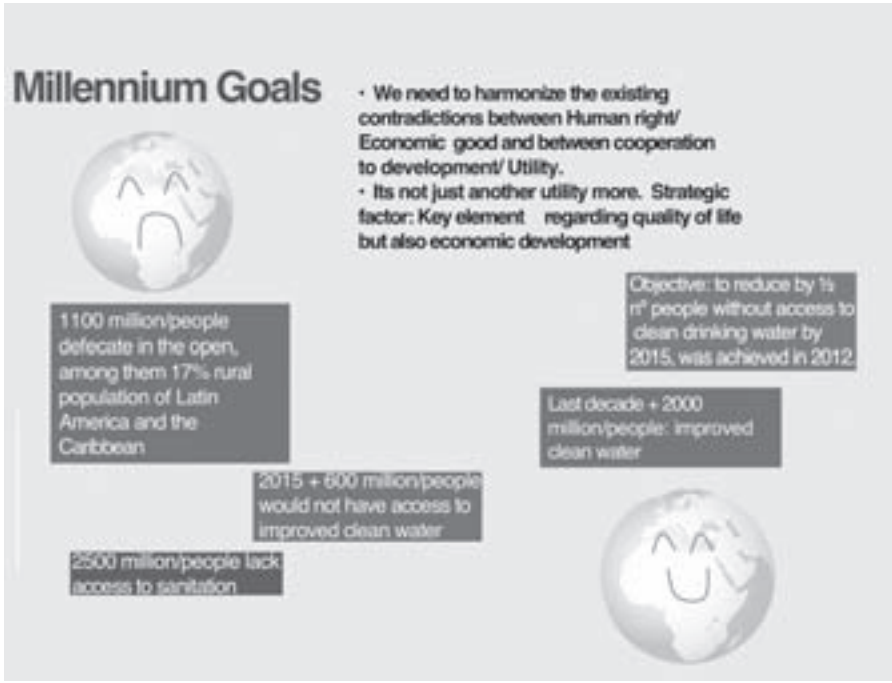
Development in Water Cooperation is a very laudable initiative; for many years it has been trying to correct the lacks of those billions of people who live with less quality, less dignity, and, above all, with less water or none at all. The initiative receives many public resources. Only the European Union, which as a whole is the largest donor, spends more than 40 billion euros a year on it. Therefore, it is essential to continue its evaluation, if only to convince everyone that it is not, as some say by way of criticism, a matter of transferring "money from the poor in rich countries to the rich in poor countries".

And, most likely, one of the factors that could improve the effectiveness and efficiency of development in water cooperation would be to give business a greater presence, not only in order to perform the necessary actions and manage the necessary services, but especially to assist in the generation and development of similar companies in other countries, forming a business network that allows for autonomy.

In addressing the issue of development in water cooperation, it is necessary to examine, albeit briefly, the 8 key Millennium Development Goals, and in so doing, to understand that access to water is a key element in six of them. These are:

— to eradicate extreme poverty and hunger
— to promote gender equality
— to reduce child mortality
— to improve maternal health
— to fight disease
— to ensure environmental sustainability.

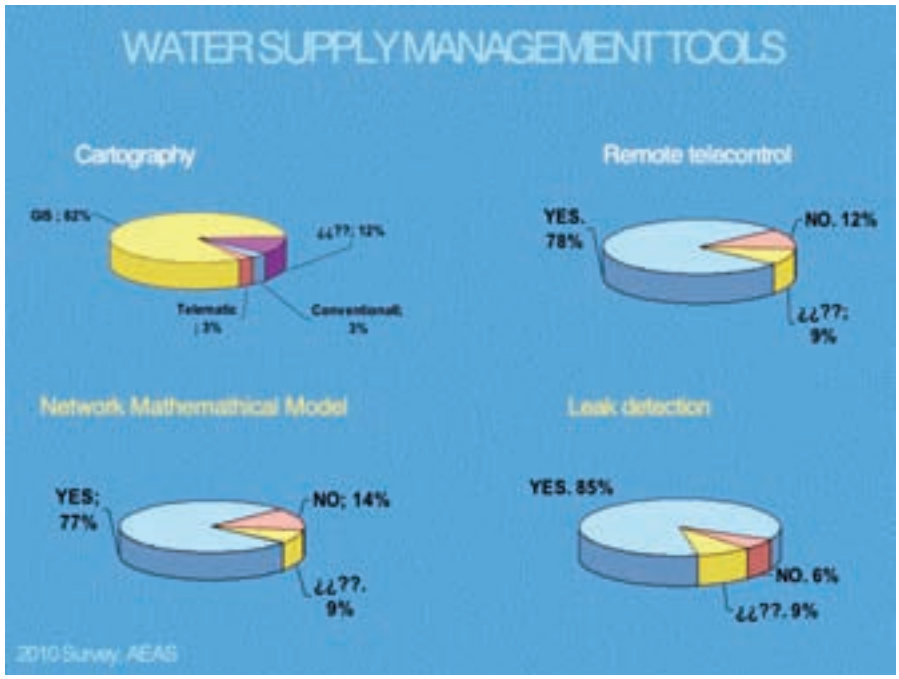
And, I must say that, most likely, the progress made in access to water has been a major contribution to achieving these goals, although there is still a long way to go.



THE ROMANTIC SIDE OF DEVELOPMENT IN WATER COOPERATION

It is obvious that water cannot be treated as another "utility". It is a human right and an essential element that determines the quality and dignity of life, as well as being a key factor in economic development, because we are badly strangled by its lack, whilst its availability has an enormous potential.

Water is still, to a large extent, a feeling, a sign of identity, a treasure. Needless to say, it should be a human right for all, but in order to turn this "dream right" into a reality, we must consider that, in practice, it is a public



service to be provided efficiently; which means not only building good infrastructures properly –an essential first stage– but, above all, good investment and obtaining the necessary resources.

By this, we mean that we must overcome the "romantic view", as it appears in many pedagogical books for children, where water falls from the sky and the river brings it neatly to our homes, as if it were not necessary to build giant dams, canalizations, purification plants and networks of pipes, to be managed with sophisticated mathematical and computer methods, and then to gather that water inside drainage and sanitation networks, purifying plants and recyclers, and to manage it all with a regulation and an organization that minimizes the conflicts and brings solutions; this means, of course, having good governance, but, above all, it calls for organizations that can manage all these complex systems correctly.

Nor is it acceptable that the environmental media diet has made the green consumer willing to pay $1 for a "bio-cucumber", but has not yet managed to get him to pay 70 cents to purify 1 m^3 of the water that is being dirtied daily.

And, most likely, one would also have to overcome the "romantic side" of development in water cooperation, entrusting the task to organizations that have demonstrated and proven that they know how to bring good governance and build the necessary infrastructures and, above all, how to manage water services to the people effectively and efficiently. Once again, the organizations that are demonstrating that they know how to fulfil these tasks best are the water companies.

The solution to the lack of water for those billions of people cannot only be the task of exemplary and dedicated organizations; we think that the establishment of effective and efficient collaboration between these organizations and businesses would be a really important step forward in the solution to the lack of water.

It is unacceptable that in some cities in emerging countries, water is much more inaccessible and expensive in the "slums", on account of an absence of supply networks, whereby tankers have to be bring the water in, than in the centre, where there are other supply networks; and all this with a poor governance characterized, for example, by the fact that most authorities do not know the price of 1 m^3 of clean water, and even less, what it would cost to purify 1 m^3 of dirty water.

This is strategically essential in a world that, although affected by climate change, would most likely first collapse from thirst, rather than from heat.

THE SPANISH WATER MIRACLE

Spain is the only country in the world that in the last 25 years has gone from being underdeveloped to having a development infrastructure; today, its infrastructures have obtained 10th place in the world for strength and quality, in the classification made, for example, by the World Economic Forum (WEF) for their Global Competitiveness Index.

Spain, seen from the air, is in great part a yellow and brown country, not a green one like the majority of our partners in the European Union and many other countries in the world. It is a country with scarce and poorly distributed rain, and therefore, we believe that we can speak with pride of the Spanish Water Miracle, the miracle which means that this yellow and brown land of ours has a good supply of quality water, reasonably priced, which is a lot better than in most green countries in the world.

The Spanish Water Miracle is better understood if one considers what would happen, for example, if the citizens of Central and North-

ern European cities, living in green countries, asked their councils to provide them also with 3,000 hours of sunshine a year, like Spain. Their municipalities would reply, of course, that such a supply would be impossible. But it is not impossible that every inhabitant of so many of these arid Spanish cities so deprived of rainfall has access to 300 litres daily of nice, good and cheap water, just like the inhabitants of the cities in the green countries.

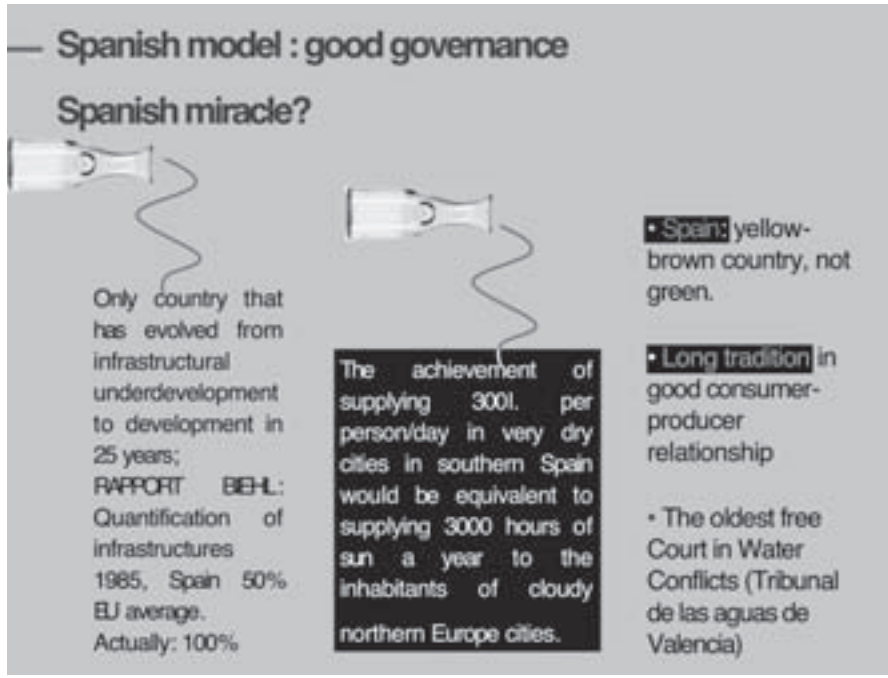
This Miracle becomes even greater if we also remember that in this yellow and brown Spain of ours, we receive 60 million tourists every year, whom we also provide with nice, good and cheap water.

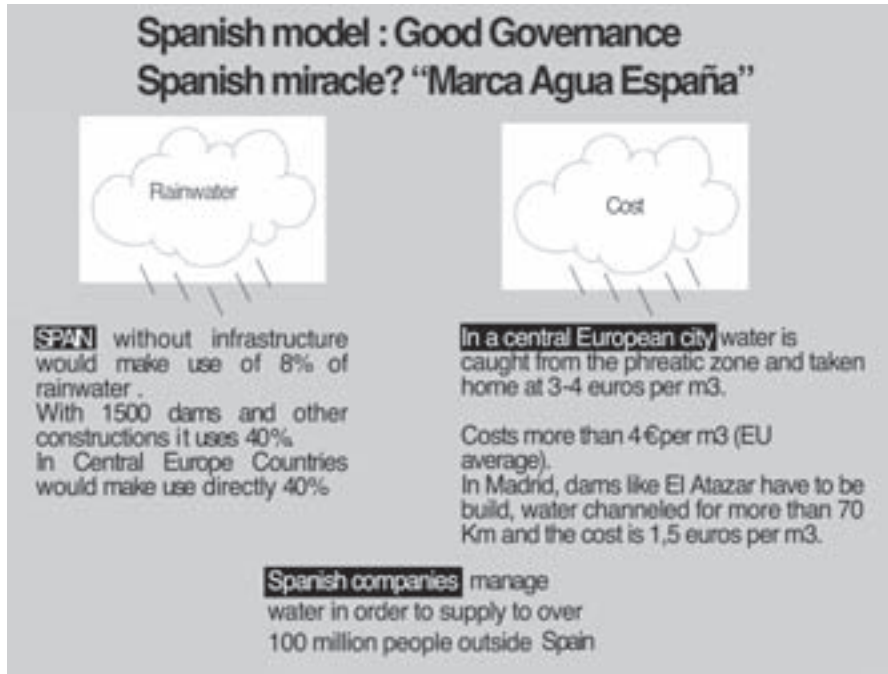
We've never had it easy, but we've made a virtue of necessity: if we hadn't built dams and other large water works, we would only be using 8% of our rain water –and it rains very little and poorly, rain is distributed very irregularly in time and space; but we've built more than 1,500 large dams and many other hydraulic works, we are the third country in the world for the most dams, and, ironize if you like, but thanks to those 1,500 dams and other waterworks, and thanks mainly to solidarity, we can use 40% of our rain, instead of a meagre 8%.

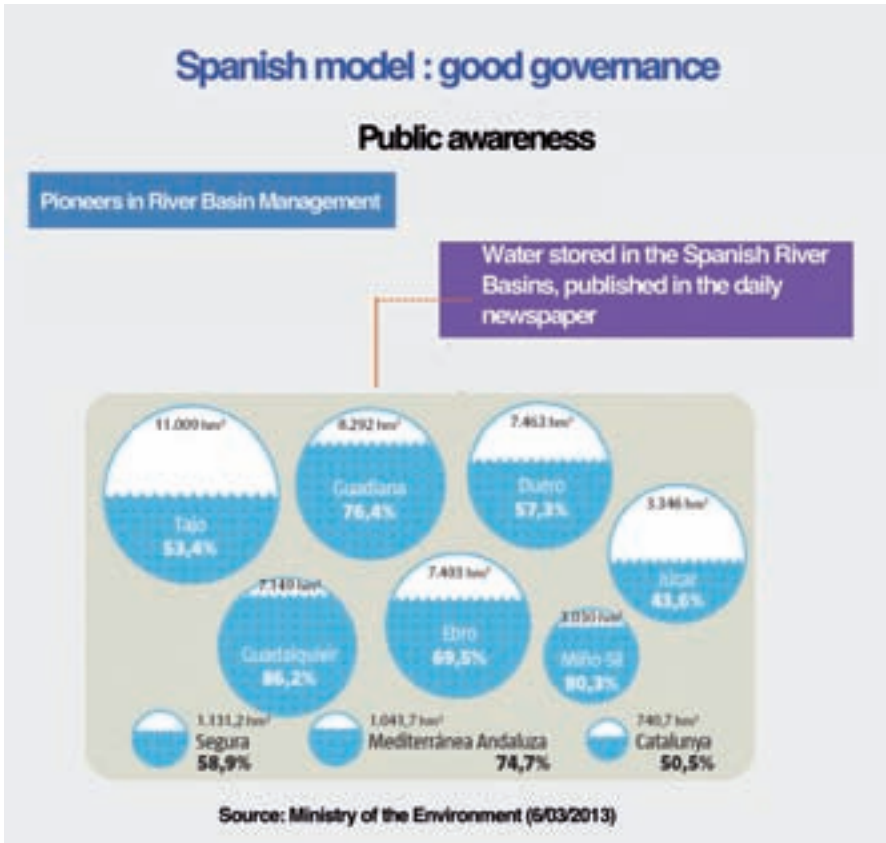
In Spain, we also think that a high level of public awareness of water has been achieved, as is shown, for example, by the fact that we are one of the very few countries in the world where the daily newspapers publish the water level in the reservoirs, as detailed in the following diagram page:

"Green" countries have been luckier with water because, without having to build dams, or hardly any hydraulic works, they can benefit directly from 40% of their rainwater. It is known that in these countries, in cities where they don't have to build large dams and hydraulic works, and where they only have to take water from the water table and simply take it home, they charge triple what they charge in Spain. Therefore, we are surprised at and appreciate much more the Spanish know-how in hydraulics. And now, to complete this miracle, we have had to resort to a sophisticated new technology like desalination, by which we supply water to more than 8 million people and, once again, turning necessity into a virtue, achieving leadership positions in this still very crude technique with its great potential for improvement.

But the Spanish expertise in water has historical origins: the Roman aqueducts, the Arab channels, and the Levantine courts where conflicts are resolved without counsel or solicitor, testify that in Spain the water miracle goes a long way back. Spanish water companies employ more than 20,000 workers, and each moment, every day, they supply water to more

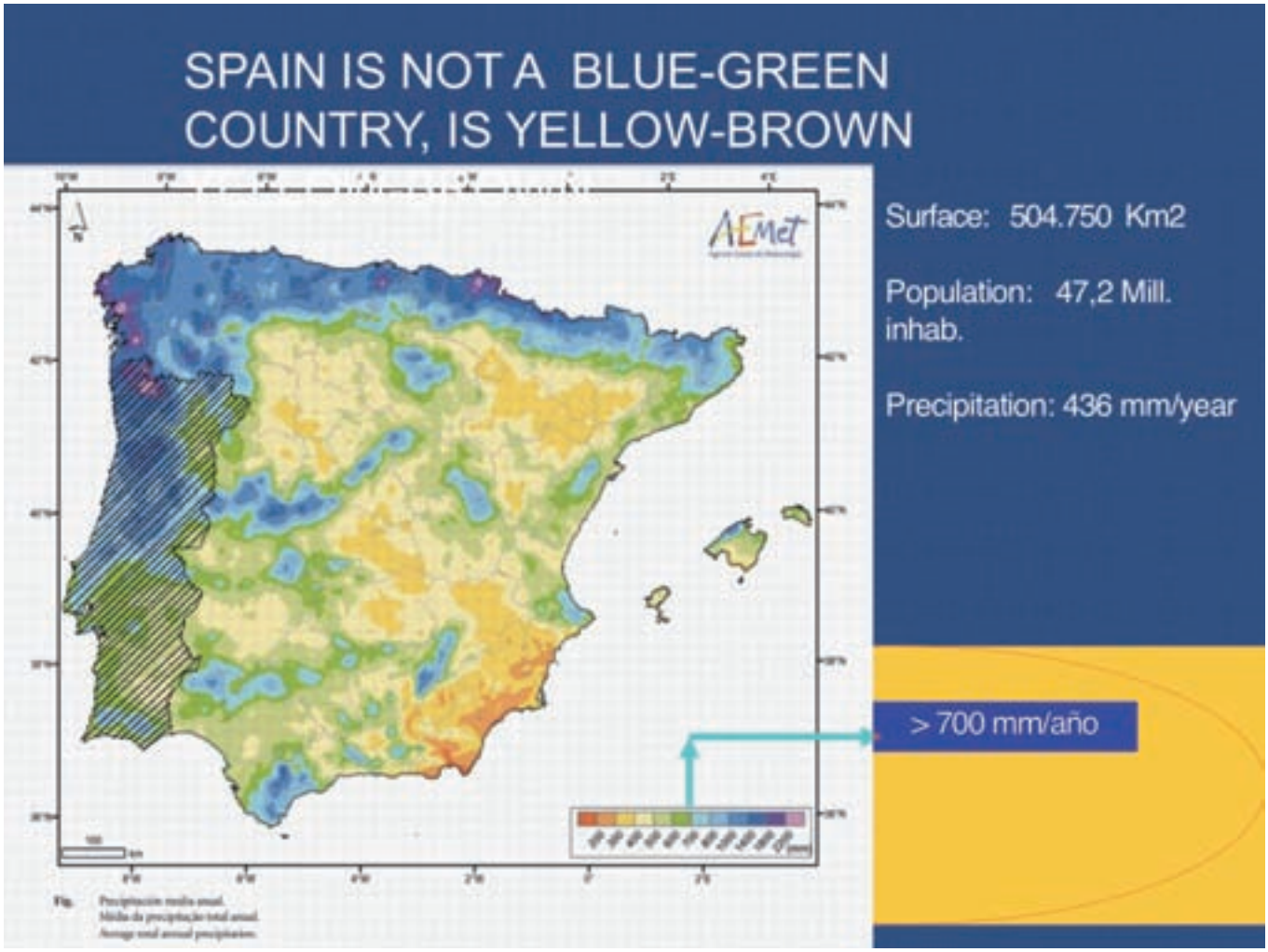






than 4 billion people inside Spain, and several million more outside the country, at a cost that in Spain implies an effort of only 63% of the European average; whereas, for example, the effort invested in telephone or electricity is 120% above the European average.

What is more, now that public-private collaboration is very often mentioned as a possible solution to economic shortages, we must say that water management in Spain is a great example of that collaboration, and it has been for many years; because between the big city and the smallest villages, behind those over 150,000 kilometres of pipes through which water flows every day, there is always a town hall responsible and, almost always, a company on whose collaboration the daily water miracle depends.



One must avoid confusing emergency solutions with good governance. We must build the necessary infrastructures and manage water services effectively and efficiently, so that they are sustainable over the long term; and for sustainability it is also essential that the water be purified, as noted by the European Water Framework Directive, and that most of it be reused, as is done successfully in the Spanish basins.

País	Consumo	Pérdida media por fugas
	litros/ habitante/día	%
Polonia	102	15
Portugal	107	40
Lituania	116	25
Eslovaquia	128	32
Malta	130	15
Bulgaria	139	54
Hungría	152	18
Chequia	152	20
Bélgica (Bruselas y Flandes)	153	6
Bélgica (Valonia)	153	23
Alemania	155	9
Países Bajos	184	5
Dinamarca	191	7
Rumania	194	32
Francia	196	23
Austria	214	11
Luxemburgo	221	30
Finlandia	231	17
Grecia	239	35
Inglaterra y Gales	241	23
Escocia	241	32
Italia	267	29
España	283	9
Suecia	302	18
Chipre	310	18
Irlanda	317	27
Total (media)	**202**	**21**

Fuentes: Endwave y Eureau: Overview on Water and Wastewater in Europe 2008 [4].

Nothing can explain the current meagre presence of companies for developing water cooperation, which, in the case of Spain, doesn't reach 20%, all the more so when it has a laudable record of effectiveness and efficiency in a country with a lot of water stress, and within the European regulatory framework, which is the most demanding in the world, and where, out of 28 states, Spain ranks 4th in per capita consumption, and has the 3rd best place in network losses.

There are a powerful combination of reasons in favour of a greater presence of companies for developing water cooperation, including:

— knowledge of the sector
— private-public accountability
— possibility of obtaining resources
— price controls
— professional skill
— innovation
— long tradition of relations with consumers
— local partnerships
— transfer of technology and know-how
— and contributing, in any case, to the development of a key business sector.

We think that not taking these sufficiently into account is an inexplicable, unwarranted and absurd waste.

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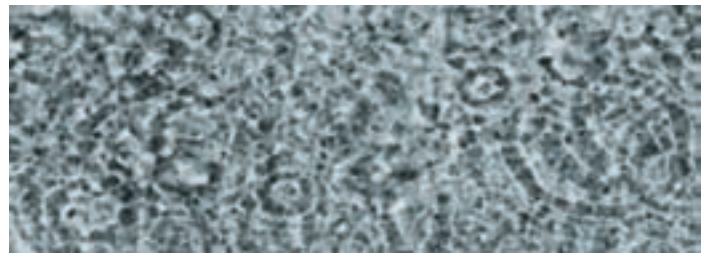
THE TRANSFER OF KNOWLEDGE:
THE BASIS FOR COOPERATION

Ángel Simón Grimaldos

Keywords: water, abundance and shortage, squandering and necessity, cooperation, dialoge and reflection, networking



At the end of last summer, a Sahrawi girl, who was about to go back to the daily desert life of her homeland after a group holiday in Spain, was asked what she would like to take with her. Her answer was fast, spontaneous and symbolic: "*A faucet*". This answer provides evidence in a way nothing else does of the tragic dichotomy at the core of water matters: abundance and shortage, squandering and necessity; a kind of point of departure for the fine line between hope and hopelessness. It also reflects the generalized perception that water springs from the faucet, the myth of eternal and infinite supply that characterizes western societies prone to ignore that one third of humanity lives in scarcity. Additionally, it shows how appropriate is the declaration by the United Nations of 2013 as International Year of Water Cooperation.

This initiative on the part of the United Nations presents us with the opportunity to engage in a multidisciplinary analysis of the concept of cooperation itself in this sphere, and prompts us to question old schemata and patterns. Official institutional statements do not always stand the test of time and can hardly bear the harsh weight of reality, its stubbornness and refractory nature in the face of any proclamation. In the case of water, as in many other cases, matters end up being what they are and not what they were expected to be. Vis-à-vis this sort of *faucet syndrome*, an unequivocal symptom of sickness, anyone and everyone who can contribute to the great challenge of making the human right to water and sanitation a reality is called to examine and debate water-related concerns.

In order to confront this challenge, the International Year of Water Cooperation must have a far-sighted, even permanent focus. A proposal of such dimensions cannot be reduced to a twelve-month period or be subject to out-of-date criteria. Cooperation must transcend its traditional meaning. It must not respond to transitory impulses and ideas of generosity or altruism, but to a willingness to integrate which includes the participation of diverse agents who interact and contribute to development and welfare from different spheres. A challenge of such proportions must have continuity and be anchored in our day-to-day activities, conceived with a view to the long term, founded on a sustained and sustainable development permitting one to situate the horizon in 2050, far from current short-tem bargaining or an immediate perspective more reminiscent of political activity. The future is very wide, and the present, conditioning. The figures are truly mind-boggling, but to ignore their reality is irresponsible. Ultimately, it is imperative to foster a cooperative spirit and the readiness for a transversal collaboration

Fig. 1. Know your water before using it.

on a global scale that transcends frontiers, and which sponsors meeting places and common spaces for thought and dialogue.

It goes without saying –though I will later return to it– that I am convinced the problem we are facing is not so much of water shortage as it is of governance and effective management of available resources. The current crisis, in that it compels us to reconsider the present and search for new future paradigms, presents us with the opportunity to undertake reforms and implement measures that enable better and more efficient administration of water and other resources. The magnitude of the present circumstances and the forecast of what is yet to come mean that progress along the path of sustainable development, requires more than ever the cooperation between all agents involved: administrations, governments, companies and institutions, international bodies and non-governmental organizations, professionals and universities, scientists and individuals who want to submit their ideas. Among other things, globalization enables us to work in a network, connect different areas and research centres, exchange experiences, and to move forward towards a great global community of knowledge about water. The creation of such a supra-association, to rule out the menacing hypothesis of an imminent crisis and advance instead towards sustainable development, is an overriding aim which, beyond any rhetoric, ties in with the practices of our company and constitutes a strategic component of *Aqualogy*.

PROXIMITY TO TERRITORY

We understand cooperation as a process of approaching each situation and each territory. Proximity supposes the ability to understand and adapt to each reality. The richness of globality is based on the sum of local particularities. For this reason, we must approach each specific case with the discretion to observe, the disposition to know, the attitude to listen and the vocation to understand and comprehend, without presuming to interpret them from ideological apriorisms or preconceived notions of any kind, and far from any philanthropic tartuffery, which, more often than not, ends up concealing a predatory attitude. Cooperation in the sphere of water must be dialogic and it is thus essential to be able to listen in order to place on the horizon certain shared objectives and goals, oriented towards overcoming existing imbal-

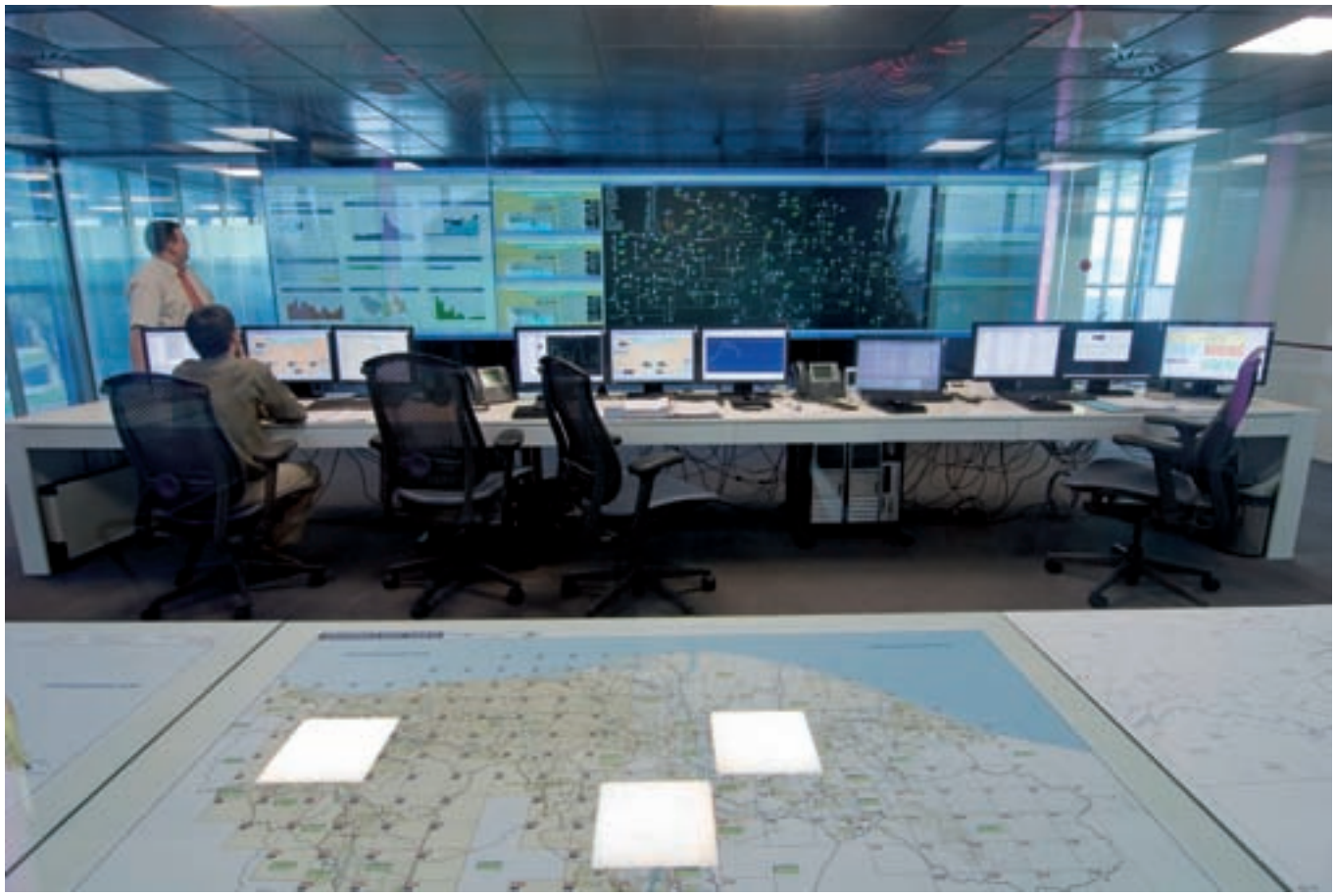


Fig. 2. Water is simple; its efficient management is somewhat more complex. Operational Control Centre.

ances. All in all, a collaboration between wills distinct but not opposed, in outlining projects in common.

The United Nations Resolution highlighted water utilization in certain areas of the planet, essential to the survival of the human race and eradication of poverty, as a tool for peace, and not as a cause of conflict and confrontation between nations and peoples. The risk is there, and the manner in which we address water issues will constitute a contribution to peace, as long as it fosters access, avoids conflicts, and reduces exoduses and migratory flows, mass displacements of human beings. The resolution has been preceded by other declarations of interest oriented towards sustainable development: the Rio Declaration on Environment and Development, the Johannesburg Declaration on Sustainable Development, the World Water Forum held in Istanbul or the objectives of the Millennium Development Goals. Although it is indisputable that these Declarations have yielded some results, they must not lead us to remain complacent or lower our guard, since the number of people affected by this problem continues to be overwhelming. Since the 1990s, millions of people have experienced improved access to water. In 2010, 87% of the world's population already had access to supply sources of drinking water, breaking a negative trend that seemed unstoppable, thus accomplishing, in advance and to a large extent – a considerable part of the Millennium Development Goals regarding water supply. However, we are still a long way from achieving similar results in the field of sanitation.

There are many other figures that must be considered: more than 800 million people (around 13% of the world's population) still lack access to drinking water, and a further 2,600 / 2.6 million/ 2.6 billion are deprived of basic sanitary conditions; between the years 1900 and 2000, global water consumption multiplied by six, that is, it almost doubled the population growth rate; the Stockholm Environment Institute has stated that the percentage of the population affected by water problems will have increased considerably by the year 2025, possibly reaching 6,000 million people; agriculture continues to consume 70% of all available water, although modern technology provides the means to achieve equivalent levels of productivity with much lower consumption, even in different areas within the same country; one third of the population lives in hydrologically stressed countries, a particularly pressing problem in developing nations, where economic and demographic growth rates are high; only 2.5% of the Earth's water is fresh water; Asia hosts 60% of the world's population but only 36% of

the world's fresh water; the difference between countries in the same continent is equally dramatic, and the potentially availability of water for citizens varies between 1 and 40; fresh water is a cherished asset, though unevenly distributed, since 75% of the resources are to be found in only five countries; recycling and reusing barely reaches 20% of its potential, when percentages could be much higher... The human suffering caused could also be added to this already alarming stream of figures: every year, between six and eight million people die on account of water-related disasters and illnesses; every day, 5,000 children die from diseases such as diarrhoea; the majority of affected people use merely five litres of water a day, which is far from the minimum threshold estimated at twenty litres and the antipode to the hundred litres consumed in developed countries.

We could continue to provide data, but in the end they are nothing more than coldly clinical accounts that simply lead to the acknowledgment that we are facing a situation of global deficit that has a direct impact on the life standards of present and future generations. In 2010, the United Nations Secretary-General Ban Ki-Moon already emphasized this matter, alluding to the possible impact that water stress could have on world economic growth, equating it with the impact of climate change. This situation, far from improving, is tending towards progressive and possibly unstoppable deterioration, according to experts.

We are facing a problem of equity and the future. We are at the crucial moment of anticipating a new paradigm for which we are all urged to provide ideas, thoughts and initiatives. Decidedly, this is applicable to different aspects of our everyday life, but what concerns me, what I above all feel really passionate about, is water. Each of us has, or could or should have, a passion - this is mine. And in this field, not a single problem is deemed trivial if we can do something to solve it. Some studies assert that passion represents one third of success in any project and that it decisively contributes to the creation of courage. Quantification is not that important. What really matters is that without enthusiasm, it is much more difficult to bring any project to a successful conclusion.

A CRUCIAL MOMENT OF ANTICIPATION

The difficulties foreseen can only be overcome through knowledge and technological development, which go hand-in-hand with indispensable scientific research, establishing adequate channels so that their transfer and application can be effective in each territory. The discovery of one of the world's largest aquifers in Kenya, enough to supply Spain for a hundred years (based on current consumption), is not a coincidence: UNESCO was employing new satellite systems for detecting water bodies.

If the current rhythm of demographic growth continues, the planet will be inhabited by 9,000 million people in the year 2050; 50% more water than we have today will then be necessary, which implies assuming substantial changes in its management if we want to avoid a crisis of planetary proportions. We must place humans at the core of our concerns, making this the axis of our values in our daily actions. The problem does not exclusively concern governments, companies or international organizations. Water, energy and food are closely linked: the balance between these three vectors is the basis of sustainable development that could prevent chaos. A dramatic reduction in water availability would generate a chain reaction of unpredictable consequences.

The increase in the population, its concentration in large urban centres, the necessary access to food and the effects of climate change, among many other factors, will make water one of the most precious resources, as much for domestic use as for industry, agriculture and services. Habituated as we are to the daily enjoyment of water, we Westerners know what we pay for it, but we either disregard or ignore the value and importance it has in other areas of the world. It is very difficult to assimilate the concept of shortage: we simply open the tap and water immediately flows from it - until the day when, owing to a period of drought or some other circumstance, we suddenly realize the danger entailed by the lack of something that seems to be almost a part of our own nature. Only then does the *faucet syndrome* become apparent. Human actions are translated into global warming; when precipitation patterns undergo modifications, cycles or drought and rain become shorter, river courses are altered and water levels in lakes and groundwater vary. However, we are the unperturbed witnesses to the extreme scarcity of water in certain areas, while others are plagued by floods. And all that is without taking into account recurrent humanitarian crises, wars and the resulting population displacements, which exacerbate the victims' vulnerability. Only the impact of certain televised images remains to awaken us from our lethargy and indifference. But the shock is ephemeral; soon afterwards, we re-enter the kingdom of oblivion and indifference.

A few months ago, five hundred scientists who had gathered in Bonn (Germany), proclaimed that

Fig. 3. Humanity needs water, ecosystems too. Llobregat Delta.

the mismanagement and excessive use of water, and climatic change, represent long-term threats to the welfare of humanity. They stressed how local human activities have repercussions at the regional, continental and global levels which are drastically altering water flows and reservoirs, reducing their quality and damaging their ecosystems. They insisted on the fact that human agency plays a crucial role in the behaviour of the global water system. "Humans –they said– usually establish water supplies through short-term engineering solutions that are often expensive and which might have an impact on social and ecological systems". This path led them to conclude that sustainable development requires both technological and industrial innovations, while "the current increase in the use of water and the poor efficiency of the hydrological system move forwards on an unsustainable trajectory".

KNOWLEDGE AND TECHNOLOGY: AN ADAPTIVE SOLUTION

In our ideal of cooperation, technological premises and knowledge become an adaptive solution to water shortage. Overcoming present and future difficulties will require substantial investments in extraction, pipes, transport, sanitation and wastewater treatment. Water-related problems will be impossible to solve without the application of knowledge, conceived as accumulated know-how and the sum of experiences, which can only become reality through habits and customs of adaptation to each local and regional context. Leaving aside technological development, here is where we can place the essence of a cooperation that enables a sustainable future and turns the universal right to water and sanitation into a reality.

Technological progress demands important resources. Like all evolution, technology and its implementation require a suitable setting. There are many water companies –and we must count the Spanish as being among the foremost– which possess enough experience in management as well as in products and services to be in a position to contribute to the rethinking of the current paradigm, and to orient it towards a more balanced, fair and sustainable model. The current path only leads to insufficiency, competition for water, worldwide price increase and confrontation. Knowledge and technological solutions have

the opportunity to be the crossroads where solutions are presented. We are at the crucial threshold moment.

Nevertheless, for knowledge and technology to make their contributions, - alongside scientific research, which is essential –it is necessary to establish appropriate channels for the transfer to be effective. The essence of the cooperation we have exposed –and for which *Aqualogy* advocates– can be summarized as a readiness to share knowledge to prevent it from losing its driving force and becoming worthless. The abysmal differences between territories are evidence that the current water model is unfeasible for ecological reasons and unsustainable on humanitarian grounds. Water calls for a new focus that places people at the core of concerns, since it is vital for their nourishment and their quality of life. We must put all acquired knowledge at the service of humanity and learn from every experience to implement it later in other places. This implies shared work, searching for common objectives, setting medium and long-term goals, putting immediate concerns to one side and having a global perspective that takes into account each local reality. The faucet wished for by the Sahrawi girl is much more than an anecdote: it is the living proof of the need to change principles and criteria, and the ways in which we understand each and every reality and how to intervene in them. In this sense, the ability to listen and communicate is decisive. There is no future without dialogue and intense aspiration.

Fig. 4. Technology needs to indicate the way out of the current crossroads.

This year also presents itself as an opportunity to underline the importance of science and scientific collaboration in confronting challenges. The search for alliances and complicity in this field can only be achieved through an understanding and consensus regarding future challenges. Handling water resources, so complex and with so many influencing factors, demands the adoption of a global and holistic perspective. The specific problem of water is more than the sum of its elements and of the diverse factors coalescing therein.

STRONG AND LONG-LASTING ALLIANCES

The main objective of this proposal for cooperation implies the weaving of strong and lasting partnerships with basic, essential and concrete initiatives to contribute to the fair and equitable distribution of water resources. All the affected parties must foster a realistic and constructive dialogue. Its importance lies in the fact that it calls for the attention of all levels and sectors. It is not too late to undertake reforms. The commitment to a future of progress that we cannot and must not relinquish, demands a correct organization of initiatives and efforts, otherwise it will be a failure on the part of all humankind. It is, above all, a problem of attitude. We must explore new paths and combine our efforts to work together for common goals, on the assumption that sharing knowledge and experience must be a part of our daily activities, an expression of the deep essence of the human race. The pathway that remains before us is undoubtedly long and complex. But there seems to be one ineluctable factor if we wish to follow the path of progress: parity between cooperation and sustainable development.

Fundamental to the International Year of Water Cooperation is the willingness to adapt to each territorial sphere; this implies a permanent dialogue between several actors, the ability to listen, the disposition to understand and the exchange of opinions and criteria, all of which go beyond formal debate, speeches and data. The aim is to define the areas of meeting, common goals and results that are worth sharing. In order to do this, we will have to make every possible effort to interpret reality in a creative fashion, anticipate events with great care and sensitivity and explore their meaning. The accumulation and transfer of knowledge means approaching events with curiosity and intelligence, and leaving aside apriorisms. Otherwise, the brilliant words, profusion of figures, apparently altruistic contributions or scholarly conclusions will only serve to mask, distort or conceal reality, and we will thus be deceiving ourselves. In the case of the Sahrawi girl, the added value of her words is not so much in what she says, as in what they mean.

Ángel Simón Grimaldos
Civil Engineer
Chairman of Aqualogy

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