Ethics Praxis 13

Blue Ethics

Ethical Perspectives on Sustainable, Fair Water Resources Use and Management

Benoît Girardin / Evelyne Fiechter-Widemann (Editors)

Globethics.net

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with the Collaboration of Members
of Workshop for Water Ethics' Association (W4W)

Globethics.net Praxis No. 13

Globethics.net Praxis Series

Director: Prof. Dr Obiora Ike, Executive Director of Globethics.net in Geneva and Professor of Ethics at the Godfrey Okoye University Enugu/Nigeria.

Globethics.net Praxis 13
Benoît Girardin / Evelyne Fiechter-Widemann (Editors), *Blue Ethics: Ethical Perspectives on Sustainable, Fair Water Resources Use and Management*
Geneva: Globethics.net, 2019
ISBN 978-2-88931-308-2 (online version)
ISBN 978-2-88931-309-9 (print version)

Managing Editor: Ignace Haaz
Assistant Editor: Samuel Davies

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150 route de Ferney
1211 Geneva 2, Switzerland
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All web links in this text have been verified as of September 2019.

The electronic version of this book can be downloaded for free from the Globethics.net website: www.globethics.net.

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FOREWORD

Blue Ethics is a very different type of book compared to others available on water. First its coverage, in terms of subjects considered, is very diversified. These range from the importance of women's voice where water stress is a threat to important other topics like plastic contamination in the food chain, impacts of microplastics on aquatic organisms, water as a human right, developing financial models to promote access to drinking water and sanitation, water conflicts, legal and economic perspectives, right to food and water, management of transboundary aquifers, social costs for building dams and a series of articles on ethical perspectives, including global water ethic and justice. Together, they will give the readers an excellent perspective on the complexities and diversities of the water issues and challenges facing the world.

A second impressive aspect of this book is its extensive geographical coverage. In the final analysis all water problems are "local", and their solutions also have to be "local". Both problems and solutions must very specifically consider local physical, climatic, economic, social, cultural, political and institutional conditions. For developing countries, which is the main focus of this book, what could be a solution in one country may not be appropriate for another country. Also, for medium to large countries like Brazil, China, India, Malaysia or Indonesia, what may work in one part of the country may not work in another part of the same country. A strength of this book is that it considers water issues of

specific countries of Africa, Asia and Latin America, and then considers how, or even, if experiences from developed countries of Europe and Singapore may be relevant with appropriate modifications to meet local conditions.

The third strength of this book is that each article is brief. One can thus quickly get a general view of the very different water problems from many parts of the world. If one wants to learn more, one can refer to the sources mentioned in individual articles.

The fourth and most impressive part of the book is its coverage of ethical perspectives of water availability, use and management, including global justice and ethics, such as rights to water and food. These issues are very seldom discussed in most water-related books.

The book has six major chapters, and each chapter contains 2 to 7 articles. The largest chapter is on ethical perspectives, with 7 articles. These are in addition to articles on legal and economic perspectives on global water justice and human rights to water in other chapters.

Singapore's success in providing clean and drinkable urban water management and also its very successful wastewater and stormwater management have been discussed in two chapters, rightly in our view. In 1965, when Singapore became independent, its urban water and wastewater management was at a similar level to that of other Asian cities like Delhi or Dhaka. Yet, in about a period of two decades, with enlightened policy approaches, Singapore became the poster child of good, efficient and equitable urban water and wastewater management in the world. This is in spite of the fact that under the standard classifications used by the United Nations agencies, World Bank, Asian Development Bank, World Resource Institute (WRI) and general water profession, Singapore "should" be suffering from acute water scarcity. In fact, when ADB, UN System and WRI identified it as a "seriously water scarce country" under their normal classification that countries with less than 500 m^3/person/year of renewable water supply are water

scarce, the Singapore Government reacted very strongly. It challenged these institutions to ask any or all Singaporeans if any of them have felt any water stress in recent decades. If they had done so, Singaporeans would have strongly rejected this assumption and conclusion that Singapore is suffering from acute water scarcity.

The fact is water is a renewable resource. It is not like oil, natural gas or coal, which once used breaks down into various components and cannot be used again. Water, in contrast, is a renewable resource. It can be used, wastewater generated can be properly treated, and treated wastewater can be reused. With good management, this cycle can continue indefinitely. Singapore has less than 130 m^3 of renewable water/person/year. With long-term planning and good management, this city-state does not fear any water stress now, nor does it anticipate any problem by 2061, when it expects water demand to double. Also, in 2061, its water treaty with Malaysia, will expire. Currently Malaysia provides more than 50% of its water requirements. With continuous reductions in per capita domestic water use, industries become more and more water efficient, collection of more and more rainwater, reuse of properly treated wastewater and seawater desalination, Singapore is not experiencing any water stress now. Nor does it expect any water scarcity during the next 50 years. This does not consider advances expected in science, technology and management practices in the coming decades. These are likely to be very significant.

How has Singapore managed to achieve so much with so little water available? It started with strong and sustained support from the highest level of policymakers. Its first Prime Minister Lee Kuan Yew, realized that, if the new country has to survive and thrive, it must achieve water security on a long-term basis. He told us that "every policy must bend at the knees for water". He had three experts in his office to determine the impacts of all policies on water. If the impacts were neutral to positive, the policies were allowed to procced. For nearly three decades when he

was the most influential political leader of Singapore, water received priority political consideration.

In contrast, in the rest of the world, top political leaders are not interested in water on a sustained basis. They are interested in water only when there are serious floods or droughts. Once these extreme hydrological events are over, their interest in water evaporates!

World's water problems can be solved but only with long-term sustained political commitments. They cannot be solved with short-term and *ad-hoc* measures.

Under Lee Kuan Yew, Singapore decided that it should have clean water for everyone, both rich and poor. Supply should be equitable, affordable and efficient. Thus, Singapore, unlike South Africa, India and many other developing and also developed countries, has no free or subsidized water. Everyone must pay water tariffs which is set at its marginal cost. PUB, Singapore's National Water Agency, must recover full cost of providing water and wastewater services, including all investment, operating and maintenance costs.

For those families considered poor, they receive vouchers. The amounts depend on their economic situations and number of family members. These vouchers are used to pay for parts of their water and electricity bills. These vouchers are issued by another Ministry. This means PUB recovers full water bills from all its households, rich or poor. PUB's task, as Lee Kuan Yew explained to us, is to run an efficient water supply and wastewater system that is financially viable on a long-term basis. Equally, it is the task of the Government to ensure the poor have access to water and electricity at prices they can afford.

PUB also has a strong research and development wing, paid for by its customers. It is constantly improving its management practices, and considering applications and adoptions of new technologies. As a result, its marginal cost of providing water has steadily declined in real terms. Because of this reduction, Singapore's water tariff did remain the same

between 2000 and 2016. It was increased by 15% each year in 2017 and 2018. Even after these tariff increases, households, as percentages of their incomes, are generally paying less in 2019 compared to what they paid for water in 2000. If water bills are indexed to inflation, current bills are less than what they were, in 2000 for the same amount of water consumed.

Singapore's water journey, and its continued success, indicated that countries and cities can solve their water and wastewater management problems, but not with conventional practices. Free or subsidized water invariably leads to wasted water. With increasing population, urbanization and industrialization, developing countries need to provide clean water, on a 24x7 basis, that can be drunk straight from the tap without any health concerns. This, however, cannot be achieved with the current practice of proving subsidized or free water. As the book rightly notes, human right to water or food does not mean people should have free access to water or food. Households must pay for water and wastewater services that are efficient and affordable. Equally, it should be ensured that poor have adequate access to these important services. Policies have to be reformulated to ensure water utilities are financially viable and provide good services at affordable prices. Singapore's experience shows that given sustained political interest and courage, good and enlightened policies, domestic and industrial water problems of both developing and developed countries can be solved on a long-terms basis.

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INTRODUCTION

WORKSHOP FOR WATER ETHICS AT A GLANCE

The "Workshop for Water Ethics" ("W4W") was created in 2010 in Geneva and gathered some individuals from several domains of expertise and all concerned by the key importance of managing water as a resource in a responsible and sustainable manner. It explicitly claims the necessity of interdisciplinary approaches, drawing from legal, economical, scientific, sociological and philosophical fields along an ethical perspective. It sees itself as an instrument to nurture reflections, to invite experts from both public and private sectors as well as to keep an eye on how perspectives and analytical approaches can inspire field projects. It seeks also to liaise with international networks and institutions sharing the same concern.

Workshop for Water Ethics has organized five interdisciplinary seminars between 2011 and 2018, at the Geneva Museum for Sciences History, respectively on:

- 2011 "Too Much Water or not Enough. How can we wisely use this Unpredictable Vital Resource? »,
- 2012 "Water, Vital Need and Global Justice"
- 2013 «Global Water Ethics »
- 2017 "Oceans Flooded with Plastics: Myth or Reality?"
- 2018 "Education, Gender Partnership, Finance: decisive keys to combat water stress?"

The composition of its founding members mirrors a wide diversity in terms of backgrounds, experience, origins, interests, gender.

Evelyne Fiechter-Widemann, a lawyer, has been the initiator of the Workshop. Members of the executive committee are Annie Balet, a

biologist, Laurence Isaline Stahl Gretsch, archaeologist and museum manager, Renaud de Watteville events manger and initiator of a project turning brackish water into drinking water, Benoît Girardin, a former diplomat and lecturer, Christoph Stucki an engineer, retired director of Geneva public transport company, Gary Vachicouras, a Greek theologian and advisor.

Contributors invited for the seminars were hailing from quite diverse fields of expertise as well as geographical places. Some due attention could be given also to field experiences, and concrete projects documented by practitioners.

The papers here published consist of a selection of presentations made during the seminars, in French or in English, as well as a presentation in 2018 to the Singapore International Water Week in 2018. The selection made here has considered their close link to ethical issues in that they either document backgrounds and today challenges, elaborate on key concepts that are appropriate or highlight the relevance of ethics. The ones made in French have been translated into English by Marc Woodward company (Geneva). Some have been sized down or slightly updated. An additional one was developed to cover the issue of water costs in several locations.

The interdisciplinary dimension has been duly respected, as it is a key marker of W4W.

A synthetical document has been recently developped under the editorial guidance of Benoît Griardin that captures the ethical challenges and perspectives, along the same steps like the chapters and topics of the book. It has been submitted to Globethics Board for further consideration and possible endorsment. Circulated among Globethics partners, it has been enriched by comments submitted. Endorsed by Globethics and published as “Guidelines and Principles”, it can be accessed on www.globethics.net/water-ethics-principles-and-guidelines

W4W was establisehd since as an association under the Swiss Civil Code.

Evelyne Fiechter-Widemann,
W4W President

Benoît Girardin,
Vice-President

PRELIMINARY INSIGHTS ON THE WATER PROBLEMATIC

1

CURRENT WATER ISSUES: CHALLENGES, CASES AND ATTEMPTED SOLUTIONS

The Importance of Women's Voices Where Water Stress is a Threat: Observations from Zimbabwe, South Africa and Singapore

Evelyne Fiechter-Widemann

Preamble

The third principle of the 1992 *Dublin Statement on Water and Sustainable Development* is dedicated to women, in the following terms:

Women play a central part in the provision, management and safeguarding of water. This pivotal role of women as providers and users of water and guardians of the living environment has seldom been reflected in institutional arrangements for the development and management of water resources. Acceptance and implementation of this principle requires positive policies to address women's specific needs and to equip and empower women to participate at all levels in water resources programs, including decision-making and implementation, in ways defined by them.

What has been achieved in twenty-five years? Very little. To move the agenda forward, our think tank on water ethics, the W4W, proposes to focus on education, gender partnership and the search for appropriate financial models.

This introduction to the 5th W4W Colloquium will be divided into two sections. After defining the meaning of "water stress", I will illustrate how this concept can be applied in the field, through personal observations in Zimbabwe, South Africa and Singapore. My aim is to combine theory and reality.

Water stress, a new concept

Water stress is an economic indicator, invented in 1986 by the Swede Malin Falkenmark, renowned for her research in science, focused on water solidarity and the resilience of water in particular. She sought to quantify the amount of water needed for an acceptable life. Simply put, water stress occurs when the amount of water available is less than the amount needed to meet needs or when water supply does not meet demand. The table below shows three degrees of water scarcity:

Water Stress	**Water Scarcity**	**Absolute Water Scarcity**
the volume of water available in a country, per year and per capita, is less than 1,700 m^3	the available water volume is less than 1,000 m^3/year per capita	the available water volume is less than 500 m^3/year per capita
4,600 liters/day per capita	2,700 liters/day per capita	1,400 liters/day per capita

Let me point out that the available water mentioned in this table uses the concept of virtual water. In addition to drinking water, this concept includes water for personal care, cooking (about 150 to 200 liters), and water to produce food and clothes, or about 4,400 liters.

In our ethical reflections, the W4W postulates that water scarcity is not inevitable. While water is certainly a natural phenomenon, it is also and above all an anthropic and therefore social phenomenon: that of the good management of the resource.

This reflection will be supported by factual contributions, during the case study section, particularly in Africa and Asia.

Observations in Zimbabwe, South Africa and Singapore

I chose to visit these three countries in order to better understand the degrees of water scarcity explained in the table above. Zimbabwe suffers from water stress, South Africa from water shortage or scarcity and Singapore from absolute water scarcity.

In *Zimbabwe* in 2011, under the dictatorial regime of Robert Mugabe, I met women who spent most of their day fetching water. Will the new head of the country, Emmerson Mnangagwa, be able to turn the situation around, which could play a crucial role in access to water? Only time will tell, and in particular the elections under close international supervision next summer. Meanwhile, women will continue to walk many kilometers to provide for their families' water needs.

In *South Africa*, I observed that not all regions have access to the prosperity that the country enjoys. In the Limpopo region I visited, the situation was not much better for women than in Zimbabwe. On the other hand, unlike in Zimbabwe, the conditions for better development do exist. Women's rights are also better reflected in South Africa's Constitution.

Singapore is a country suffering from absolute water stress because it does not have enough fresh water for its 5.5 million inhabitants. It must exploit unconventional water sources such as desalinated water or wastewater converted into NEWater. If it has been able to develop these innovative water resources, it is thanks to new technologies, in particular reverse osmosis, as the Access to Water foundation will discuss this afternoon.

I note with pleasure that three women have contributed to Singapore's well-being in its struggle against absolute water scarcity,

one Chinese, one American and one Mexican, Olivia Lum, Juan Rose and Cecilia Tortajada respectively. Olivia Lum founded Hyflux, the company that runs the water reprocessing plants, and Juan Rose lived in Singapore for 17 years to promote NEWater. Cecilia Tortajada published in 2013, with two other authors, the *Singapore Water Story* which reports on Singapore's incredible resilience in providing access to drinking water for all. Granted, the villagers who lived in stilt-huts, as is still seen today in Malaysia, a few kilometers from Singapore, and had neither running water nor toilet facilities, were moved to low-income housing, called HDB, but they did get tap water and toilets in their new homes. We are talking about the generation of pioneers, who are widely respected and admired by Singapore's current inhabitants and are supported by social assistance programs.

Conclusion

Before concluding, and in anticipation of the speech at the end of the afternoon by Child's Dream, an NGO founded by two Swiss bankers, I will say a word about philanthropy, to which I devoted a chapter in my book published last year *The Human Right to Water: Justice or... Sham?*

In the book, I point out that although there is resentment towards those who have significant economic resources, some of those who have gained these resources by their own efforts have chosen to share with the most vulnerable. For instance, the banker Lien Ying Chow founded the Lien Foundation in Singapore, which today focuses on three areas, namely education for disadvantaged children, the issue of water and care for the elderly. His Chinese widow had a verse from Luke's Gospel (12:48) put on the website of the Lien Foundation: *"From everyone to whom much has been given, much will be required; and from the one to whom much has been entrusted, even more will be demanded"*.

2

WATER STRESS IN SUB-SAHARAN AFRICA: WHAT CHALLENGES FOR WOMEN AND HEALTH?

Annie Balet

In many countries in sub-Saharan Africa, women work long hours every day to provide water for their families and households[1]. They draw water from ponds, backwater and rivers without treating it. However, in these countries, as in Mali, nearly 10% of the population does not have access to covered latrines, and outdoor defecation is a common practice. The feces of sick people contaminate water, hands, soil and food with pathogens that maintain the cycle of diseases such as diarrhea and intestinal worms. In addition, feces attract flies that spread pathogens and contaminate drinking water if it is not protected. Under these conditions, women are at once victims of this water stress, responsible for the spread of infectious agents and maintain the vicious cycle of poverty. In 2017, WHO estimates that the lack of drinking water and sanitation alone is responsible for 80% of the diseases

[1] A doctor of ecophysiology at the Paris-Sud Orsay Faculty of Sciences, Annie BALET worked on metabolism and the ultrastructure of plants in reaction to environmental changes. She subsequently taught biology at the secondary-school level, raising the awareness of students to associate environmental and humanitarian issues. She helped organize informal week-long seminars on sustainable development.

affecting developing countries. Sub-Saharan Africa has a high rate of endemic waterborne diseases.[2] Thus, women and children suffer most often from diarrheal diseases, the second cause of death in children under five years of age; schistosomiasis, the second endemic parasitic disease after malaria; and trachoma, the leading cause of infectious blindness. Another form of gender inequality, related to the lack of asepsis and antisepsis during childbirth, is maternal and infant morbidity and mortality, which remain very high.

In addition, conventional medicine is unable to break the cycle of water stress-related diseases because the accessibility and quality of care in health facilities in rural areas are inadequate, and preventive care messages are difficult to understand. To solve health problems, the majority of the population uses traditional medicine because it is culturally more accessible, less expensive and there is at least one traditional healer in each village. Traditional medicine was combatted for many years, but was rehabilitated in 1978 by WHO in the Declaration of Alma-Ata, which advocated the use of traditional skills and knowledge available for primary healthcare. This declaration raised so much hope that WHO and the Heads of State of the African Union made it a priority.[3] But is traditional medicine safe and does it meet the desired quality and effectiveness criteria for primary healthcare? Given that conventional medicine focuses on the biomedical causes of diseases, and traditional beliefs adopt an empirical and holistic approach, is collaboration between these two types of medicine possible? Faced with this medical pluralism, how are water-related

[2] An endemic disease is constantly present in a population of a given region. It is caused by the presence of a reservoir of pathogens in the area which allows it to proliferate and contaminate humans.

[3] Declaration of the Decade for the Development of Traditional Medicine (2001-2010) by the Heads of State of the African Union. Since then, WHO has officially designated 31 August of each year as African Traditional Medicine Day.

diseases addressed, what is the place of traditional knowledge, and what contribution does it make?

Let's start by examining how conventional medicine treats waterborne diseases. According to biomedicine, diarrheal symptoms are a sign of intestinal infection caused by various microorganisms such as viruses, enterobacteria or protozoa. Infection is transmitted through contaminated water or food, or from one person to another if hygiene is poor. However, three quarters of these infections could be prevented by access to drinking water and hand washing. Oral or intravenous rehydration treatments prevent the severe dehydration and water loss that led to death in the past. Due to a lack of antibiotics and vaccinations, bacterial septic infections are now the leading cause of death. In low-income areas, children under five suffer several episodes of diarrhea per year. Each episode deprives them of the nutrients they need to grow. As a result, diarrhea is a major cause of life-threatening malnutrition and immunosuppression.

Also known as bilharzia, schistosomiasis is a vector-borne parasitic disease caused by Schistosoma worms. Although in decline, this chronic disease affects poor populations who do not have access to water and sanitation and especially women who do their laundry in backwater and the children who accompany them to play. It is very disabling in adults and causes stunted growth in children. Contamination occurs when Schistosoma larvae (called cercariae) emerge from water snails and enter the skin. In the body, adult worms live in the digestive or urinary tract where they reproduce. Infected people excrete eggs with their excrement, which in turn can infect the water snails. The snails then release the second generation of cercariae into the water. The single dose of Praziquantel reduces morbidity, but does not prevent superinfections, and should be repeated periodically on a large scale. In addition to building latrines, the other way to break the schistosomiasis cycle is to destroy the snails using either synthetic molluscicides, which

are dangerous for fish, or extracts of native plants rich in saponins or tannins that are less harmful to the environment.

In Mali there is a linear relationship between the distance to the water source and the prevalence of trachoma among children ages 1 to 9. The prevalence is low when there is a well in household' compound, but having to walk more than 30 minutes is a serious risk factor. Caused by repeated infections, trachoma manifests itself by chronic inflammation of the eyelids which causes the eyelashes to turn inward and rub on the eye, eventually leading to blindness. It is spread through contact with dirty hands, dirty clothes and flies contaminated by a bacterium, *Clamydias trachomatis.* Topical and oral antibiotic therapy does not prevent reinfection. The later effects of trachoma such as corneal opacities are more common in women because of the care they provide to children, who are reservoirs of the disease. At the advanced stage of the disease, surgery is performed to prevent blindness. Prevention is based on face-washing, providing safe drinking water at a reasonable distance and building closed latrines to prevent flies from proliferating.

More than half of maternal deaths occur in sub-Saharan Africa, particularly among rural populations. Most deaths are due to inadequate, late or absence of treatment. Among the main causes of maternal mortality[4] are infectious diarrheal diseases aggravated by pregnancy and intestinal parasitosis. Hookworm[5] causes severe anemia in pregnant women, resulting in low birthweight and premature birth, which can be life-threatening to the child. One of the complications during childbirth is the deformation of the pelvis resulting from the heavy loads of water

[4] Maternal mortality is defined as the ratio between the number of women who die during pregnancy and the 42 days after delivery and the number of live births.

[5] Intestinal parasitosis caused by two tiny round worms (nematodes), *Necator americanus* and *Ankylostoma duodenale* that contaminate the soil. This disease is transmitted by contact with soil contaminated with feces when walking barefoot or accidentally swallowing contaminated soil particles.

carried from childhood over long distances. Added to this are the disastrous hygiene conditions during childbirth. According to WHO (2017), 38% of health facilities have no access to water, 19% have no sanitation facilities and 35% have no soap and water for hand washing. In these conditions, the risk for the mother of puerperal infection leads to 15% of all maternal deaths, and for the newborn, there is a high risk of contracting often fatal diseases such as neonatal tetanus or sepsis.

Let us now consider how traditional medicine can manage diseases. It can be defined as *"the sum total of all the knowledge and practices, whether explicable or not, used in diagnosis, prevention and elimination of physical, mental, social or spiritual imbalance and based on sociocultural and religious foundations of a given community, as well as on practical experience and observation handed down from generation to generation, whether verbally or in writing"* (Koumaré). The traditional practitioner's sphere of action is therefore not limited to diseases in the strict sense. As keepers of the heritage on the potential of plants, traditional healers also offer holistic care.

Phytochemical studies have shown that the pulp of baobab fruit (*Adansonia digitata*), commonly used in self-medication for diarrhea, is rich in electrolytes and has the same effect as oral rehydration salts. *Moringa oleifera* leaf powder, used in the infant malnutrition program, is very rich in minerals, vitamins and protein. It contains all the amino acids essential to humans. Moreover, moringa seeds are used as a natural flocculent to clarify turbid waters, and are biodegradable, unlike aluminum sulphate. They also have a mild antibacterial effect and eliminate protozoan cysts.

As a pioneer in this area, Mali developed policies in 1968 to promote traditional medicine by creating the Department of Traditional Medicine (DMT) of Bamako within the National Institute for Public Health Research. In collaboration with traditional healers, the DMT has developed improved traditional medicines that have obtained marketing

authorization. These medicines from the traditional pharmacopoeia are said to be improved because they have undergone scientific testing to verify their safety and efficacy, and the production quality is monitored. Numerous studies have shown that *Euphorbia hirta* extract is non-toxic, reduces intestinal motility and kills amoebas. Pharmacies sell Dysenteral, a tea made from *Euphorbia hirta*, at an affordable price to treat diarrhea and amoebic dysentery. In Senegal, Mbaltisane, also made from *Euphorbia hirta* and prepared by a private laboratory, obtained a marketing authorization.

The inclusion of traditional healers into the conventional health system is less advanced and takes longer to establish, as it requires intercultural dialogue and greater cooperation. Traditional practitioners enjoy high credibility and deep respect within their communities, and when well trained, they can avoid a delay in care by diagnosing and referring serious clinical cases to the mainstream health system. For example, traditional practitioners have their own diagnostic criteria: *"red eye disease that does not secrete pus; broken or itchy eyelashes correspond to the more advanced stage"*.

In Africa, cleaning is the job of women, as they are involved in providing personal cleanliness, preparing food, caring for children and the ill and cleaning the house and yard. Although traditional healers do not subscribe to the notion of germs, they could be educated about hygiene, which is a medical notion that is different from cleanliness. As they are better respected than any other health specialist, as the UNAIDS study shows, they can be good messengers for hygiene measures, such as hand washing and water management, to prevent the spread of pathogens. Moreover, these hygiene measures are particularly important and effective if they are applied by traditional birth attendants.

In rural areas, traditional birth attendants are responsible for three quarters of all deliveries. In the villages, they are the only ones to provide healthcare during pregnancy, childbirth and the postnatal period.

Moreover, the population is traditionally in favor of them. R. Sanogo and S. Giani have set up a communication and intercultural partnership program in Mali to promote traditional birth attendants. They learn the basics of antisepsis and asepsis, umbilical cord care, early detection of pregnancy complications requiring transfer of the mother-to-be and basic hygiene rules. The program has been effective in reducing perinatal tetanus and late neonatal deaths, encouraging immunization and registering births.

Endemic water-related diseases particularly affect women's quality of life, which is endangered during every pregnancy. These dangers can only be lastingly eradicated when safe drinking water, sanitation and hygiene education are accessible to all. To ensure better primary care coverage, the functional and structural failures of conventional medicine could be offset by promoting traditional medicine, to which the populations are very attached. It is important to advance the dialogue between these two types of medicines in order to perceive the possible convergence between traditions and biomedicine to enable traditional medicine to modernize. It must be better supervised, regulated, categorized and standardized to provide effective, safe, high quality care. Traditional healers are valuable local providers of preventive and primary healthcare. The traditional pharmacopoeia offers avenues of research that can lead to the production of drugs to replace imported drugs. This ethno-medicine, which is affordable to lower-income populations, helps enhance the cultural and natural wealth and autonomy of sub-Saharan African countries.

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3

DO WATER'S CHALLENGES REQUIRE MOBILIZATION OF ALL SECTORS OF SOCIETY, INCLUDING THE PRIVATE SECTOR?

François Münger

The Global Water Crisis

Now, at the beginning of the millennium, water is a strategic issue of critical importance, but this is not new. It is a common good of humanity that has shaped our past history and will affect our future as well[6].

Potable water, sanitation, and water for food production are vital. It is also of the utmost importance that we leave enough water for nature in order to maintain ecosystems and, in return, to benefit from what they can offer us. Water is also at the heart of industrial and energy production.

The water sector is facing unprecedented changes. In the twentieth century the world's population tripled, while during the same period

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water consumption recorded a six-fold increase. The most important of these changes regards sanitation. The distribution of global consumption is 70% for agriculture, 20% for industry, and 10% for human needs. Worldwide, only one in two people has running water available. We must achieve integrated water resources management (human beings, industry, agriculture, and nature).

Climate changes are also complicating the picture. Added to this is the degradation of water quality: each day, two million metric tons of untreated wastewater are discharged into the world's aquifers and surface water.

The threat of a global water crisis is real. It is expressed in different ways:

- The potable water and sanitation scandal: about one billion people still do not have access to potable water and 2.6 billion have no sanitation. Only one out of two people has a water tap at home.
- Another expression of the crisis is the risk of a shortage and its consequences for agricultural production. Agriculture will need to increase production by 50% by 2030; it already currently consumes 70% of all fresh water used. If no correction in the use of water occurs in order to save it, it is estimated that by about 2030 half of the world's population will live in areas where demand exceeds the available usable resources.

The concept of integrated water resources management is used: certain amounts of water are allocated to meet demand in four major categories of use:

- household water
- agriculture water
- industry water
- nature water

These four categories compete for a limited resource, and there are inequalities among them in terms of their political and economic weight. One can cite the example of nature, in comparison to the economic and political weight of agriculture or industry. But there are also great injustices in how decision-makers take into account the interests of urban and rural areas, and of course the rich and the poor.

Access to potable water and sanitation has gained status through its recognition as a human right, which has also conferred it a special, necessary weight. Such recognition also goes beyond the 2000 MDGs and fits within the 2015 SDGs (goal 6) by highlighting some new values such as water quality and quality of services, accessibility, and affordable rates.

But there are also misunderstandings about this right to water, especially where the profit oriented private sector's involvement in potable water services and sanitation is concerned.

Private Public Partnerships

Even so, Private Public Partnerships (PPPs) remain an option. They supply technical expertise and managers in the urban environment, rural areas, and small towns alike. Such increased capacity is especially important for local authorities, who in the context of decentralization must meet a huge demand for services with often very limited financial and human resources.

Discussions on this issue have focused too heavily on international companies, forgetting the importance and development potential of the domestic private sector and small local entrepreneurs, for example, operators in Mauritania's small towns, or Plastiforte/Aguatuya in Bolivia. Currently, this local private sector is often the only party present to ensure minimal service in underprivileged urban areas.

A few years ago, the Swiss Development Cooperation (SDC), together with the State Secretariat for Economic Affairs (SECO) and

reinsurance company SwissRe, engaged in very extensive international dialogue to develop some principles for implementing such projects.

The principles were built around core values, especially potable water as a human right, due regard for sustainable development, fair participation in processes, and good governance. These guidelines are structured around ten or so key principles, including responsibility to the poor, protection of resources, and transparency. In no way do they constitute a neoliberal vision promoting the privatization of services or abdication by the State. Water is not charged at a market rate!

Furthermore, participation by civil society is of the utmost importance, especially by representatives of the poor, as partners in implementing, supporting, and monitoring these processes.

We feel that by taking this prudent, participatory, and transparent approach, the PPP concept can make an important contribution, but it is only one option, and one which if chosen must in no case be a condition that is imposed by financing institutions.

As already mentioned, however, the question of "water" must not be reduced to the single issue of drinking water.

As it is known, it takes 400,000 liters of water to manufacture a car. This is "virtual water," that is, the amount that is needed to make products or provide services plus the polluted water so generated. This total amount is a product's water footprint, a relatively new concept.

The private sector is essential in reducing this footprint. To this end, we entered into some partnerships with major Swiss companies, such as Nestlé, Syngenta, Holcim, active especially in southern countries. The interest here lies in the fact that we need to reduce, not only factories' footprints, but also those of their suppliers (agriculture, mines, etc.). It cannot be ignored for instance that 80% of Switzerland's water footprint is "caused" outside of the country!

Moreover, the ISO is taking up the new area of standardization of potable water management services. It is focusing its efforts on water

supply management, preservation of water supplies in crises, and the efficiency of distribution networks. Globally speaking, Switzerland is a driving force behind ISO standards concerning the water footprint.

Some players are even suggesting fostering a water offsets market similar to the compensation for carbon offsets - although in principle this may not necessarily prove a good idea; still their real relevance in mobilizing funds for water must be analyzed.

Another aspect is that green technologies – much talked about nowadays – could impact positively and advance fundamental causes such as the war against poverty. Many startups for managing green tech are being launched in poor countries and they need support.

Several startups and small and medium-sized businesses in Switzerland and around the world are undertaking technological developments to meet water's challenges, with a clear desire to help serve the bottom of the social pyramid in developing and emerging countries while being environmentally responsible[7].

In this sense, considerable progress has been made in recent years in terms of reliability and cost reduction for membranes. This is a good opportunity for improving and widening water treatment capacities.

The specific challenges for these courageous startups are difficult. In addition to the technological aspect, they include having a solid business model that provides for the operation and maintenance of equipment and the constraint of producing water at the local price. I believe that such commitments must be supported.

[7] A listing is available under Partnerships for environmentally friendly core business behaviour, in *SDC Public Private Development Partnership evaluation* of 2013

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UN Global Compact: https://www.unglobalcompact.org; see in particular its Ten Principles and Management Model.

4

WATER, VITAL NEED AND GLOBAL JUSTICE: A LEGAL PERSPECTIVE

Laurence Boisson de Chazournes

In 2010, both the United Nations General Assembly and the Human Rights Council noted the need to recognize and protect the right of access to potable water and sanitation[8]. Though the reasons for which each resolution was adopted may have differed, the stated objective was to provide every human being with access to potable water and a sanitation system.

The fact that the General Assembly and the Human Rights Council passed these resolutions sent a powerful political message about the importance of this right. Certain of its legal components are acknowledged by some international instruments and they are implicit in others. For example, according to the comment on the right to water in the International Covenant on Economic, Social, and Cultural Rights, this right ensues from the right to a decent living. The UN resolutions

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mentioned above have made it possible to take a political inventory of the situation while helping to give this right a place of its own on the international agenda. The work done by the Human Rights Council's Special Rapporteur on Human Rights helped refine its content and reveal the gaping holes in the international community's responsibility with respect to sanitation and the inequalities that prevail.

Promoting the right to water in international human rights law helps to shape an egalitarian discourse about access to water. Governments are reminded of their responsibility to meet this goal. They are obligated to respect the law and to ascertain that non-governmental entities under their jurisdiction or supervision also respect it. Consequently, private and public entities responsible for distributing water are subject to the provisions of this law, and more specifically to the requirement that associated services be furnished to everyone under decent social and legal conditions.

Access, quality, availability, and affordable cost are among the conditions for implementing the right to water. Sufficient water must be available to each individual to meet his or her personal needs. The quality must be such that it does not endanger the recipient's health, and the means of supply must be accessible. The cost of facilities needed to implement the right and furnish service must not be prohibitive. In fact, the cost should be reasonable in view of the relevant population's resources.

Governments are obligated to ensure everyone has access to water without excluding groups that are marginalized for social, economic, or cultural reasons. Indeed, implementation of this right must meet the requirements of the principle of equality and non-discrimination, which demands that implementation be by means of proactive strategies aimed fulfilling the rights of disadvantaged and vulnerable populations. In this respect, promotion of the right to water complements the Millennium

Development Goal concerning water and sanitation by calling for a non-discriminatory approach to meeting this goal.

At the international level, policies on development, aid, and cooperation cannot be dissociated from these ambitions. Lack of access to water and sanitation is often tied to questions of poverty and social or political organization. Where public assistance and development are concerned, promotion of the rule of law should guide normative, institutional, and operational activities in the area of water and sanitation access. In this regard, achieving the Millennium Development Goals will benefit from the promotion of human rights, and human rights will benefit from the momentum imparted by the UN General Assembly in 2000 to meet the 2015 goals.

Human rights bring justice at both the national and international levels. They ought to inspire national and international action in this area and serve as parameters for evaluating its merits. National laws that apply to public and private operators must meet these standards, especially where universal access to water is concerned, including access for the most vulnerable people. Aside from their cooperative and aid efforts, international organizations use their various activities to help reinforce the content of the right to water and sanitation through the adoption of quality standards, by ensuring that vital aquatic ecosystems are protected as water sources and that operations do not hinder implementation of the right to potable water.

5

RIGHT TO FOOD AND RIGHT TO WATER: ARE THEY THE SAME CHALLENGE?

Christian Häberli

Right to Water, Trade and Investment Perspectives

My research at the WTI focuses on trade and investment rules relevant for food security[9]. Together with you I would like to explore the parallels between the regulations applicable to the Right to Food and the Right to Water which both have been enshrined in national and international human rights law.

In a chapter for a book on poverty and trade, entitled "God, the WTO and Hunger," I show the fragmentation existing between human rights and economic treaty law. I start with an analysis of three monotheistic religions, Judaism, the Christian religion, and Islam. All originated between the large river systems of Mesopotamia and Egypt, in a region forever focused on access to water, and where hunger was a well-known phenomenon and cause for migration and exodus.

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[9] Christian HÄBERLI is a Fellow at the World Trade Institute of the University of Berne on food security from a trade and investment perspective as well as a consultant for scientific research and outreach activities in Europe, Asia, Africa, and in the Americas. His professional career with the ILO and the Swiss government led him to chair the WTO Committee on Agriculture and to be a panellist in some twenty dispute settlement proceedings.

The common element in all three theologies is the notion of distributive justice. Not in a simple sense of charity but as an inherent obligation for all members of the compact, of the ecclesia, or of the Dar al Islam: almsgiving for Jews and Christians, or zakat based on the Islamic law sharia is an obligation beyond charity, directly derived from God's love for the people and his commandment to love one's neighbor.

Interestingly, the world's very first constitutions (Ukraine 1710; Prussia, Preussisches Landrecht 1794) recognize social rights and obligations on precisely the same premises. This then goes on until today, with the new Constitution of Kenya recognizing the Right to Food, or the Constitution of Cambodia recognizing traditional, communal land rights including access to water.

In the UN system, in respect of poverty and hunger, we now have the International Covenant on Economic, Social and Cultural Rights (ICESCR) which entered into force in 1976 and which finds its roots in the 1948 Universal Declaration of Human Rights. Article 11/2 reads as follows:

"The States Parties to the present Covenant, recognizing the fundamental right of everyone to be free from hunger, shall take, individually and through international co-operation, the measures, including specific programs, which are needed to improve methods of production, conservation and distribution of food [in order] to ensure an equitable distribution of world food supplies in relation to need."[10]

Professor Boisson de Chazournes has just shown us the corresponding UN treaty law for water. Is it the same? At least on the face of it, yes. First, though, let us look at how these noble goals and words translate into international economic law.

[10] International Covenant on Economic, social and Cultural Rights.

I will address, first, the rules for trade and, secondly, for investment applying to hunger and food and then return to water. I think you will easily see how close we are to water, and where the differences lie.

Rule for Trade, Rule for Investment

For trade, I will start with the WTO.

The objective of the WTO Agreement on Agriculture (AoA), according to its preamble, is 'to establish a fair and market-oriented agricultural trading system', where 'commitments under the reform program should be made in an equitable way among all Members, having regard to non-trade concerns, including food security and the need to protect the environment.' The Doha Round negotiating mandate has the same objectives (Häberli 2012).

For the first time in history world agricultural trade is now regulated in basically three disciplines (the so-called "pillars" of the AoA): (i) all production support measures with a price support effect are limited, (ii) historic amounts and volumes of export subsidies have been reduced and new ones are prohibited, and (iii) all border protection measures must now consist in tariffs only; these tariffs were somewhat reduced and can no longer be freely increased.

The problem now is, while both export and domestic subsidies were (somewhat) reduced, other competition-distorting instruments remain largely unregulated, in particular international food aid, export credits, state trading in exports and export restrictions. These policy instruments have an obvious bearing on the famous 'level-playing field' by which an optimal level of global food security could be achieved. When the food crisis occurred, many commodity markets were shut off, without developing countries being able to buy their food import requirements on the world market. Rich countries did not face such problems. By reducing their applied import tariffs, they were able to import food and feed at affordable prices and without hurting their own producers.

For investment, the dichotomy between human rights and economic law is even bigger. Distributive justice seems to be even more remote here than for trade rules. WTO offers no investment disciplines in a food security context. The relevant, mostly bilateral investment treaties protect even investors who violate human rights and environmental norms and who can benefit from the over-protection and under-regulation provided for in these agreements. This is a shocking case of rules fragmentation, because neither the home nor the host governments can have an interest in so-called "land grab" investment projects. A valid argument could perhaps be made here in favor of "public interest" protection under these treaties.

Overall it appears that present international trade and investment rules are ill-suited to address food trade issues which have a negative impact at the national and household levels. These shortcomings can be said to violate the right to food laid down in human rights treaties. What is clear, however, is that we are in presence of a job half-done—and one, for that matter, which even the results envisaged in the now dead Doha Round negotiations would not really have improved! Actually, some significant loopholes could be getting even bigger, impairing both global and national food security especially in times of high food prices.

A Way Forward

Possible trade and development-related solutions would ideally be forthcoming in a package of coordinated measures. I see four such measures which together would fulfil the obligation of the international community laid down in the human rights treaties.

1. Poor developing countries must retain policy space for at least temporary protection of fragile agricultural producers. Regional trade agreements may in any case leave them eventually with few options in terms of effective border protection.

2. The absence of new disciplines in export restrictions and export competition, including especially food aid, are the most blatant threats to food security. These problems must be addressed in the WTO. As a minimum, the November 2011 G20 decision to exempt food aid supplies from export restrictions should have been made mandatory without delay.
3. International finance institutions need to review their investment policies and lending priorities, including for their research and development programs.
4. The same goes for the bilateral investment treaties, at least in respect of agricultural land acquisitions in vulnerable countries.

In conclusion, and to open the discussion, let me ask you what all this means for water?

The main parallel, I believe, is the fragmentation between what I call the over-protection and under-regulation of FDI in food and water. Economic law allows "to do harm," something which human rights provisions explicitly forbid. John Ruggie, the Special Representative of the UN Secretary-General on business and human rights and transnational corporations (TNC) and other business enterprises, developed a tripartite framework on business and human rights including (i) the state's duty to protect, (ii) the TNC's *responsibility to respect,* and (iii) *appropriate remedies* for human rights violations.[11] He pointed out that one social norm "has acquired near-universal recognition by all stakeholders, namely the corporate responsibility to respect human rights, or, put simply, not to infringe on the rights of others".

[11] See http://www.business-humanrights.org/SpecialRepPortal/Home (accessed January 5, 2012).

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6

PLASTIC POLLUTION OF THE FOOD CHAIN: MYTH OR REALITY?

Annie Balet

Pollution of surface water by plastic materials is just the visible part of a problem that is of concern to both scientists and the general public[12]. Press articles talk about the threat of large marine animals disappearing and more recently the presence of small particles of plastic in our food. To untangle myth from reality, researchers have studied the physical and chemical properties of plastic, measured the pollution in the water column and verified the presence of microplastics in the food web[13] and the balance of ecosystems.

Plastics consist of long chains of large molecules or polymers to which additives are added to obtain specific properties. These hydrophobic synthetic molecules have the capacity to adsorb[14] and

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[12] A doctor of ecophysiology at the Paris-Sud Orsay Faculty of Sciences, Annie BALET worked on metabolism and the ultrastructure of plants in reaction to environmental changes. She subsequently taught biology at the secondary-school level, raising the awareness of students to associate environmental and humanitarian issues. She helped organize informal week-long seminars on sustainable development.

[13] The food web is the network of intersecting and overlapping food chains for an ecosystem.

[14] Adsorbed molecules adhere to the surface of an object, while absorbed

concentrate persistent organic pollutants and have an estimated lifespan of 100 to 1,000 years. However, under the combined action of light and mechanical erosion (wind, waves, current), plastics break up into small particles measuring less than 5 mm that closely resemble plankton. Other microplastics are directly dumped into the environment, including microbeads in cosmetics and personal care products as well as microfibers shed by fleece textiles made from recycled PET during washing which are not completely filtered out by wastewater treatment plant. Storm runoff also contains pre-production pellets lost during transport. These pellets approximately the size of fish eggs, also called nurdles or mermaid tears, end up with all the other microplastics in rivers and lakes and accumulate in the oceans.

Microplastic concentrations in surface waters measured recently in the Mediterranean, the Great Lakes, Lake Geneva and the Danube, Thames, Rhine and Rhone rivers are very high, comparable to those found in ocean gyres. In some places, there is as much microplastic as there is plankton. Even the waters of very sparsely populated, non-industrialized areas are contaminated, like those of Lake Khovsgol in Mongolia, indicating that the entire hydrosphere is polluted by plastic. Surface water pollution is just part of the problem. Sediments are also heavily contaminated with plastic debris. Not only do plastics that are denser than water fall to the bottom, but lighter plastics that become bio fouled[15] lose their buoyancy and sink as well. Thus, the entire water column contains plastics that can interact with organisms in all the trophic levels of the food web, especially with zooplankton and detritivores, small organisms at the bottom of the food chains that live either on the surface of the water or in the sediments.

It has long been known that ingesting plastics can cause large marine animals to die from choking or obstruction of the digestive tract. For

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molecules enter the object.

[15] Biofouling is the accumulation of living organisms on underwater surfaces.

example, adult and baby albatrosses die of starvation after mistaking plastic items covered with eggs or edible marine organisms for food. This food confusion is also described in a recent EPFL study on Lake Geneva. Plastic debris is found in the gizzards of 89% of dead aquatic birds (herons, swans, mallard ducks) as well as in the stomachs of 7.5% of small carnivorous fish (dace and bleak) found dead. Pellets from gulls in the port of Vidy contain plastic pellets and other kinds of plastics. According to some authors, plastic debris causes the death of 1.5 million animals from more than 250 species, including crustaceans, fish, turtles, birds and mammals, each year in the marine environment. Plastics also cause a false sense of satiety causing the animals to eat less. Under-feeding not only depletes their vitality and reproductive rates, it threatens the survival of many species and can also disrupt the trophic balance of the ecosystems.

The trophic transfer of microplastics leading to contaminants in seafood is a quite recent issue, but it has been investigated in several controlled studies conducted *in situ*.

Numerous catches in the wild show that plankton-eaters such as small crustaceans or lantern fishes, as well as detritivores (mud worms), which are the first links in the food chain, ingest microplastics because they are so widely available and are similar in size to plankton and sediments. However, in copepods (small crustaceans) that feed on microscopic algae suspended in water (phytoplankton), the researchers found that ingested fluorescent plastic particles are ejected in fecal pellets. Gut transit time takes a few hours in copepods and several days in fish.

While these observations suggest that contamination of the food chain is a myth, other research supports the hypothesis of bioaccumulation and trophic transfer of microplastics. Studies show that North Sea mussels contain 0.2 to 0.3 plastic microparticles in the digestive glands. Under controlled conditions, fluorescent polystyrene

microbeads measuring approximately 10 μm taken up via the digestive tract and the gills of blue mussels can accumulate in the hemolymph (circulatory systems). In addition to this bioaccumulation, another study shows that the particles transfer to crabs. Polystyrene microbeads measuring 0.5 μm are found in the stomach and hemolymph of crabs fed for four hours with mussels exposed for one hour to the particles. Although the retention rate of microfibers by mussels is low (0.28%), as is the transfer rate to crabs (0.04%), this study demonstrates that some plastics are transferred up the food chain.

Although direct ingestion of microplastics is difficult to distinguish from translocation,[16] in upper trophic species it is strongly suspected. In fish that prey on small organisms, the level of contamination of the stomach contents is 20 to 40% depending on the species and catch areas (marine or freshwater). Contamination of double-crested cormorants living in the Great Lakes region and sea lions of the Sub Antarctic islands indicates that microplastics do reach the organisms at the highest trophic levels of the marine food web and those farthest from inhabited and industrialized areas.

More importantly, plastics not only transport additives such as phthalates, bisphenols, and flame retardants (PBDEs) but also adsorb and concentrate persistent organic pollutants (DDT, PCBs[17] or PAHs[18]) on their surface, up to 1 million times the amount measured in water. All of these persistent bio accumulative and toxic substances (PBTs) are known to be either endocrine disruptors or carcinogens.

One study shows that DDT, PCBs and PBDEs have been identified in most of the juvenile flounder caught in the North Pacific central gyre. The authors conclude that although the source of the PCBs and DDT

[16] Translocation is the passage of small particles into the tissues.

[17] The use of PCBs has been prohibited in France since 1987.

[18] PAHs: polycyclic aromatic hydrocarbons produced during incomplete combustion.

cannot easily be determined, the massive presence of microplastics as a source of PBDEs was strongly supported.

The release of toxins, as well as the toxic effect of PBTs resulting from marine pollution, is demonstrated in the medaka, a small laboratory fish. The concentration of PBTs in the adipose tissue of individuals exposed for two months to polyethylene microplastics submerged for three months in San Diego Bay in California contaminated with PCBs, PAHs and PBDEs is much higher compared to controls. In addition to endocrine disruption of gonad function, physiological stress was observed, with glycogen depletion in 74% of contaminated fish, liver cell necrosis in 11%, and a liver tumor in one fish.

Other researchers exposed mussels to polyethylene microplastics contaminated with PAHs for two months. They found that not only do the mussels ingest and accumulate plastic microbeads in the hemolymph, but 20% show stunted growth, 41% have decreased fertility and they also report impaired immunological response and oxidative stress compared to unexposed mussels. These toxic effects indicate that the pollutants transported by the plastic fragments are transferred to the internal tissues of the organisms, even though the retention capacity of PVC is higher than that of sand, as shown by another study carried out with mud worms.

Another little-studied ecological risk of plastic debris in the ocean is the transport of species to sites where they were not previously present. A single piece of plastic measuring 4 m, which washed up on Canada's west coast after the 2011 tsunami in Japan, carried 54 species new to the North American ecosystems. These artificial rafts form an ecosystem (plastisphere) that is different from the surrounding sea water. They can upset the balance of the food chain, as the proliferation of sea skaters (*Halobates sericeus*) demonstrates. The females lay their eggs on the hydrophobic surface of plastics, which are perfect incubators. When

they mature, the adults end up in new areas and feed on plankton and fish eggs. In doing so, they not only weaken the bottom of the food chain but also jeopardize the fishing industry.

These floating rafts are also colonized by algae, which benefit from good sunlight and capture more CO_2 by photosynthesis. Unfortunately, they can also carry toxic algae and pathogenic bacteria that are dangerous to marine wildlife. For example, *vibrio* bacteria that cause cholera in humans and attack the digestive system of fish can quickly colonize polypropylene and polyethylene, which are present in large quantities in ocean gyres. These micro-organisms can make wild fish unfit for consumption and endanger fish and shellfish aquaculture.

Other bacteria form a biofilm that generates fissures in the surface of polyethylene particles, suggesting bacterial hydrolysis. This bio fragmentation could add to the photochemical and mechanical breakdown of the plastics. It could release nano plastics whose health and environmental impacts are unknown and could be completed by bacterial enzymes that break down hydrocarbons.

The reality is that animals at all trophic levels ingest plastics. Recent studies demonstrate microplastic translocation and trophic transfer. They are therefore vectors of toxic substances that can be biomagnified[19] up the food chain and contaminate seafood as well as freshwater fish. Although fish are gutted prior to consumption, this research explores a new source of consumer exposure to chemical contaminants. Not only is there a public health risk, but little research has been done on the adverse effects on the food chains. By causing the death of many animals and by transporting invasive species and toxic or pathogenic microorganisms, plastic pollution endangers the ocean resources. This is a global problem that has emerged with the widespread use of plastics,

[19] Biomagnification is the concentration of toxins in organisms at the top of the food chain.

which gives rise to environmental, health, economic, political and social consequences when it comes to managing the waste.

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7

IMPACT OF MICROPLASTICS ON AQUATIC ORGANISMS: TINY PARTICLES, BIG PROBLEMS?

Vera I. Slaveykova

Plastics are synthetic materials made from a wide range of organic polymers with more than 20 different types in use, including polyethylene, PVC, nylon, etc. According to the Plastic Europe the production and use of plastic materials is continuously growing and benefit the modern society[20]. In the "Age of Plastics", the global plastic mass production steadily increased form 15 million tons in 1964 to 311 million tons in 2014. The estimations showed that more than 12.2 million tons end up in the ocean each year from different sources, resulting in an increasing environmental contamination. Indeed, the accumulation of plastic waste in the oceans is a global, rapidly growing

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problem which is particularly pronounced in the five major oceanic gyres which represent hotspots of waste accumulation.

From ecotoxicological perspective, microplastics are emerging contaminants of global importance with increasing concerns about their environmental implications. Microplastics can originate from primary and secondary sources. Primary sources include various skin care products, cosmetics, toothpaste, synthetic textile, while secondary sources include breakdown of large items by degradation and fragmentation. Various processes can lead to microplastic formation, including physical, photo- and bio transformation and degradation. Microplastics are characterized with small size and very high surface area, which make them highly reactive. For example, if totally transformed to 40 nm-size plastic particles, a classical supermarket bag will have a surface area of 2,600 m^2. They account for the larger proportion of plastic in the environment by number of particles per km^2, while macro-sized debris account for largest proportion by mass (kg/km^2). Microplastic densities varied from 0 to 466,305 microplastics per km^2 as reported in the recent review summarizing the available measurements of the concentrations and distributions of micro-sized plastics in ocean surface water, beach sand, deep sea water, and lake water worldwide. Beside entanglement and ingestion of macro debris by large vertebrates, microplastics are accumulated by planktonic and invertebrate organisms, being transferred along food chains.

Owning to their small sizes, the aquatic microorganisms can readily ingest microplastics, affect them and accumulate in the aquatic food chain thus contributing to human exposure via food. In addition to the intrinsic physical toxicity, microplastics can be vectors for toxic metals and organic micropollutants and thus can induce chemical toxicity in the aquatic organism. They can sorb different environmental pollutants, e.g. persistent organic pollutants, as well as leach additives and monomers.

The present talk focused on the toxic effects intrinsic of micro-sized plastics. The impact of microplastics has been studied since the 1990s and it was shown to affect algae, ciliates, invertebrates, crustaceans, and fish mainly in marine ecosystems. Low-density floating microplastic debris was shown to affect significantly the pelagic biota, while the high-density microplastics – the benthic biota. Factors contributing to the bioavailability of microplastics to marine invertebrates including size and density and susceptibility of different feeding guilds; the accumulation and translocation were thoroughly reviewed. High-density polyethylene particles were found to accumulate in the gill surface and inside the gills, in the intestine of the edible blue mussel. Exposure to polystyrene microparticles was shown interfere with energy allocation, reproduction, and offspring performance in oysters. 5 μm-diameter polystyrene microparticles were found to accumulate in zebra fish gills, liver, and gut after seven days of exposure, while larger-sized 20 μm diameter polystyrene microparticles accumulated only in fish gills and gut and no similar particles were found in liver, demonstrating the importance of microplastics size in the bioaccumulation (Lu et al., 2016).

More recently such research was extended to freshwater ecosystems. As an example, our own research demonstrated that positively and negatively charged latex particles of 200 nm-size were consumed by water flea *Daphnia magna* (Saavedra et al, 2019). The accumulation of the microplastic particles detected in the *D. magna* gut increased with their concentration in the exposure media. The 48-hour immobilization tests showed that both microplastic particles could be classified as hazardous towards the water flea. Trophic transfer, as one of the major routes of exposure to microplastics was also shown to occur as a common phenomenon concurrently with direct ingestion in few studies mainly in marine ecosystems.

A recent study reported the first findings of plastic debris in gut contents of fish and bivalves sold for human consumption, thus raising concerns regarding human health (Rochman et al. 2015). Briefly, anthropogenic debris was found in 28% and 25% of individual fish for human consumption in Indonesia and the US, respectively. Anthropogenic debris was also found in 33% of individual shellfish sampled (Rochman et al. 2015). These results revealed the need to include plastic waste when developing seafood safety criteria. Interestingly a recent study also revealed potential to human exposure to microplastics by the consumption of contaminated salt: the microplastics content of 550-681 particles/kg in sea salts was found to be much higher than those in lake salts (43-364 particles/kg) and rock/well salt (7-204 particles/kg) (Yang et al., 2015).

Overall, the plastic pollution is ubiquitous and the tiny plastic particles emerge as a big environmental problem of global concern. Although the environmental impact of macro-plastic waste is extensively studied, the behavior and the effects of microplastics, either unintentionally released in the environment, either formed as a degradation of the macro-plastics are not yet fully elucidated. Nonetheless, the existing literature showed that microplastics could induce complex physical and chemical toxicity in aquatic biota.

The assessment of the environmental hazard and potential risks induced by the microplastics is important task of the environmental risk assessment. It can provide a scientific basis for establishment of the sound environmental quality criteria. Understanding of the possible alteration of the aquatic systems and thus the potential impacts to aquatic biota and humans, as well as their reduction, e.g. via changes of the plastic waste management, reduction of land-based plastic waste input into the aquatic systems is an important research and societal priority in the "Age of Plastics".

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INNOVATION ETHICS IN WATER: SOLUTIONS TO TAKE INTO ACCOUNT

8

SINGAPOREANS' WATER JOURNEY AGAINST WATER STRESS

Evelyne Fiechter-Widemann

The potable water issue is to be taken seriously by each of us, but the responsibility of governments is huge[21]. The Singaporean model which brought the nation state from *Third World to the first* as Former Prime Minister Lee Kuan Yew wrote it in a famous book, is a lesson to humanity. About fifty years ago, Singapore was a mudflat, the fishermen were living in slums, their houses being built on stilts, with no running water and no sanitation. With the political will, as well as with the population's endeavours, the unimaginable happened: one of the poorest countries on earth became prosperous and started to have a say on the World stage, as Singapore's role in the United Nations Security Council (UNSC) from 2001 to 2002 proved.

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Of course, this tremendous social change had a cost which cannot be forgotten: the people had to quit their kampongs (villages). But they started enjoying living in public housing (called HDB), having even the possibility to buy their flat at a reasonable price, 80 percent of the Singaporeans being nowadays owners of their dwellings. The consequence of this urbanistic transformation was that the population started to be asked to contribute to the cost of water, the State starting to regulate it. As a kind of a compensation, the so called "pioneers" enjoy a profound respect from the present generation, which recognizes their sacrifice for a better living in Singapore.

Singapore's strategy towards water sufficiency for its 5,5 million inhabitants on an island counting only 710 square kilometres, is the "four tabs" one. Singapore improved first the rain catchment, passing from three reservoirs to seventeen. Second, it still can count on Malaysian water supply thank to a Water agreement which expires in 2061. The two last "tabs" are transformed water, becoming potable thank to desalinization and the membrane technology: the reverse osmosis[22] . Most remarkably, Prime Minister Lee Kuan Yew has understood that this American invention of the 1990s could solve the dramatic issue of water scarcity in Singapore. Therefore, he insisted on promoting a new concept for the transformation of waste water into potable water and baptising it as *NEWater*. Knowing that the population would reluctantly adopt this new technology, he took the opportunity of the national day in 2002 to drink *NEW*ater in public. Here an excerpt of a speech he held at the opening of the Singapore International Water Week, in 2008[23] :

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[22] Saied, E. (2016) *Urban Water Reuse Handbook*. Taylor & Francis Group ed., 387.

[23] Lee, K.Y. Speech at Singapore International Water Week 2008 (2016). In Ho, P., Liu T. K., Liew M. L and al., *A Chance of a Lifetime*. *Lee Kuan Yew and the physical transformation of Singapore*, Didier Millet, ed. 93.

> *[…] with 60'000 of us in the stadium, we all drank NEWater that had come out of the sewers. But they thought that it was a gimmick. It wasn't a gimmick. We had a showroom in Bedok, and said please come and watch it. And they did. Then they realized, it's for real.*

Water is a precious resource. Without it, you die. […] The way water is being wasted around the world, misused, I foresee water shortages in many countries. Besides earth warming causing disruptions in water supplies and river bases and so on. So, I believe that water reclamation and waste management will be a huge industry because almost every society, especially China, India, the big ones, will have to cope with this problem.

[…] The world will need this because what we previously assumed was limitless, endless supplies of water, is not so. And we have found it not to be so and we have found a way out of it.

The question remains though whether this most remarkable transformation of a city-state, lifting people from poverty is sustainable and is an exportable model.

Recently one could read in the *Straits Times* (October 2017, A6) that the new Chinese Chief economic adviser, Mr. Liu He, met Prime Minister Lee Kuan Yew at the Davos Forum in Switzerland in 1993 and was, already back then, convinced by his remarks on the urbanisation's challenges.

9

SUSTAINABLE SOLUTIONS TO PROVIDE ACCESS TO DRINKING WATER AND CREATE JOBS IN SENEGAL

Renaud de Watteville, Christoph Stucki and Clémence Langone

The Access to Water (A2W) program has demonstrated over some years the feasibility of supplying Senegalese households with drinking water purified out of polluted, brackish waters, at a price that villagers could afford and that covered maintenance costs as well as (part) amortization[24].

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Access to Water and Job Creation Programs in Senegal

A2W is a non-profit Swiss foundation, initiated by Swiss Fresh Water (SFW) in 2012, implementing access to water and job-creation programs for low-income communities in developing countries. Since then, A2W has installed more than 180 water-treatment machines in water kiosks called DIAM'O (*water of peace*) in Senegal, creating around 650 direct jobs, and providing access to drinking water for approximately 380,000 people.

The A2W foundation installs kiosks in villages of all sizes, from small to large, in rural, sub-urban and urban areas. It then establishes cost-sharing of maintenance expenses among these kiosks.

This project was made possible through multiple financing of impact loans and grants. In towns and large villages, the sale of water makes it possible to repay investments in 5 to 7 years, but as soon as we are in small villages, which are often in rural and remote areas with urgent water needs and are most affected by the migration of young people, it is necessary to find sponsors for every water kiosk installed. Thanks to the Opec Fund for International Development (OFID), the Order of St. John, the Lions, the Soroptimist and especially the Rotary Club (RC), several projects have been carried out. For example, through a Global Grant initiated by RC Geneva-Lac and supported by all RC Geneva clubs and RC Dakar Soleil, an important action was carried out in the Tambacounda region, where water is also distributed in schools and health posts.

This locally produced water is sold at a very affordable price negotiated with local authorities, varying between 0.7- and 1.5-euro cents per liter, i.e. 20 to 80 times cheaper than the first available drinking water. Even at such low prices, the income from this water is sufficient to finance the local salaries and maintenance of the facilities, as well as repayment of the funds borrowed by A2W for large villages.

A2W, with its programs throughout Senegal, aims to offer a sustainable solution to populations living under water stress. The transformation of brackish and/or polluted water — most of the time rich in bacteria and viruses — into drinking water allows populations to see a significant improvement in their health and living conditions. In addition, this solution is economically sustainable and viable in the long term through the creation of direct, indirect and induced jobs, which promote the development of rural areas and reduces rural exodus. Thanks to a solution offered with Internet monitoring and regular maintenance, water kiosk installations meet few disruptions and operate as long as the project is financially supported.

The overall project brings major benefits in these four domains:

- Health: reduction of diseases linked to dirty, salty or polluted water, including diarrhea, fluorosis, hypertension, cancer, bilharzia, etc.;
- Economic: job creation and reduced absenteeism;
- Social cohesion: improved living conditions, reduction of rural exodus, increased integration of women into the labor market; accountability and responsibility principles
- Environmental: reduction of waste through the use of recycled bottles, use of solar energy and reduced transport of water due to on-site production.

Technical Solution

The water treatment units were developed in the Lausanne region by Swiss Fresh Water. While chlorine can kill bacteria and viruses and is, in some cases, an effective and necessary solution, the SFW machine, owing to reverse osmosis, can produce fresh water without chemicals, free not only of bacteria and viruses, but also of hormones, antibiotics, pesticides, heavy metals such as lead and mercury, and salt.

Reverse osmosis is a system for purifying water containing materials in solution by an extremely fine (0,0001µm) filtering system that only allows water molecules to pass through a semi-permeable membrane, thanks to the pressurization of the water. Reverse osmosis removes almost all undesirable components such as: bacteria, viruses, cyanide, arsenic, mercury and other heavy metals, hormones, antibiotics and salts.

The energy required to counter osmotic pressure is provided by electricity from the grid or by a solar panel. The water source for treatment may come from the public water supply system or from a well, a borehole or even the river. To complete the technical solution, the telemetry system allows control of each machine's operation. Internet telemetry enables the monitoring of each machine and, if necessary, facilitates the coaching from headquarters of those responsible for local maintenance. It also allows for possible breaks to be anticipated.

Every day, the machine can produce up to 4,000 liters of drinking water certified to meet WHO standards. The water's composition and flavor are very close to those of rainwater, and greatly appreciated by those who drink it. The water can be re-mineralized to suit different tastes as needed.

Villagers collect the purified water as usual in cannisters and pay the kiosk manager for the volume.

Reverse Osmose Device: low Cost and Decentralized. Performance and Arrangements.		
	Years 1-4	Years 5 -
Water quality	Drinkable; free of any viruses and bacteria, Fluor, heavy metals, salts and more	Drinkable; free of any viruses and bacteria, Fluor, heavy metals, salts and more

Protection against water related diseases	Diarrhoea, Cholera fluorosis, hypertension, and more	Diarrhoea, Cholera fluorosis, hypertension, bilharzia, and more
Electricity	supplied by Solar Cells or grid	supplied by Solar Cells or grid
Drinking water processed per day	Around 2'000 l	Up to 4'000 l
Lease agreement including a maintenance contract	Device is paid, owned by a sponsor then leased to users' community	Device is paid, owned by a sponsor then leased to users' community
Rent fare	Covering amortization and maintenance	Covering maintenance and new machines after amortization
Payment system	Post payment with invoice	Prepayment
Remote and telemetric monitoring	Allowing proactive maintenance	Allowing proactive maintenance and prepayment
Job creation	Kiosk keepers, Local, regional repairers	Kiosk keepers, kiosk managers, salesmen, delivery men, local, regional repairers (technicians), cleaner, quality manager, driver, and many more indirect jobs
Production cost per litre (over 10 y)	Euro 0.7 cents	Euro.0.5 cents
Price per litre	Euro 2.1 cents	Euro 1.4 cents
Prize covering	1/3 local wages, 1/3 amortization, 1/3 maintenance	Local wages and maintenance and new machines after amortization

Market price of local competitors	in plastic bags: 20 cents/l	Bottled: 50 cents/l

Field Project

To develop the project throughout the country, including in the Senegal River region where the need is significant, and to increase the efficiency of existing kiosks, A2W foundation needs high-quality, well-trained staff to implement the project. To that end, A2W has launched new training programs related to water professions that aim to improve significantly the know-how of current kiosk employees, and also to train personnel for new kiosks. The main strategy is expansion, e.g. finding new entrepreneurs to invest in new kiosks, but also consolidation of existing kiosks, e.g. finding new sales agents to sell the water produced in existing kiosks in so-called "satellite kiosks" in villages around the existing kiosks. Indeed, the water kiosks have a production capacity of up to 4,000 liters of filtered water per day, but most are currently running below this capacity. A2W's objective is therefore to increase the production of the existing kiosks by increasing the distribution in neighboring villages. Therefore, A2W is working on the development of the of "satellite kiosks" concept.

A2W aims to integrate women and youth as much as possible while creating jobs. Indeed, A2W has found that, among the many kiosks installed, those in which women play an important role in management are the most effective. It also reflects the strong demand for economic and social empowerment of rural and urban women. Most of these women are eager to enter the work force, but often lack opportunities or independence. For this reason, A2W wishes to offer this opportunity primarily to women.

The training program includes preliminary work on awareness campaigns to raise awareness of the importance of water in terms of health. With a local partner in the field of solar energy "Little Sun",

A2W goes to rural or sub-urban areas to promote sustainable solutions such water kiosks and their points of sale and the commercial distribution of cheap solar lamps. Both distribute a decentralized solution to address the acute lack of access to key components of human development: drinking water and high-quality solar energy, as "products". Both require that the public's awareness be raised.

People generally react positively to any type of campaign (promotion, tasting, awareness raising, training, discussions), especially when the subject is as important as access to or sale of drinking water. During field research, market study and awareness campaigns or training sessions, the local A2W team has observed that the populations see the immediate benefits. In rural areas, thanks to the Bottom-Up approach, projects are progressing rapidly. Indeed, A2W addresses the village chief, the women's association and the health post directly. On the other hand, in urban or semi-urban areas, A2W sometimes meets with resistance. Indeed, it is necessary to have commercial authorizations, often from the town hall or regional government. Authorizations often take a long to acquire for reasons of administrative red tape. Sometimes private interests take precedence over the interest of the community. A2W has always refused to act through dubious intermediaries or pay baksheesh

Thanks to the expertise, knowledge and patience of the local team, A2W has fortunately been able to defuse several difficult situations with potential conflict and since then has had access to many authorities or individuals who have helped to develop the project.

Learned Lessons

To conclude, A2W is confronted with all kinds of situations. Experience in the field shows that integrating the local market with a basic necessity product, such as water, can be quite delicate.

The best guarantee of success is to have a simultaneous approach on several levels:

- Local, with the people directly concerned (women's association, village chief, etc.): bottom-up
- Regional and national, informing prefects, governors, ministries and offering them support for the project.

Then, it is necessary to be patient, confident and trust local partners. Therefore, it takes time in each new action area or project implementation there is always a period of adaptation that is not easy, but worth it, because ultimately people need fresh drinking water, better health and living conditions, and work.

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ECONOMIC ETHICS: PUBLIC GOOD AND ECONOMIC MARKET VALUE IN WATER

10

THE RIGHT TO WATER: WHAT SOLUTIONS, WHOSE ACTION? THE POINT OF VIEW OF A BANKER SPECIALIZING IN MICROFINANCE

Emmanuel de Lutzel

Introduction

What can a banker specializing in microfinance contribute to this interdisciplinary colloquium on access to water throughout the world? [25] Well, first, this topic is related to microfinance insofar as it concerns the world's four billion poor people who currently live at the "bottom of the pyramid" (BoP). Second, financing is a prerequisite for the access to water that will make this right a reality.

Not being a legal scholar, ethicist, or water specialist, I will rely heavily on the Hystra consulting company's report of December 2011. Written jointly by a consortium consisting of Veolia, Suez, the French development agency Agence Française de Développement, Aqua for All (Dutch water sector) and the Children's Investment Fund Foundation

[25] Emmanuel DE LUTZEL is the head of microfinance for the BNP Paribas group. Since 2007 he has been developing a microfinance portfolio for the bank, in eight countries and with 17 microfinance institutions, for a total of 50 million Euros, reaching 350,000 micro-entrepreneurs. He helped shape a new regulatory framework for microfinance funds in France and Europe.

(British), this document is based on an initial report by the Swiss Agency for Development and estimates that an investment of 6 billion dollars would make it possible to reach one billion of the two billion people who have no access to potable water, and to reduce mortality from polluted water by on the order of 300,000 deaths per year. 6 billion dollars is a relatively modest amount, since only about one-third of it, or less than 2% of the annual budget for public development aid, would have to consist of subsidies or gifts. The remaining 4 billion dollars would be financed by loans or investments in equity capital.

After analyzing the various existing technical solutions, we will allude to the main agents of change who might drive effective implementation of the right to water.

A Range of Technical Solutions

There is not one single solution, but rather a range of technical solutions that would provide access to potable water for the two billion poor people at the bottom of the pyramid. They vary depending on the quality of the untreated water and on population density. Innovative solutions exist in both the macro (infrastructure) and micro (village or household level) domains.

Pumping systems: For 570 million to 650 million people living in rural areas with low levels of pollution, such systems are among the most economically effective solutions, but this assumes ongoing maintenance. In fact, more than a third of the 800,000 pumps installed in Africa are no longer in working order. The investment for a pumping system ranges from 30 to 40 thousand dollars.

Filters and tablets: For 740 million to 830 million people living in rural areas where the water is moderately polluted, household filters or bottles with chlorine tables are suitable. Basic filters cost from 20 to 40 dollars for equipment that lasts two years on average. In this case, two factors are essential to success: educating the public about the

importance to health of treating drinking water, and the existence of a product distribution network. We can build on Unilever's experiences in India and those of NGOs in Africa and Asia.

Mini-plants: For 44 to 52 million people living in metropolitan areas or on the urban fringes, small treatment plants (commonly called water kiosks)-often using reverse osmosis technology-supply water in quantity at the kiosk or in bottles at the residence. The investment for a mini-plant comes to about 3 thousand dollars. Several promising experiments with this kind of social business are underway in India (Naandi, Sarvajal).

Mini systems: For 410 to 480 million people living in metropolitan areas or on the urban fringes in neighborhoods not currently covered by public water services, small decentralized systems (managed by local entrepreneurs) can be a solution. Up to 500,000 people can be served for an investment on the order of 8 to 10 million dollars. Examples are Balibago and IWADCO in the Philippines.

Public urban systems: Expanding and improving the public water system is also an alternative for these same urban populations. Both public and private operators have had some success in this area (investments of several hundred million dollars). These developments frequently make use of cross-subsidization (wealthier areas are often assessed a surtax to fund investment and cover shantytowns). Examples: Veolia in Morocco and Suez Environnement in Jakarta.

Who Are the Agents of Change?

Traditional providers of development aid, for example the World Bank, regional development banks, and national development agencies, are naturally a driving force. Here I will focus more on innovators working in this sector, which to date has been dominated by large financial or corporate entities.

Traditional or social business: Many of the solutions mentioned can be run as social businesses. The goal of such an enterprise is not to maximize profit, but to try to make a social difference. We must distinguish between two types of actors: (1) local operators (for example, water kiosk operators or filter manufacturers), which must be for-profit businesses if they are to attract entrepreneurs capable of taking the risks; and (2) the organizations responsible for developing networks of these operators (by providing them with technology, financing, training, etc.), which can only be social businesses.

Microfinance: Microfinancing institutions can finance connection to the system (about 200 dollars) and local entrepreneurs (for up to a few thousand dollars). They can also be associated with equipment distribution (filters, tablets) and customer education efforts. This kind of diversification assumes a suitably adapted business model and a staff dedicated to this type of products.

Impact investing: This type of specialized fund has been developing over the past decade. It seeks a moderate yield and maximization of social impact. About 200 of these funds exist in the world, half in microfinance, which manage over 10 billion dollars in assets. This sector is in a strong growth phase due to heavy demand from private clients. Geneva is a world hotspot for impact investing, which could reach a level of over 500 billion dollars in the next ten years according to estimates in a 2010 report by JP Morgan. However, this figure is based on an estimate of financing needs and assumes the existence of the necessary entrepreneurs. The difficulty experienced by existing funds when it comes to identifying projects worth financing shows that this assumption is far from being confirmed.

Philanthropy: Here we are not talking about emergency aid (for example, reconstruction in Haiti), but about programs structured for the long term, especially for financing field studies and the massive social

marketing campaigns (on the order of 1 dollar per person) needed to create a real demand, as well as health education.

Large companies: Companies such as Veolia and Suez Environnement have started experimental projects-Veolia with the Grameen group in Bangladesh, and Suez in Indonesia. Such programs are part of the company's corporate social responsibility efforts, while still keeping to its core areas of business. Even though they make up only a tiny fraction of the companies' activities, we should welcome this trend of working with social entrepreneurs to experiment with innovative models. Hystra's report recommends the creation of a BoP Utility with hybrid (private/public) capital, to be used to develop mini systems that might present an additional opportunity for large companies in the sector.

Local communities: An African proverb says that the hand that gives should not be above the hand that takes. Development aid projects have often suffered from not being rooted in the local communities. Major players such as Suez and Veolia have understood this, and called upon anthropologists, not solely technical and financial experts, to ensure that they will be supported by the relevant communities.

Concluding Remarks

Free access to water falls within the realm of a Platonic utopia. As you accurately commented at the previous colloquium, water has a cost. We must leave Plato's cave and enter Aristotle's world, or that of Leibniz, "the best of all possible worlds." The question is, who should bear the cost and what is a fair price. Must we make users in wealthier areas pay so that we can give water to the poor? Should the government subsidize the rates? What if the government has no allocated budget and is being monitored by the IMF?

So this is not a choice between good and evil (with free water being good and paid water being evil), but between a lesser evil (paid water

but at a low cost) and a greater one (seeing one's child die of dysentery, paying for expensive medications, buying bottled water for 1 Euro per liter).

The ethical debates over water are akin to the discussions that have been going on in the world of microfinance for the past four centuries. After the first institutional pawnshops were created in Italy in 1462, a fifty-year debate ensued in the Church, pitting the Dominicans against the Franciscans over the question as to whether such enterprises could legitimately lend to the poor with interest. In 1515, the Lateran Council and Pope Leo X decided the issue: making the poor pay interest was legitimate, but the rate must be reasonable.

The discussion about interest rates that has been going on in the world of microfinance for four centuries could enlighten the water sector and help it leave Plato's cave to provide access to water for the greatest possible number of people.

11

DOES WATER HAVE A COST? IF SO, WHICH ONE? SEVEN THESES

Benoît Girardin

1. Water as such has no price[26]. It is a public good. The same is true of air and wind. That said, a specific water might not have the same quality as another one.
2. The operations that add a cost to water are spring water collection and protection, desalination, treatment prior to use, purification, transport and distribution, wastewater treatment, and wastewater recycling. These costs arise from operating and maintaining the infrastructure, not to mention research and development costs and insurance premiums for flood and erosion risks attributable to water's use and distribution.
3. The monopoly or privilege of availing the resource for a specified span of time, during which other aspiring users must

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obtain their supply elsewhere, this ought to have a price. Through that amount of money, injured or water-deprived groups should be able to tap water from distant sources. Compensation should be fair in that respect

4. When it becomes a rare commodity, a "scarcity tax" intended to curb the rash use of supplied water, cut the wastes and losses within systems and discourage profligate, irresponsible use.
5. Water pricing must reflect its true cost without omitting associated or hidden costs. When not, waste is encouraged. Social and environmental costs cannot simply remain externalized. When subsidies are used over long term, they might introduce negative effects that generally tend to benefit well-off and public users. The requirement of cost transparency is paramount.
6. The ethical requirement for price consists in coming as close as possible to the true cost by revealing all components, even hidden ones, and avoiding the addition of exorbitant and discriminatory profit margins. Terms of reference specified by the local community are required to set the frame of this practice.
7. Additional ethical requirements regard:

    - fair access and distribution, to vulnerable groups;
    - responsible consumption that promotes the sustainability of the resource and its renewal, as well as efficient distribution and minimization of leaks;
    - within a watershed, reciprocal responsibilities of upstream and downstream parties,- countries and dwellers as well - should be clarified within riparian agreements specifying not only mutual rights but also risks -water quantity; quality (pollution, …) – and renewal or protection
    - specific responsibility for aquifers, given that pollution reaching them may be persistent.

Operational Consequences

- The term "owner" does not fit for describing the position of the community or the individual household in the territory where the spring, aquifer, or river is located. "Steward" looks preferable.
- Springs, aquifers and rivers can be used by a community, a public entity, or a subcontracted private company through a public service subcontracting.
- An operating lease should stipulate the commitments of riparian communities to responsibility, sustainability, and service: quality, price, repairs, maintenance. Terms of operation and water volume should be set limits.
- Long term leases should encourage sustainable management, offer incentives to improvements, and avoid lax maintenance practices or even outright permanent appropriation.
- Operating and distribution contracts must clearly assign responsibility for wastewater or polluted water: purification, cleanup after pollution, discharge, recycling and reuse, and so on.
- The "true" cost includes all the actual, total costs throughout the whole chain, from extraction to recycling and reclaim. Research and development costs, investment risks and the risk of accidental damage (flooding and erosion) should not be downsized. A profit margin seems acceptable when in appropriate proportion.
- Transparency and a stated cost breakdown must be ensured.

Open Questions

- How can inadequate maintenance be ruled out and professional, fair maintenance be encouraged? How can the pitfalls of a lopsided balance of power between communities and the operator be avoided?

12

COST AND PRICE OF WATER. LESSONS FROM A CROSS COMPARISON BETWEEN SELECTED CITIES, COUNTRIES.

Benoît Girardin

Purpose

The purpose of the paper is to approach as far as possible the costs of the water supply in its comprehensive chain from extraction to sewage, and to approach the key elements of the costs[27]. Cases chosen from all the five continents, but particularly from places where detailed documentation is available, help to realize the diversity of costs, of costs calculation as well as of the relative size of water costs' components. The ways costs are covered differ also from places where they are charged to users only to places where public budget cover infrastructures or even basic needs. Indeed, the analysis has been compounded by some unwillingness to establish detailed calculation or at least a certain lack of transparency.

[27] See the List of Contributors section for the author's biography.

Preliminary Remarks

Assessing real production and supply costs of water and sewage looks far less easy than one could expect. Many calculations do not specify the real costs of each step from extraction to collection, storage, cleaning, distribution, maintenance and expansion of the infrastructure, minimization of leakages, but also sewage, recycling, reclaim. For instance, in Jordan or in Calcutta, sewage costs are not accounted for. In most countries, important infrastructures such as dams, reservoirs, …are financed by State's' budget whereas operation and maintenance costs are charged by the operators to consumers. In other places, details of the private/public mix are kept hidden or displayed in part only. Grey zones between steps are far from removed.

Many sources asked about costs answer with tariffs, fees or price of water. Many data that claim to be named as costs are in fact rates, fees or tariffs. Most of the water suppliers mix up costs and prices or stress on tariffs. Even if tariffs structures differ, they all tend to make the provision of water as sustainable as possible without threatening the affordability to each section of the population. Tariffs set for agriculture and irrigation as well public usage are always at quite a low level, for industries in the lower quarter and for households in the high half. That makes almost impossible to reach the level of true costs.

Fees for basic households' needs are either void – in Hong Kong first 12 m³ a month are free and in Durban first 6 m³ for poor - or cheaper – like in USA cheaper under 22.7 m³ (20000 US gallons). Countries such as Belgium, Jordan, UAE adopt a four tiers scheme, benefitting to low income sections. Jordan and UAE charge expatriates more than nationals[28]. Higher consumption will be priced higher. In

[28] In Hong Kong, the first 12 cubic meters in a quarter are free, the subsequent 31 cubic meters cost each 4.16 HK$, the next 19 cubic meters 6.45HK$ each, and beyond 62: 9.05HK$ each: see Hong Kong Water Supply Department. In Belgium the following prices in euros have been set as of 2014: for a yearly

Ireland water is free but costs are covered by general taxation. Those differing water fees render a cost assessment even more complicated.

Still a lot of costs' variations can be related to the level of yearly rainfall, the size of the catchment basin, the quality and access to underground water, to the total length of distribution pipes and size of the network. But the quality of the water in terms of health, constant or interrupted pressure, is bearing on the costs. The level of leakages matters also but their costs are silently reflected in water bills. Management and administration do not perform equally well. In many cases, cost allocation does not coincide with cost classification.[29] This of course does not ease cross comparison.

Cost Comparison

The purpose here is not to rank cities or companies internationally. Rating and ranking are meaningful specifically at national or regional levels in order to identify variations and stimulate management efficiency, quality and coverage. Figures displayed reflect mean consumption. Although data have been collected on the web from the five continents, the details offered in USA, Europe and the Pacific explain choices made for in depth analysis. In USA studies on largest cities as well as details about smaller towns and counties of Michigan are made available[30]. Studies done on European countries as well as specificities from Auckland in New Zealand explain some edge given to them.

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consumption from zero to 15 cubic meter: 2.06 € per m^3, from 16 to 30: 3.68, from 31 to 60m^3: 5.44 and beyond 60m^3: 7.95.

[29] Griffin Ronald C. *Water Resources Economics. The Analysis of Scarcity, Policies and Projects, p.* 240 ff[2].

[30] See yearly data provided by the Michigan Municipal Treasurers' Association: www.mmta-mi.org/stories/water-and-sewer-cost

Data here displayed have been collected based on several reports issued on the topic. Figures supplied are average ones per country for a cubic meter. The initial report published by the Berlin based Ecologic Institute comparing prices in EU countries in 1998 [31], then a survey conducted in 2008 by Global Water Intelligence on behalf of OECD and covering 35 countries with a report issued in 2010[32]. At the 2018 Water Conference in Berlin, Civity Management Consultant submitted the results of its research focusing not only on costs but also on tariffs, related to services' quality and purchasing power parity.

Table 1. Average price of a cubic meter (1000l or 1Kl) in 8 countries of Europe[33]

	Spain	Sweden	France	NL	Germany	Denmark	Poland	CH
1998	DM 0.40		DM 2.00	DM 2.70	DM 2.85	DM 0.80		
2008	USD 1.92	USD 3.59	USD 3.74			USD 6.70	USD 2.12	USD* 0.63 – 4,93
2010	€1.60	€2.70	€2.92	€3.90	€5.10	€5.60		
2018 ppp[34]			€1.96 (2.07)	€1.55 (1.55)	€1.99 (2.02)		€1.86 (2.16)	

[31] Kraemer, A., Piotrowski, R & Kipfer A.(eds)., *Comparison of water prices in Europe–summary report. Vergleich der Trinkwasserpreise im europäischen Rahmen*, Berlin, Ecologic 1998. So far Switzerland (CH) is concerned, see Baranzini A., Faust A-K & Maradan D. *Water Supply Costs and Performance of Water Utilities: Evidence from Switzerland* 2010

[32] OECD 2010 "Water pricing in OECD countries: state of play" in *Pricing Water Resources and Waster Sanitation Services*, p. 45.

[33] Bergamin, J. 2007 *La tarification de l'eau en Suisse romande,* Genève, Cahiers ACME 2007/1.

- 2008 price/m³ submitted by OECD survey, including water supply and sanitation.
- 2018 cost/m³ cover water and sanitation costs supplemented by public grants; 1 € = CHF 1.5 in 2010 and 1.2 in 2018.

Table 2. Average USD price of a cubic meter in USA: five big cities and Michigan municipalities. Tariffs for water supply (W) or water supply and sewage (W&S)

	USA Average	Atlanta	Detroit	Los Angeles	New York	Washing-ton DC	Michigan Grandville min	Michigan Negaune e max
2013 W&S	3,18	5.88	0.71	2.57	5.61	3.62	0.94	6.76
2018 W	1.56	1.93	1.14	2.09	1.34			

Data collected in 2013 by Black and Veatch do relate to Water and Wastewater for a monthly consumption of 3'750 US gallons (= 14.195 cubic meters). Data collected by Blue Circle in 2018 do not encompass sewage.

Through a comparison between five US cities done in 2010 by an American Association of Water "Circle of Blue", a direct link can be established between the rates and the level of rain or proximity to abundant water and an inverse link between rain level and consumption. Great Lakes area offers expectedly the lowest tariffs against California where the tariffs are much higher and capita consumption similarly higher.

[34] Friederike Lauruschkus, Civity Management Consultants, *Comparisons of European water prices*, Our Future Water, Berlin Conference Nov 2018: figures refer to covering cost per m³, yearly cost per head at purchasing power parity (ppp) .https://civity.de/en/news/.../comparison-of-european-water-prices/

Table 3. Average price in USD equivalent of a cubic meter in Middle East, Asia, Pacific, Africa, South America. Tariffs for water supply (W) or water supply and sewage (W&S)

UAE Abu Dhabi*	Jordan Amman	India / Mumbai**		Singapore	Hong Kong***	Auck-land	Brisbane price	Dar es Salam	Sao Paulo
		Slums	City rate						
2018	2015	2016	2008	2012	2017	2018	2018	2008	2008
0.58-0.71 2.14-2.84	1.56 – 8.91 -	6-9	0.09	1.88	0.63	2.09 - 3.61[35]	2.915	0.46	1.45
W	W&S	W	W&S	W&S	W&S	W&S	W&S	W&S	W&S

**in UAE and Jordan, tariffs differ for nationals and expatriates; they take into account geographic area, type of use (residential, industrial, agricultural) and volume. Figures provided here are for nationals and expatriates. An increasing block system is followed, as an incentive for saving resources.*

*** India figures reflect rates, invoiced to consumers rather than costs in Mumbai slums, households pay the water 5-6 times more than families who afford a tap from the public water supply, In Rs 350 = USD 0.05 per 1'000 liters. USAID & Safe Water Network Drinking Water Supply for the Urban Poor: City of Mumbai 2016*

**** Calculation for a quarterly consumption amounting to 60m3 and discharge of 30m3*

The price of water can thus range from a few cents to €5 per cubic meter, or even more in rare cases, particularly when water is sold out of containers, buckets or water trucks. In dry and low-income countries water supply is heavily subsidized and the share of irrigation might

[35] Waste water is charged either through a yearly charge of 148USD or a rate of USD1.78 per 1000 l or 1 m³ discharged.

amount to 60% of water use. As supply is not regular over time, consumers resort to water vendors. In Jordan the price of a cubic meter sold by vendors is multiplied by a factor 30 to 50 against piped water supplied by municipal utilities. In Mumbai, the factor soars to 100.

Would a comparison reflect effective costs, a calculation should consider the local purchasing power parity. Why not refer to some method like the Mac Donald index or a soda bottle bought locally where water tariffs are assessed in a factor of those prices?

Tariffs' structures differ from country to country but basically tariff set for agriculture are the lowest, for industries in the lower quartile and fresh water at the highest. A policy of full cost recovery is not adopted in most countries, while securing affordability is deemed a priority. Infrastructure costs are often charged to public budget.

Interestingly water scarcity is fostering an increase of water prices for agriculture and encouraging industries to use recycled water.

Sewage costs as compared to water supply and distribution reflect also surprising variations.

Table 4. Costs Ratio Water Supply/ Sewerage in cities of selected countries

	Brazil Sao Paulo	Singapore	New Zealand Auckland	France average	Canada Ontario	USA 50 largest cities*	Switzerland	
							Geneva	Lausanne
	2006	2012	2019	2014	1999	2013	2006	2017
water	50.3%	68.4%	36.9%	51.5%	62.6%	42.5%	48.8%	56.5%
sewer	49.7%	31.6%	63.1%	48.5%	37.4%	57.5%	51.2%	43.5%

50 Largest Cities Water/wastewater Rate Survey. Black & Veatch 2012/2013 Report; Auckland Watercare Asset Management Plan 2018-2038, p.100. In some cities storm water fees are included but add only a few points to the bill.

Tentative Lessons

Out of these figures and tables, some lessons can be drawn:

- Rainy areas, large basin matter a lot in terms of water extraction
- Geographical conditions: flat or hilly areas; distance from sources; quality of water from the source
- Desalination costs or membrane-filtering are highly expensive operations.
- Separating rainwaters from used water in outflow pipes is costly but allows reclaim.
- Regular monitoring of leakages helps to reduce costs importantly
- Sewage costs tend to overrun supply costs; and should be included in water bills
- Maintenance costs tend to reach the level of direct supply costs
- Water pricing aligned exponentially on consumption fosters savings and addresses resource scarcity
- Actual full costs are often underestimated and not covered by fees
- Infrastructure renewing and extension costs tend to overpass supply and administration
- Higher tariffs for agriculture and industries should work as incentives for economical use of water: drop watering, reclaiming used water, separating fresh water from recycled water

Further Work: Measuring and Refining Detailed Cost Breakdown to Approach Actual Costs

The hereunder proposed scheme is to be used as a research tool. Once filled with detailed figures, such a breakdown could ease comparisons at local, regional, international levels. Through comparison, high costs could be highlighted, and justification required

with respect to specific geographical conditions as well as effective measures to cut costs explored.

Costs need to be balanced against amortization years and cost sharing formulae between consumers and public budget. The point here is to tend towards a detailed assessment of each component, both in absolute amounts and percentage. Risks of damages caused by storm water need to be considered. Figures hereunder are only broad and wild guesses based on an interview with a selected case and consultations on the web. Keys are to be considered as indicative. Diversity of cost sharing formulae illustrate choices made by local, regional and national policies.

WATER SUPPLY & SANITATION COST BREAKDOWN	Investment Life, years	Expenditure in % of Σ	Cost sharing Formula %	
			Consumers	Public
Catchment and Supply		**20-40%**		
- Source, catchment area protection	80-100		0-30	100-70
- Pumping	30-50		30-70	70-30
- Abstraction or Collection			30-70	70-30
- Storage facilities, reservoirs	50		0-30	100-30
- Filtration facilities	10		30-80	70-20
- Treatment	20		50-100	50-0
- Resource preservation			0-30	100-70
- Labour costs			70-100	30-0
Distribution		**15-30%**		

- Network bulk, local and extension	50-80		0-40	100-60
- Local network and extension	50-80		40-80	60-20
- Maintenance and Renewing of the Network			80-100	20-0
- Pressure and Flow operation	30-50		20-80	80-20
- Leaks Detection, Repair, Loss Management			20-80	80-20
- Labour costs			90-100	10-0
Sanitation		**20-50%**		
- Sewage, Recycling Plant infrastructure	40-50		0-20	100-00
- Infrastructure: collecting pipes	80		0-50	100-50
- Sewage Plant operation			40-100	60-0
- Recycling of used water. Reclaim			0-60	100-40
- Labour costs				
Administration		**20-30%**		
- Consumption Metering	15-30		100	0
- Users' clusters Specific Billing			100	0
- Issuing bills, reminders			100	0
- Bookkeeping, Planning			100	0

- Information, Communication, Statistics			100	0
- Research & Development			0-20	100-80
- Strategy, Tariffs' structure setting. Growth			100	
- Labour Cost			100	
Financial costs		**10-20%**		
- Insurance to cover risks, storms, disasters		1-3%	0-70	0-30
- Taxes			100	
- Amortization		10-15%	0-80	0-40
- Debt service		10-15%	0-80	0-50

Source: Lausanne Water Dept 2019; June.

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Associations

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American Water Works Association. https:/www.awwa.org/

European Environment Agency: https://www.eea.europa.eu/
International Water Association: https://iwa-network.org/

Financing Sustainable Water Project: www.financingsustainable water.org/

International Benchmarking Network for Water and Sanitation Utilities: https://www.ib-net.org/

The European Federation of National Water Supply Associations: www.eureau.org

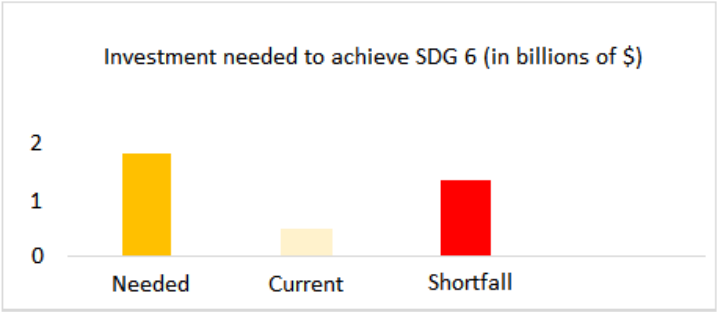
13

DEVELOPING NEW FINANCING MODELS TO PROMOTE ACCESS TO DRINKING WATER AND SANITATION

Julia Bertret

Currently, 1 billion people worldwide still live without access to drinking water and 2.5 billion without sanitation[36]. The 193 United Nations Member States committed themselves to ensuring access to safe drinking water and sanitation in Goal 6 of the Agenda for Sustainable Development (SDG 6). Recent estimates by the World Bank indicate that investments in excess of $1.7 trillion are needed to achieve this by 2030. However, current funding is four times lower, at 420 billion. This means that 1.28 trillion must be mobilized to achieve the SDGs.

[36] Julia BERTRET, an Environmental Engineer holding a Master's degree in Entrepreneurship from HEC Paris. After starting her career in environmental strategy consulting, she was managing the Veolia open innovation department. Since 2017, Julia has devoted her energy to developing FWE, which aims to offer new models for financing environmentally related infrastructure in order to accelerate the ecological transition.



Source: World Bank

To find out how this shortfall can be financed, it is first necessary to understand how the water sector is financed today.

In developing countries, investments in the water sector are mainly provided by government loans and concessional financing from national, bilateral or multilateral development banks. Global development financing, which amounts to $130 billion, includes not only water-related investments, but also all other development sectors, and is therefore not sufficient to finance the 1.7 trillion needed.

The global economy is worth $100 trillion. Involving the private sector in water financing therefore seems to be the only sustainable way to achieve the SDGs. Unfortunately, today there are very few private financiers in this sector in emerging countries, because water is perceived as a risky and unprofitable sector.

How can water financing be made sufficiently attractive to private investors?

As we have seen above, a quarter of resources are now deployed, mainly by development banks, governments and, to a much lesser extent, by philanthropic foundations. Rather than using financial resources to carry out a limited number of projects in the form of loans and grants, why not use public funding as a catalyst to eliminate the barriers that currently inhibit private investment? This concept is called

blended finance. It is defined as *"the strategic use of development finance and philanthropic funds to mobilize private capital flows to emerging and frontier markets"*. Philanthropic and public financing can use various tools to reduce the risk of private financiers or increase their return, including development funds, guarantees, reserve funds and interest-free loans. Thus, the contribution of philanthropic or public funds can take different forms, depending on the needs of a project.

Case Study: Blended Financing for the Expansion of the As-Samra Wastewater Treatment Plant in Jordan

Location: Amman and Zarqa, Jordan

Context

Jordan is one of the most water-scarce countries in the world. Per capita levels of available water resources have fallen to 155 m^3, far below the 500 m^3 threshold of absolute water scarcity. In addition, the country's rapid population growth and a large influx of refugees are generating a huge increase in demand. This is placing enormous stress on the water infrastructure. In particular, the As-Samra wastewater treatment plant, initially designed to treat wastewater for Amman's 2.3 million inhabitants, nearly reached its maximum capacity in 2008.

The Jordanian government therefore decided to expand the plant, and at the same time upgrade it to enable the use of treated wastewater in agriculture, thereby freeing up freshwater for use by the population. However, the project was too expensive to be financed by the country. Attempts at securing private financing through a bank loan were also unsuccessful.

Blended Finance Approach

As the project cost was $223 million, the Ministry of Water decided to finance it through a build-operate-transfer (BOT) contract. In the

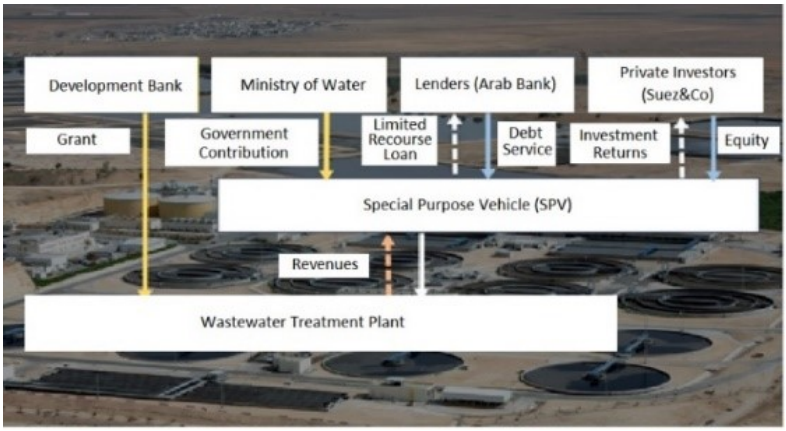
BOT framework, the government delegates the construction, operation and financing of the project to private companies. It grants them the right to operate it commercially, for a specified period, at the end of which the facility is transferred back to the government. Consequently, a special purpose vehicle (SPV) was created by a consortium of private companies, led by Suez, to make financing attractive to these private investors. A diverse blend of financing was accessed:

- a US development bank, the Millennium Challenge Corporation (MCC), provided a $93 million grant for the expansion work
- the Government contributed an additional $20 million
- payments are guaranteed by a reserve fund of the Ministry of Water, itself guaranteed by the Ministry of Finance

The blended finance approach reduced the project costs and increased profitability while limiting the risk.

The SPV financed the remaining $110 million, including 102 million in commercial debt from a syndicate of Jordanian local banks and other institutions arranged by the Arab Bank. The remaining 8 million was financed by the consortium in the form of equity.

Figure 1: Investment contract model. Source: World Bank



Results

This approach made it possible to secure funding to increase the plant's processing capacity by 40%. The upgrade also enabled the treated wastewater to be used for irrigation, freeing up additional freshwater for domestic use for over 2 million people.

Conclusion

The public funding and development grant made it possible to attract private financiers to this project, without whom the project would not have seen the light of day. For these private actors, the risks and returns were sustainable. For Jordan, this helped to address a vital problem for its population that it could not solve alone.

This type of model can be applied to many projects around the world, particularly in emerging countries. At fWE, we believe that promoting such models is one of the keys to solving the global water crisis. Thanks to our dual expertise in the water sector and in investment, we have given ourselves the mission of supporting local authorities and businesses in setting up outsourced management models

for their water-related infrastructure. We develop and design with each of our clients the best solution for each case, identifying the stakeholders to involve in the project (development banks, private investors, water agencies, EPC contractors) then provide ongoing support until their project is effectively up and running.

For more information: http: //waterassetdeveloper.com.

14

THE ROLE AND REACH OF THE "POLLUTER PAYS" PRINCIPLE IN WATER MANAGEMENT

Anne Petitpierre-Sauvain

The Polluter Pays Principle

"Polluter pays," a type of causality principle, requires that the costs of environmental harm be paid by those responsible for the damage, i.e., the polluters. This goal is met only if such costs include not only restoration and cleanup but also the prevention of more damage later. So the costs of prevention should also be paid by the potential polluter.

The principle applies to all external costs or "externalities" (i.e., the social costs resulting from environmental damage). It demands internalization of expenses for preventing and mitigating environmental harm as well as those for taking suitable steps with regard to the polluter's liability. It is also expressed through incentive taxes that both provide the resources needed to cover the costs of environmental protection, and show the real cost of products and services, thus giving it an informative and educational function.

In international law, the polluter pays principle first appeared on May 26, 1972 in OECD Recommendation C(72)128 on Guiding Principles concerning International Economic Aspects of Environmental Policies, and on November 14, 1974 in Recommendation C(74)223 on

the Implementation of the Polluter-Pays Principle. In a more general context, it is included in Principle 16 of the Rio Declaration.

Polluter Pays Principle and Access to Water

Questions about the price of water

Should water have a price? If so, should it correspond to "internalization" of costs?

- Costs of eliminating another water service?
- Costs of water-supply infrastructure?
- Costs for wastewater removal and treatment?

Who in the chain of production and consumption should pay the costs?

Does the right to water (as a necessary good) preclude payment for it, even as a function of the polluter pays principle?

Does the right of access include the right to pollute? If so, what are the limits?

Should a public water service corresponding to the human right be created? Who should pay for it?

Polluter Pays Principle and Responsibility

Questions about water uses

Should some uses of water be prohibited (excessive pollution).

- based on the treatment costs arising from them?
- based on the type of impact on water quality (harm to biodiversity)?
- based on the type of impact on water availability (negative effects on other users' rights)?

If all uses are permitted, how should the costs be distributed?

- based on the amount taken (internalization of costs)?
- based on third-party rights (liability)?

Is a competitive water market conceivable?

- if not, how should allocation be managed?
- if not, who should pay the costs of water use?

PEACE ETHICS: MANAGING CONFLICTS OF INTERESTS AND CONFLICTS BETWEEN WATER USERS

15

INTERNATIONAL HYDRO-POLITICS: LESSONS FOR WATER DIPLOMACY FROM THE JORDAN AND THE NILE

Mark Zeitoun

Water Diplomacy Requires Improvement

Water diplomacy will be assisted by solid analysis and objective water-sharing standards. Because international transboundary water conflicts are by nature distributional, they are perfectly suited to Lasswell's definition of politics paraphrased as "who decides who gets what, when, and how." This document draws lessons for water diplomacy from two rivers that are often considered cooperative, but where the asymmetry in water-sharing is extreme: the Nile and Jordan. The mischaracterization is due in part to the use of inadequate analytical tools, and the lack of objective standards, amongst others. It is asserted that the shortcomings of analytical techniques can be improved through tools that allow for interpretation of power asymmetries, and the co-existence of conflict and cooperation. The potential and limits of international water law as diplomatic tool are also discussed.

Power, and Co-existing Conflict and Cooperation on the Jordan and Nile Rivers

The vast majority of transboundary water conflict analysis relies upon the Basins at Risk (BAR) Event intensity Scale[37] (Wolf, Yoffe and Giordano 2003). The tool posits water conflict and cooperation at opposing ends of a spectrum—and is often used with data from the Transboundary Freshwater Dispute Database (TFDD 2008). Recent criticism related to the quality of the dataset aside (Kalbhenn and Bernaeur forthcoming), the BAR scale has served to highlight that the overwhelming majority of international water events are "cooperative"—thus also helping to dispel media hype about the existence of water wars.

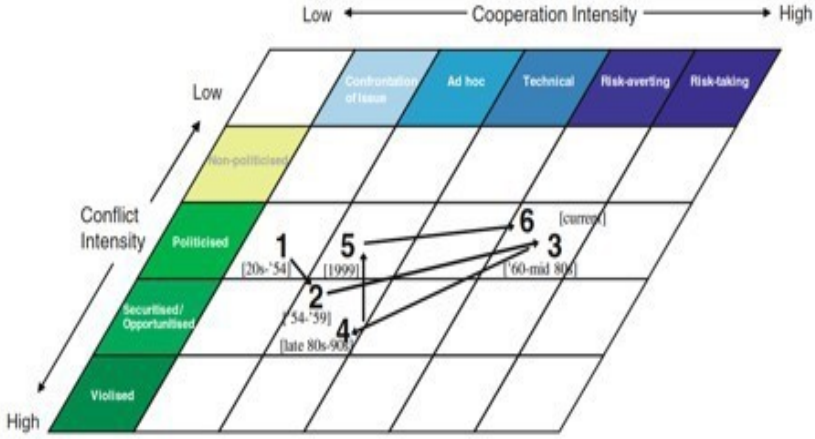
The combined use of the BAR scale and quantitative approach has a number of shortcomings that prevent the utility of the analysis, however: a tendency to downplay the importance of non-violent water conflicts, neglect of political and historic context, and—perhaps most importantly— naïve assumptions about cooperation (Zeitoun and Mirumachi 2008). For instance, the BAR scale counts transboundary water treaties as proof of a pinnacle of cooperation, though numerous other authors have noted either their ineffectiveness (Bernauer and Kalbhenn 2008) or the coercive ends they serve (Conca 2006; Zeitoun, Mirumachi and Warner 2011). Sometimes, as in the Nile and Jordan, the water treaty is the problem, and analysts of transboundary water conflicts are advised to pay particular attention to the destructive side of such "cooperation."

Fortunately, another tool— Mirumachi's (2007) Transboundary Water Interaction Nexus (TWINS)—provides a way to interpret relations between states in a more realistic manner. Recognizing that

[37] The BAR scale has inspired a number of econometric studies from North America (Yoffe and Larson 2001; Dinar, et al. 2012) and Europe (e.g. Brochmann 2012) to further the analysis of water conflicts.

conflict and cooperation between states can co-exist (e.g. technicians collecting data jointly, while politicians engage in rhetoric), the TWINS turns the BAR scale into a matrix. Figure 1 shows both the TWINS matrix and its application to relations between Sudan and Egypt over the Nile.

Figure 1: Mirumachi's TWINS matrix of water conflict and cooperation, applied to bilateral relations over time between Sudan and Egypt (up to 2008) (from Zeitoun and Mirumachi 2008: Fig 3).



With conflict and cooperation plotted against each other, the analyst can begin to see how some actors might choose to emphasize cooperative events over conflictual events, or vice-versa—normally with the chosen perspective reflecting their political interests. The interaction between Egypt and Ethiopia during the period of the Nile Basin Initiative (1990s-2010) was presented as conflictual by Ethiopian (Mekonnen 2010) perspectives, for example, but as cooperative from the perspective of Egypt (Metawie 2004), or intermediaries such as the World Bank (Grey 2006). The latter perspective typically makes no mention of the 1959 Nile Treaty that provides the lion's share of the flows to Egypt (and none at all to

Ethiopia, which was not included in the negotiations), while the former is always quick to point out the effects of that heavily skewed agreement. The fact that ministers from each country were jointly discussing data-collection and development projects masked the tensions at the root of the Nile conflict—at least for the more powerful sides. The uncritical observer may thus be lured into thinking the technical cooperation matters more than the political conflict, and thus miss the strategic, manipulative and coercive sides of "cooperation."

Such asymmetry in power between transboundary water actors is the other piece of the puzzle that water diplomats must take into consideration. The particularly strong influence of "soft" power is emphasized via the analytical framework of hydro-hegemony (Zeitoun and Warner 2006), for instance, to demonstrate the who decides and how of Lasswell's phrase. The authors reveal how military threats (a soft expression of hard power) can back-up expressions of soft power like the construction of knowledge, the "sanctioning" of discourse— and the signing of skewed treaties. The effect is not only to maintain an asymmetric distribution of water, but to get the consent of the weaker side and international mediators to the arrangement. The 1995 Oslo II Agreement between Israel and Palestinians, for instance, anchored a 90%-10% distribution in flows for basin hegemon Israel. The PLO consent to the agreement commits the Palestinian side to self-enforcement of the unfair terms of the agreement and has proven a considerable obstacle to the sustainable development of the water sector in the West Bank and Gaza (World Bank 2009). The once-heralded and still enduring Israel Palestinian Joint Water Committee is now discredited as an Israeli tool to legitimize the colonial Israeli settlement project via water negotiations (Selby 2013)—an instance of "domination dressed up as cooperation" (Selby 2003). Palestinian consent to both the Agreement

and the wrangling of the Committee may be explained by the coercion applied by the Israeli side, but as with the asymmetric distribution of the flows that are at the head of the conflict, this is rarely even mentioned by the international diplomatic community (Zeitoun 2008) in any of the several ongoing transboundary water initiatives (Waslekar 2011; e.g., FOEME 2012b; FOEME 2012a).

Effective water diplomacy continues to evade us.

International Water Law as Guide to Fair Water Sharing

It follows that diplomacy efforts aimed at resolving or transforming transboundary water conflicts must consider both the co-existing conflict and cooperation, and the influence of soft power. Even with a sound analytical basis, however, diplomatic efforts would be assisted if they were working towards a common objective or measure of fair water-sharing. International Water Law presents some opportunities in this regard.

State claims to water shares have been anchored in territorial sovereignty (the "Harmon doctrine") or "first in time, first in right" (i.e., a state can do what it wants with the water, regardless of downstream impact or whoever else might need water later). A more multi-lateral approach has developed, however, through customary state practice—and has been codified in the 1997 UN Watercourses Convention[38] (UNWC). The predominant article of the UNWC related to water sharing is "equitable and reasonable use,"[39] which provides a

[38] IWL also includes the UNECE Water Convention (UNECE 1992), and the Draft Aquifer Articles (UN ILC 2008)

[39] The UNWC also lists a number of factors that may be used to determine "equitable and reasonable" entitlements, including size of population, economic needs, historic use, availability of alternative water sources, etc.

middle ground between attempts to establish sovereignty over a resource that mocks political borders, and perfect equality—which does not take into consideration social and physical realities about dependence upon the flows (millions of Egyptian farmers have no option but to rely on the surface water flows, given the lack of rainfall in the country, for instance).

As with all international law, IWL has detractors—but by setting "equitable and reasonable use" as the goal, it is as close to an objective standard as any mediator may find. The recent Clingendael report on water diplomacy (van Genderen and Rood 2011) makes the point emphatically and calls for "neutral brokers" and entrepreneurs of fair water-sharing norms. IWL furthermore provides a legal framework that serves to de-securitize the discussion to allow public empowerment towards environmental justice, at least in theory. The result of a collective effort of dozens of years of deliberation amongst scientists and lawyers, the principles of the UNWC are a distinct conceptual step towards a "community of interests" (PCIJ 1929; ICJ 1997) and "shared sovereignty," and away from unilateralism.

The widespread reluctance of or resistance to ratification of the UNWC has come from a number of influential states (see McCaffrey 2007; Rieu-Clarke and Loures 2009), typically by those who favor the asymmetric status quo—like basin hegemons (Woodhouse and Zeitoun 2008). IWL thus faces the same challenges faced by all forms of international law, in terms of implementation and the "soft law" approach of guidance and development of norms. It is certainly not realistic to expect that the UNWC will rectify the unfair sharing on the Nile or Jordan, for instance, but it is worth noting how the principles may be employed by intermediaries or weaker states towards conflict resolution. With law as guide, furthermore, other water conflict resolution approaches used in tandem (e.g. Sadoff and Grey 2005; Phillips and Woodhouse 2010) may prove more effective.

Conclusions—Water Diplomacy Can Be Improved

(1) While power asymmetry and co-existing conflicts and cooperation may be "facts of life" in most basins around the world, their destructive impacts and escalation of tensions need not be. Diplomatic efforts can be based on critical analysis that incorporates this reality and are assisted in the task by such tools as the analytical framework of hydro-hegemony and the Transboundary Water Interaction Nexus. These have served in the Nile and Jordan cases to explain how power asymmetries serve to project images of transboundary water interaction (as either positive or negative) to suit political ends. With the distribution of the flows wholly inequitable and unreasonable, tensions continue to mount on these rivers—and affect the broader political conflict in ways that are difficult to ascertain, but very real (see e.g. DNI 2012).

(2) The potential for International Water Law to serve conflict resolution or transformation efforts lies in its call for "equitable and reasonable" sharing but is compromised by resistance to such intervention by powerful actors. With the only other option being un-guided politically pragmatic initiatives that are blind to power plays, the principled approach remains the preference.

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16

WATER AND WAR: A LEGAL PERSPECTIVE

Mara Tignino

One of the main concerns about the possibility of water-related clashes is that they can lead to armed conflict between nations. Hostilities can take various forms: international armed conflict, violence within a country, or occupation of a territory. If we observe the ties between water, peace, and international security, we can consider water not only as one of the triggering natural environment factors for war, but also as a weapon and a military objective—an aspect that is often overlooked in studies of the relationship between water resources and armed conflict. Finally, when a dispute limits access to water and causes environmental damage to water resources, the safety of the entire population is threatened, which makes the process of reestablishing peace in the affected country longer and more difficult.

International humanitarian law contains important rules for protecting water resources in times of armed conflict. The 1977 Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts and the 1977 Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of Non-International Armed Conflicts provide for an obligation not to attack objects

indispensable to the survival of civilians, including drinking water reservoirs; prohibit bombing of installations containing dangerous forces, such as dams and dikes; and forbid the causing of "widespread, long-term and severe damage to the natural environment."[40] It is appropriate to emphasize, however, that the protection established by these standards is weak where international watercourses are concerned. In particular, articles 35.3 and 55 of Protocol I, which concern environmental protection in times of armed conflict, set conditions that are difficult to meet.[41]

International law governing international watercourses can protect water resources during an armed conflict. Instruments that pertain to transboundary water resources and provide rules for armed conflict are rare, however. At the regional level, only the Revised Protocol on Shared Watercourses in the Southern African Development Community, adopted in 2000, contains a standard in this area.

At the global level, the 1997 United Nations Convention on the Law of the Non-navigational Uses of International Watercourses entered into force in 2014 and the Draft Articles on the Law of Transboundary Aquifers adopted by the International Law Commission in 2008 contain provisions covering armed conflict. The provisions' terms are ambiguous when it comes to implementing these instruments in times of armed conflict. However, analysis of actual practice shows that countries involved in armed conflict do take the instruments covering

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[40] Articles 35.3, 54, 55 and 56 of the Protocol Additional to the Geneva Conventions of August 12, 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I); and articles 14 and 15 of the Protocol Additional to the Geneva Conventions of August 12, 1949, and relating to the Protection of Victims of Non-International Armed Conflicts (Protocol II).

[41] See M. Tignino, 2011. *L'eau et la guerre: éléments pour un régime juridique* [Water and War: Elements of a Legal Regime], Geneva Academy of International Humanitarian Law and Human Rights, Brussels, Bruylant.

protection and management of watercourses into consideration. This was the case with respect to the river regime in effect on the Danube.

During the conflict in the former Yugoslavia, the UN Security Council, acting under chapter VII of the United Nations Charter, imposed sanctions on the Federal Republic of Yugoslavia (Serbia and Montenegro). In Resolution 820 of 1993, the Security Council confirmed "that no vessels registered in the Federal Republic of Yugoslavia" or "in which a majority or controlling interest is held by a person or undertaking in or operating from the Federal Republic of Yugoslavia […] shall be permitted to pass through installations, including river locks or canals within the territory of Member States […]."[42]

The Danube Commission was created on August 18, 1948 by the Convention regarding the Regime of Navigation on the Danube. During the period from 1993 to 1995, aware of the risks to free navigation on the Danube posed by the Security Council sanctions, it stressed the importance of having Yugoslavian ships participate in maintenance work on the Iron Gates locks. In light of information received by the Danube Commission, the Security Council decided in 1995 to make exceptions to the river navigation sanctions and allow Yugoslavian ships to repair the Iron Gates locks.[43] During the work, the Danube Commission was to ensure that the authorized exceptions worked toward the Security Council's objective.[44] Despite the armed conflict in the former Yugoslavia in the early 1990s, the navigation regime established by the 1948 Convention remained in effect. So the Danube Commission contributed to compliance with this regime during a period of armed conflict. Enforcement of international humanitarian law and the law on international watercourses could strengthen the protection

[42] Resolution S/RES/820, par. 16.
[43] Resolution S/RES/992, par. 1.
[44] Ibid., par. 2.

accorded to such waterways. Compliance with the instruments that cover transboundary water resources helps avert the risk of significant damage to other riparian States. As the International Court of Justice noted, the States must "ensure that activities within their jurisdiction and control respect the environment of other States […]."[45] Enforcement of the legal instruments for international watercourses plays an important role in implementing this general obligation of international law.

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[45] Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, I.C.J. Reports 1996, p. 226, par. 29.

17

DRINKING WATER IN BATCHINGOU: INCREDIBLE CONFRONTATION BETWEEN DAVID AND GOLIATH!

Hermine Meido

It was in October 2006 that, surrounded by some friends and close relatives, I had the privilege of convening the constituent assembly of GAB (Batchingou-Cameroon Action Group) in Geneva.

The initial aim was to improve the quality of care at the Integrated Health Centre in Batchingou, a village in western Cameroon.

The traditional authorities having welcomed our project with pride and enthusiasm, there was no reason not to get started. The large ceremony took place at the Batchingou chiefdom, all day on 31 December 2007. The notables gathered in the village were in charge of preparing and serving offerings to each of the nine sanctuaries of the village, without forgetting the old chiefdom.

After which, GAB began its activities in the field with complete peace of mind.

Initially, we provided training for the laboratory assistant, as well as the two nursing assistants to whom we continue to pay a monthly salary.

In order to reinforce staff training, GAB invited Jacques Bufquin-Goutaud, a nurse representative of the AGIR association in Paris, on several occasions.

In Geneva, the members of the Association felt that we cannot provide health without drinking water.

Luckily, I met Jean-Michel Yepdieu, Chairman of the Village Consultation Committee at the time, in Batchingou. In due form, his team had studied the terrain and located springs on Doubok Mountain. The report initially prepared and signed by the competent authorities had to be sent to Cameroon's capital, Yaoundé, for approval by the Office of Participatory Development.

Despite the efforts of the Consultation Committee, the project was not approved. Some hidden resistance was opposing its approval. We did not understand the reasons.

However, the project could proceed because Jean-Michel became a founding member of GAB in Batchingou, and responsible for the implementation of the water catchment project.

Then, around this simple and courageous man, a core of "dedicated sons of the land" formed, and work began. I leave it to the members of GAB to recount how the young and not so young loaded down with bags of cement or iron bars would travel more than a kilometer uphill, to build underground water tanks. They will also tell you about the grueling and sometimes dangerous work involved in breaking rocks to make way for pipes or to make gravel, digging arid soil and chopping through tree roots. Everything was done by hand.

Unlike other water projects, which receive large amounts of funding, we could only count on individual donations and membership fees. Nevertheless, GAB remains a non-profit association, and respects international standards for each of its decisions.

However, not only the gravity fed water catchment project in Batchingou did not avail of any budget, but expenses were imposed on our humble association whose main goal was to improve the health of people in Batchingou.

Moreover, I learned at my expense that the solidarity law, which was one of the strengths of Africans, had now been transformed into a law of opportunism, fueled by corruption. In this sense, there is a lot of work to be done to develop popular awareness, in order to recognize and respect the common good.

To say that an association is not for profit means that it supports one or more humanitarian projects, without seeking to contribute to anyone's personal enrichment.

However, so far and paradoxically, I realized that the wealthiest expected to remain privileged, including when it comes to the distribution of drinking water in Batchingou that is not for profit.

Fortunately, GAB could improve, make progress and strengthen itself, through such obstacles.

Although the project was initially limited to eight water points, and despite our very limited resources, GAB now has reached twenty-four standpipes throughout the village. The inhabitants of some neighboring villages even come to Batchingou to get drinking water.

Several times, the population has shown its determination, especially against those who want to privatize water for their sole advantage.

God willing, local GAB members will continue to maintain their water catchment systems, assuming their responsibilities, as they have done so far. Because, in the end, they were the first to believe in it and they put all their efforts into it right from the start. For that reason alone, they deserve everyone's respect.

But nothing can be taken for granted. This is why we have begun working to raise awareness among the population as a whole and make people accountable for the upkeep of the water distribution system. Every citizen should in the near future consider the possibility of participating, even financially, in the upkeep and repair of pipes, taps and other parts of the system.

Eventually, we will have to exploit a new spring in addition to the three existing ones.

Last years' experience has made this clear. A few months ago, the country experienced a major heatwave, and water became extremely scarce. One of the consequences was the epidemic of typhoid fever and other types of fever.

So far, the Health Centre is concerned, it has remained our primary concern and a significant decrease in infectious diseases could be documented in 2014.

There are also many personal expressions of gratitude from the population.

In conclusion, the fight continues.

18

THE SOCIAL CONSEQUENCES OF BUILDING DAMS: WHAT ARE THE RESPONSIBILITIES, WHAT ARE THE TOOLS?

Evelyne Lyons

Today's dams, with their enormous size made possible by technical advancements and their cross-border ecological and social consequences, are particularly controversial.

The issue of dams brings up questions about development models and perhaps even the very notion of development itself. On the one hand, these constructs increase human control over river flows, making populations less reliant on changes in natural runoff (which is increasingly variable as the climate changes). On the other, their benefits are often less than hoped, while consequences for the directly affected populations and the environment can be terrible. The power relationships they create between upstream and downstream countries, and between central and local authorities within the same country, challenge institutional capacity for fairly and peacefully managing the change.

Following a significant wave of construction in southern countries during the 1960-70s, scientists and many civil society groups (in India, the United States, France, and elsewhere) offered increased resistance.

Near the end of the 1990s, the World Commission on Dams (WCD) undertook a major review based on retrospective analyses, culminating in 2000 with the new recommendations included in the "Dams and Development" report. Without denying the usefulness of dams and the need to build more such facilities in the future, the report listed seven strategic priorities broken down into 26 recommendations for consideration when planning new projects.

Reactions to these recommendations have varied. The principle that public acceptance of such projects is necessary has been contested by many governments on the grounds of acting in the country's best interests. However, some of the points are gradually being applied and incorporated into financial institutions' new normative or regulatory texts. For example, in the World Bank group, the Bank's safeguard policies have been improved to include better informing the affected populations, and in particular better protecting indigenous populations in dealings with their governments. OECD export credit agencies have adopted protective "common approaches," though these have largely been inspired by the safeguard policies. As far as financing for private companies is concerned, the International Finance Corporation has issued performance standards that have been included in the Equator Principles adopted by a large number of banks. These principles provide, in particular, for the presence of international ombudsmen to whom victims can turn. In addition, most national agencies that provide international aid have their own standards, more stringent than those of the southern countries themselves, governing impact studies for projects they might be likely to finance. This is less often true of financing from emerging countries, however. Finally, the International Hydropower Association's new standard for hydroelectric dams,[46] which was

[46] "Hydropower Sustainability Assessment Protocol" of the International Hydropower Association (IHA).

developed together with the Chinese, incorporates some of the WCD's recommendations.

In principle, it is a government's responsibility to protect its citizens, including their right to just compensation for any unavoidable damage. Yet civil society organizations, including those at the international level, rely largely on the various tools outlined above to slow or stop the building of new dams. This is certainly an opportunity to negotiate better support for the affected populations. Current demonstrations associated with the gradual development of India's Narmada River are serving mainly this purpose. The approach favored by the WCD, equality of rights for affected communities, has little chance of being adopted as a general principle for action. In contrast, promising new approaches include a systematic analysis of social risks so that they can be proactively addressed.

The example of resistance to the Ilisu dam on the Tigris River in Turkey shows the succession of European opposition movements that affected its financing, first by the British, then by the Swiss, Austrians, and Germans. Today, the Turkish government is continuing the project with Chinese financing. This is despite two successive decisions by the Turkish Council of State, which ruled against construction; and the possible listing of the city of Hasankeyf, which is several thousand years old, as a UNESCO World Heritage Site.

So, the issue of dams is heavily tied to that of democracy. Transition to democracy is often accompanied by abandonment of government dam-building projects (in Burma, for example). Yet civil society's systematic resistance to all projects often merely slows the work. In the context of climate change, more dams and reservoirs will be needed to adapt. Where is the line between development aid and adaptive strategy drawn? The terms of the debate are often muddled.

GOVERNANCE ETHICS AND EDUCATION IN WATER ISSUES

19

FAIR MANAGEMENT OF TRANSBOUNDARY AQUIFERS

Benoît Girardin

Background

Unlike watercourses, which flow in plain sight of all nearby residents and create a physical asymmetry between those upstream and downstream riverside communities, the water in aquifers is accessible only through springs or pumping. Its flows, but also its reserves and their quality, are much less easily observable. Strictly speaking, it has no natural outlet as rivers do: springs and wells work as points of contact where discharge and intake occur.

Over half of the potable water swallowed by Earth's inhabitants comes from aquifers; in Europe, this proportion rises to as much as three-quarters. According to some estimates, 47% of the earth's surface overlies transboundary aquifers (Charrier 1997), which therefore take on great importance.

Many aquifers extend beneath multiple countries, for example, the 40,000 km³ Guarani aquifer between Brazil, Argentina, Uruguay, and Paraguay, which is easily rechargeable; the Nubian sandstone aquifer between Egypt, Libya, Sudan, and Chad; and the Iullemeden aquifer between Mali, Niger, and Nigeria, which recharge less easily.

Just within a stone's throw from Geneva lies an aquifer that completely disregards the French-Swiss political border and is therefore a transboundary one.

Overuse of these aquifers becomes a tragedy, especially in areas with irrigated crops such as northern China, the southern United States, and the Punjab of Pakistan and India, where the aquifer level has fallen by 10 meters since 1973 and severely compounded the soil salinity. Pumping from the Iullemeden aquifer has exceeded recharging since 1995, which poses a threat to the Niger River during the dry season. The Nubian aquifer is also being heavily pressured by Libya and Egypt. In the Geneva aquifer's case, the threat of depletion prompted an attempt to reach an agreement on limiting extraction and systematically refilling to preserve the resource.[47]

One characteristic of transboundary aquifers is that water pumping may occur on one side of the border while recharge occurs on the other; the volume of water being pumped can be hidden for a long time, and it is possible to be unaware that the aquifer is being polluted—or the polluter may know it but pretend not to. The time needed for the effects of steps taken to appear may be relatively long, and a no return point may be reached before anyone realizes it. Emptied aquifers may take decades to refill, and decontamination of polluted groundwater can prove extremely difficult and expensive a process, and therefore simply be abandoned. In the case of surface water streams or lakes, the probability is much less as low water or pollution appear rapidly.

These underground water reserves can consequently be considered as strategic advantages as well as potentials of crises. Considering that demand is increasing, pressure on the aquifers has intensified due to the proliferation of boreholes and technology, and finally that cross-border management is a sensitive issue, confrontation seems a likely outcome.

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[47] http://www.agu.org/journals/wr/wr1201/2011WR010562/.

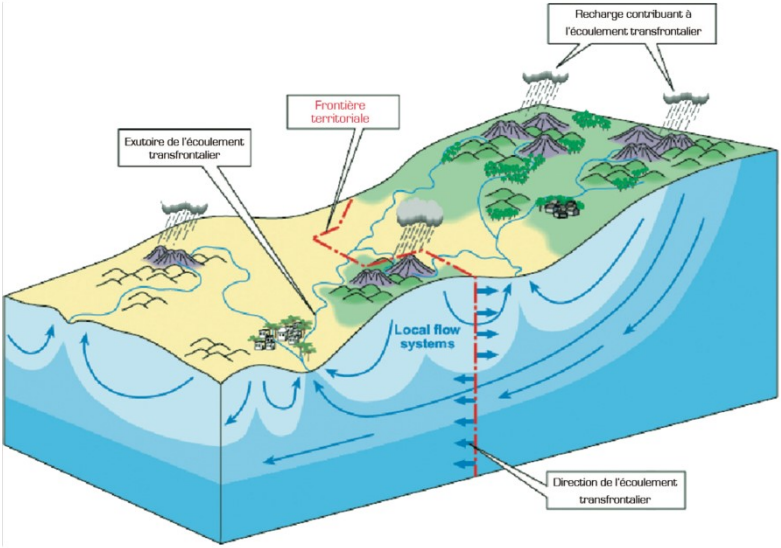
In 2008 UNESCO listed and mapped the 273 transboundary aquifers and is now committed in developing internationally recognized rules for managing them. This task is being approached holistically, with identification of the legal, institutional, socioeconomic, environmental, scientific, and hydrological aspects.

Very few international agreements have been signed to regulate the use of transboundary aquifers, in stark contrast to the case of transboundary watercourses. The scarcity of legal instruments and agreements indicates that the level of awareness of this reality does not yet match its severity, and that the parameters for use are more difficult to define.

Traditionally, legal frameworks and agreements have considered either (1) springs or wells, thus treating water as a "commodity";[48] or (2) the development of transboundary mining lodes or petroleum deposits—thus demonstrating an inability to envision the reality of transboundary aquifers and take into account the fluid, moving, and fungible nature of water.

[48] Such is the case in British public law, the French civil code, and Spanish law—which, however, introduces the idea of a public aquifer. Islamic traditions are the most open-ended, speaking of a right to drink, water animals, and irrigate the land, but limiting itself to wells and springs with no mention of aquifers. The first time transboundary aquifers were taken into consideration, other than for joint management of transboundary springs or wells, was during a 1950 discussion between Luxembourg and Germany with regard to the consequences that building a dam in Luxembourg might have for the aquifer. The 1978 agreement between France and Geneva was the first to focus on the aquifer itself: extraction and recharge: see de los Cobos G. 2015.

Figure 2 Schematic watercourses or aquifers



20Of course, not all geographical configurations are identical. Various typologies have been suggested based on the respective geographic positions of aquifers and watercourses—whether they are connected or not —and especially based on whether the aquifer is confined or not, since the recharge and decontamination may be possible only when it is not. However, it is not the purpose here to go into such sophisticated details.[49]

It was not until 1997 that the UN Convention on the Law of the Non-navigational Uses of International Watercourses and Lakes explicitly recognized the systemic connection between surface water and

[49] Although Barberis suggested four types of transboundary aquifers in a 1986 FAO study, 2005 Ecktstein contested two of these and suggested four others, reaching a total of six, to illustrate the diversity of hydrologic situations and their legal implications, especially in terms of confinement or non-confinement (connection to a hydrologic system), and capacity for and location of recharge based on pumping sites.

groundwater. In December 2008, the UN General Assembly approved the 19 articles developed by UNESCO's International Hydrological Program and the UN International Law Commission to provide a framework for managing transboundary aquifers. It is worth being noted that an agreement concerning Guarani was signed in the summer of 2010. In 2007 the Geneva region agreement was reframed along the same lines.

Challenges and Dilemmas

The first challenge is political. Transboundary aquifers are managed by sovereign States that are "naturally" inclined to adopt a unilateral approach centered on their territory and immediate interests, whereas effective management requires getting beyond sovereignty, or accepting that sovereignty is limited and shared with both neighboring countries and future generations. To see this clearly, it suffices to raise questions about aquifer ownership, withdrawal rights, access capacity, and states parties' obligations and responsibilities with regards to contamination. Dilemmas are located between management for today and sustainable management, a national approach or an international one, a single-factor or holistic approach, levels of responsibility between national, regional or even municipal as well as between the State as owner versus the State as a steward that cares for its resources, keeping sustainability in mind. The commitment to inform the other party in a timely manner is another aspect of this limitation of absolute sovereignty.

In fact, national responsibility still focuses too often on national territory. This being the case, transboundary aquifers mark the limits of traditional sovereignty, the limits of the sovereign approach to a resource that transcends borders of sovereign territories.

The second challenge has to do with an equitable and reasonable allocation of the water and the determination of user's rights. Of course, every country has the right to fair and reasonable use of the aquifer

resource: the criteria for what is "equitable and reasonable" remain to be defined, and the authority that will set and monitor the rights must be identified. Should "fairness" reflect the needs of the public, of industry or irrigation or simply the area or the amount of water located beneath each nation's territory? Here, the dilemma has to do with solidarity's share—in view of allowing, for example, use by less well-off farmers or nomads—all while stressing responsibility in case of sanctions or compensation. What is most reasonable? With due consideration of the future and sustainability, one could also argue that "reasonable" demands a certain level of frugality such that the volumes used do not exceed the recharge volumes. Could such self-limitation be implemented within one country only?

The third challenge involves the resource itself, its use and its quality because contamination could occur, as well as recharging which can be by percolation or pumping but may also be affected by dam construction in the percolation zone. In cases of overuse or unilateral contamination, how and especially when can liability be determined, and compensation or reparations set? In this case, the dilemma relates to management that is effective, sustainable, and fair while complying to "polluter payer" principle.

The fourth challenge is of economic kind: what price is to be paid to extract and use the water, recharge the aquifer, and monitor quantity and quality? Experience shows that the practice of zero-cost water has led to devastating overuse and monopolizing by powerful players who are capable of learning to use expensive technologies and then implementing them.

The fifth challenge belongs to the scientific realm: the expertise necessary to describe the water table's condition must be available. Is the aquifer rechargeable or not, confined or not, vertically accessible, prone to salinity? Also needed is the ability to measure existing amounts of water; flows; amounts withdrawn, lost, or wasted; and the quality of

the water with sufficient accuracy and rapidity in order to avoid a no return point; and finally, to identify areas at risk of pollution. Capacity to accurately and impartially establish responsibility for use and contamination is required as well. Such a scientific professionalism also implies a quickness or "high speed" commensurate with the importance of the stakes.

The sixth challenge is institutional in nature and regards the status, capabilities, and authority of the monitoring entity. First, the need for rapid analysis and action requires that management be carried out from as close as possible to the aquifer area, which means that municipalities, not national governments alone, will have to be involved. This was the breakthrough achieved at the Karlsruhe summit in 1996.[50]Next, the monitoring authority or institution must be professional, impartial, about facts, and efficient. Its independence must be beyond question since it has to suggest or even impose sanctions. The dilemma related to the monitoring agency's composition has to do with the appropriate mix of professionalism versus loyalty—loyalty both to one country and to several countries.

As it can be seen, there are dilemmas between sustainability and effectiveness, shared responsibility and equity, solidarity and conciliation, against a backdrop of possible tensions and a threat to peace and security.

Ethics Matters in Implementation Details

Fair and appropriate management of transboundary aquifers relies on an ethical frame of reference. Such a frame of reference makes it

[50] The 1996 Karlsruhe agreement was preceded by two important steps, the 1980 Madrid Convention on Trans frontier Cooperation between Territorial Communities or Authorities, followed by the 1992 Helsinki Convention on the Protection and Use of Transboundary Watercourses and International Lakes.

possible to reach an efficient and adequate management – see also my article further down on water governance.

In seeking joint management, the terms of which cannot be imposed unilaterally by one of the parties, a dynamic of peace building is created. Conversely, one party's intentional or tolerated contamination can be considered a declared hostility. So, it is of the utmost importance that a kind of national sovereignty that is both plural and limited is accepted. That turns out to be an essential condition for effective aquifer management.

This ethical frame of reference proves of obvious usefulness in agreements and international conventions, where it is well accepted if one judges by the growing number of conventions that have been or are being signed.

The experience of cross-border management of the Franco-Genevan aquifer,[51] which was laid out in an initial agreement in 1978 and reworked thirty years later in 2007, clearly demonstrates the importance of ethics to effective implementation, measurement, and monitoring instruments. These "details" are highlighted throughout this experience:

- Originally, in the name of sovereignty, the approach taken was unilateral management, that is, two parallel management systems. Each side considered that the issue should be handled in order to better serve "its own" taxpayers. This approach quickly turned out to be too short-lived and inadequate. A gradual transition to joint management of a shared resource required that each party agrees that its sovereignty was limited by an overriding interest,

[51] The need to use a transboundary approach in managing the Geneva aquifer arose when the resource was seen to have declined dramatically in the 1960s due to excessive pumping that exceeded the natural recharge rate. The aquifer's level had dropped by 7 meters, and one-third of the entire layer of water had disappeared in 20 years.

and that sustainability to make the resource last could not be downsized.

- The need for efficiency and close management of the operation, especially in emergency situations, fostered a move from a State-level agreement in 1978[52] to an agreement between operating agencies, through a formal delegation framework. Unity and swing-wing diversity were accepted thanks to a patiently built-up trust!
- Eventually, once such a trust between partners was confirmed and consolidated through sharing of information and joint handling of emergency cases, a move towards a mutual and reciprocal accountability could be achieved. Measurement, planning, and monitoring procedures are bilateral and transparent: criteria and risk thresholds are jointly defined, risk areas on either side of the border are identified together, amounts of water pumped on both sides of the border and the amount that is recharged are measured and billed by one operating agency. Technical feasibility facilitated political interaction, and the scientific basis established objectivity and impartiality and strengthened mutual trust.
- Distribution of the operating and recharge costs is based on equity, though also with an element of solidarity and counterbalance: equity because each party pays in proportion to the amount of water pumped, and solidarity through exempting for the French side for the first 2 million cubic meters and

[52] The 1978 signed agreement between the Republic and Canton of Geneva and the French Republic—represented by the Upper Savoy Prefecture – was replaced in 2007 by agreement signed between local government entities delegating their authority to operating entities: respectively the public and independent Geneva Water, Energy and Waste Management (SIG) and Annemasse Regional Metropolitan Area Community (Communauté d'Agglomération de la Région d'Annemasse),

through the mention of a price ceiling if consumption on Swiss side should decrease considerably.[53]

- These two policies can be summarized as judicious and checks and balances are proportionate.
- From an ethical point of view, it can be highlighted that:
  efficient, effective, appropriate management is, at the same time, fair management that is rooted in the values of responsibility, equity, sustainability, and limitation, and implemented using detailed and transparent operative measures, especially mutual accountability.
- this is an incremental trust building process, mutual and international that gets stronger over time; opposite to processes where cooperation is preconditioned by the fulfillment of some essential prerequisite.
- the key players must sit around the table to voice their interests and risks, in order to be able to understand the other party's interests, concerns and fears.

In many places of the world, countries that share an aquifer do not have equal institutional capabilities and technical expertise. So, the risk that the stronger country will push its advantage is far from nil. It may then prove wise to turn to a third party, independent multilateral or regional that is involved from the beginning with the joint evaluation of the steps taken and risks. Implementing policies and sustainable strategies, but also awareness campaigns to prevent escalation of disputes, and multisector technical partnerships would be highly advantageous. Here, again, equity, responsibility, and sustainability are affirmed, supplemented by a kind of solidarity that can avoid the trap of

[53] These 2 million cubic meters reflect French consumption estimated during the previous shared management era, an amount that was compensated by the natural recharging of the water table.

dependency. This does not replace political will but can certainly help it to be more fitting and fairer.

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20

WATER MANAGEMENT IN PERU: WHAT AVOCADOS ARE WE EATING?

Christian Häberli

Gold and Water from Peru

Four centuries ago, Peru gave us the potato, which saved us from famine in Europe. But the Incas had also built one of the greatest empires in the world, without wheels, without iron, without writing and without horses, and they revolutionized agricultural production, food security, conservation technologies unknown in Europe, and irrigation - even in desert regions.

Today, water management is an even greater challenge than in the pre-Columbian period. Agriculture provides 8% of the GDP and employs one third of the female labor force. Advanced irrigation technology literally turns water into gold. But, to take the example of the avocado, now traded worldwide, it is not just more profitable for the producer, but also much more water-hungry: it takes a thousand liters to produce a single kilo of this delicious fruit. The question is whether, by eating avocados and drinking the virtual water they contain, we are depriving urban populations, foreign exchange-earning gold and copper miners, and women farmers, of water. And would those farmers, rather than growing our avocados, earn a better living by working their own

fields – with that water they had had access to for centuries in order left to grow their potatoes? Not to mention the amazing natural landscapes and world-class biodiversity of Peru, forever incarnated by the goddess Pacha Mama.

Indeed, water stress is a serious problem in Peru where only 10% of the total population lives in the Amazon forest (66% of the national territory) where rainfall is very abundant. All the other inhabitants, about 30 million, live in the desert or on the high plains. That's where our avocados, asparagus and Pisco Sours grow. And that is where the cost of producing, transporting and distributing water is highest. How can we ensure the Right to Water to the portion of the population that no longer has the means to pay the market price? It is an extremely difficult and never sustainable trade-off: politically privileged urban populations and cash crop farmers pump from the aquifer, and mines (industrial and, even more artisanal) pollute rivers, at times until they are clinically dead.

Avocados, Water and the Local Issues

In the Ica Valley, some 500 kilometers south of Lima, there is not much left of the Ica River (seasonal and diverted), nor of the famous irrigation canal allegedly built by the Ninth Inca, the famous Pachacútec Yupanqui (1438-1471). Poor maintenance and climate change are just two of the reasons for this. The current shortage for everyone has led commercial agriculture to migrate to the coastal desert, where the water is underground, not renewable, but of much better quality.

In short, the water management dilemma in these conditions is the choice between an almost waterless, inefficient and expensive family field, and the hi-tech plantations that use much less water, pay their workers better, and earn much more by selling their cash crop products in Lima or Geneva. Moreover, it seems that they pay their workers up to three times the legal minimum wage, which in 2016 was 30 soles a day

(about 9 Swiss francs). Peru, it should be said, is not poor. According to World Bank statistics, only 3% of the total population lives below the poverty line.

While politicians, economists and agricultural engineers seem satisfied with this situation, sociologists report a crisis of governance in the Ica Valley, and in Peru, resulting according to them from the neoliberal policy of its governments.

The question is how to assess the sustainability of avocados. To tell the truth, nothing is certain in this country that may have emerged from its frequent political crises and coups d'état, except that water will become even scarcer and that there will still be earthquakes and storms and other disasters of all kinds. Not to mention Peru's other existential challenges, such as climate change, El Niño, and the price of copper!

Is one avocado in the hand worth two in the bush?

What Solutions?

It's important to remember that water does not flow on its own. Too often, in Peru as elsewhere, it flows towards the rich, and towards men. And the virtual water contained in each avocado is consumed even in our households in Geneva.

The challenge is ensuring an equitable allocation of water. But how can we get there? Should we stop eating avocados to ease our conscience? It is of course possible for all of us to do so – but this would also reduce the income of Peruvian farmworkers.

We could limit our consumption to fruit deemed "fair trade" by the Max Havelaar organization. However, if we want water to flow equitably, we should know that "organic" is not synonymous with "well managed" or "fairly priced" water. And it is not right for us to define, in Switzerland and for the whole world, what "fair trade and sustainable avocados" are.

Can we measure, and charge for, the virtual water in each avocado? There are some interesting avenues to explore. But they are not very realistic at this stage of the debate.

Unfortunately, there is no internationally agreed public standard for "fair trade and sustainable avocados". So it is not possible to prohibit imports only of predatory avocado producers that divert water from the poor and underpay their farmworkers. On the other hand, many private quality standards already exist in Europe and the United States. The one I prefer, based on my research and experience, is called GlobalGap. One problem I see in such private standards, however, is that they are often a sort of diktat imposed by our distribution chains.

Personally, I find the proposals of Nestlé's former CEO Peter Brabeck-Letmathe very interesting. He frequently and explicitly recognized the Right to Water and advocated for a given quantity of water delivered free of charge around the spring producing mineral water for his company. According to Nestlé, this water for nearby residents should and could be paid for by consumers of mineral water. For economists, this is a form of transfer pricing.

For agricultural water, in line with Mr Brabeck-Letmathe's idea, Peru could perhaps regulate access to water by reserving a share of the water pumped by exporters for small-scale farming, at an affordable price justified by their presence since pre-Hispanic times. In order to prevent unfair competition and social dumping by competitors in Mexico, Guatemala, Chile, South Africa, Ghana, Israel and Spain, cooperation between the largest exporters would obviously be an excellent thing.

Stay tuned!

21

OCEANS GOVERNANCE AND THE CHALLENGES OF MARINE DEBRIS

Daniela Diz

This contribution explores the fragmented system of marine governance in light of the challenges posed by marine debris, especially plastic (and microplastic) impacts on marine biodiversity. In doing so, it explores the obligations under the UN Convention on the Law of the Sea (UNCLOS) and its relationship with the UN Convention on Biological Diversity (CBD) and other relevant instruments, including the Sustainable Development Goals (SDGs).

A holistic approach for tackling the issue is needed (especially from land-based sources), while also considering cumulative impacts of marine debris with other stressors on biodiversity and species. For example, while plastic is chemically inert, plastic can absorb organic pollutants in high concentrations. Microplastics can be retained in tissues of marine species and humans at the top of the food chain, and associated-pollutants might be released upon ingestion. Entanglement of marine species is also a big problem; floating plastic litter can also transport invasive species. UNEP has estimated that 80% of marine debris and plastics are from land-based sources and that 90-95% of marine pollution is composed of plastic.

Under Part XII of UNCLOS, Article 192 imposes an absolute obligation on States to protect and preserve the marine environment, with Article 207 (1) binding States to adopt laws and regulations to prevent, reduce and control pollution of the marine environment from land-based sources, taking into account internationally agreed standards and best practices. This article therefore allows for the incorporation by reference of policy instruments such as the CBD Decisions on marine debris and UN environment Assembly (UNEA) resolutions. Article 213 of UNCLOS is also relevant since it also mandates that States not only adopt laws and regulations, but also enforce these, while taking measures to adopt international standards.

Several other international instruments[54] address marine debris in some form both from land-based or sea-based sources, assisting with the interpretation and implementation of UNCLOS obligations on the protection of the marine environment from pollution under Part XII in a systemic manner. On the other hand, given this fragmented nature of the current legal regime governing marine debris, efforts to enhance cooperation and coordination among different international fora is key for a comprehensive implementation of such obligations to take place. In this connection, it is important to note the efforts by UN Environment

[54] These include, inter alia: the International Convention for the Prevention of Pollution from Ships (MARPOL), Annex V on Prevention of Pollution by Garbage from Ships; the London Convention and its London Protocol; the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal; the Agreement on the Conservation of Albatrosses and Petrels; the Global Program of Action for the Protection of the Marine Environment from Land-based Activities, and Regional Seas Programs and Conventions; the Stockholm Convention on Persistent Organic Pollutants; the FAO Code of Conduct for Responsible Fisheries; UN Agreement for the Implementation of the Provisions of the UN Convention on the Law of the Sea of December 10, 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (Fish Stocks Agreement).

Assembly (UNEA) through its Resolution 2/11 (2016) on marine plastic to address the issue by recognizing the need for an urgent global response taking into account a product life-cycle approach. The resolution also welcomed the work of different conventions such as the CBD on impacts of marine debris on marine biodiversity, and called for coordination of efforts. The 2017 session of UNEA will be particularly important given its overarching theme of pollution.

The UN 2030 Agenda for Sustainable Development and its SDGs are also particularly important, especially the relationship between SDG 14.1 (on preventing and reducing marine pollution, in particular marine debris from land-based sources by 2025) and SDGs 12.1 and 12.5 on sustainable production and consumption, since production life-cycle is at the heart of the problem. In connection with the SDGs, it is noteworthy that CBD Decision XIII/3 (2016) urged Parties, when implementing the 2030 Agenda for Sustainable Development, to mainstream biodiversity in the implementation of all relevant SDGs. Parties can do so, for instance, by implementing CBD Decision XIII/10 on marine debris, which urged States to prevent and mitigate the potential adverse impacts of marine debris, taking into account the CBD Voluntary Practical Guidance on Preventing and Mitigating the Impacts of Marine Debris on Marine and Coastal Biodiversity and Habitats [4]. Despite its voluntary nature, this CBD guidance could be interpreted as internationally agreed standards under UNCLOS Article 207 cited above.

Habitat Impacts

Some areas are more vulnerable than others, for example, there is evidence that as Arctic ice freezes, it traps floating microplastics – resulting in abundances of hundreds of particles per cubic meter [5]. This is three orders of magnitude larger than some counts of plastic particles in the Great Pacific Garbage Patch. The deep sea has also been found to be a major sink for microplastics [6].

Article 194(5) of UNCLOS establishes the obligation to protect and preserve rare or fragile ecosystems and habitats of depleted, threatened or endangered species as well as other forms of marine life. UNCLOS, however, does not provide criteria for identifying such areas, relying again on other instruments to do so. Several instruments have developed relevant criteria and identification processes. Of particular note is the CBD ecologically or biologically significant marine areas [7] (EBSAs) process. The CBD has described 279 areas globally that meet the EBSA criteria.[55] Even though the EBSA description does not automatically trigger conservation and management measures, given its scientific and technical nature, in light of Article 194(5) of UNCLOS, Coastal States[56] and competent organizations have an obligation to take appropriate conservation and management measures to protect these sites. In light of this, impacts of marine debris on EBSAs should also be assessed when considering conservation and management measures for these areas (e.g. the Sargasso Sea [8] EBSA provides a good example).

Conclusion

Despite UNCLOS obligations regarding the protection and preservation of the marine environment including from marine debris and plastics from all sources, implementation is lagging. There is an urgent need to improve marine and terrestrial waste management, foster stakeholder partnerships, training schemes and reduction of packaging,

[55] The EBSA criteria were adopted by CBD Decision IX/20, Annex I and includes the following features: uniqueness or rarity; special importance for life history stages of species; importance for threatened, endangered or declining species and / or habitats; vulnerability, fragility, sensitivity, or slow recovery; biological productivity; biological diversity; and naturalness. The process to describe EBSAs globally was initiated through CBD Decision X/29.

[56] With respect to EBSAs located within national jurisdiction.

and long-lasting products – these are also issues related to the need for sustainable production and consumption practices and regulations. Finally, there is a need for more coordination between international efforts related to marine debris and a comparative review of existing policy and legal instruments would be recommended. Such analysis could also build upon the relationship between UNCLOS and relevant international instruments, including the CBD, to facilitate the implementation of globally agreed standards and best practices incorporated by reference under UNCLOS' obligations to avoid and minimize this enormous threat to marine and coastal biodiversity.

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22

WATER GOVERNANCE: AN ETHICAL AND MULTI-STAKEHOLDERS' PROCESS

Benoît Girardin

The purpose here is to highlight the political and societal benefit of conceiving and leading the negotiation processes as an ethical process and seeing the water governance itself as an ethical endeavour. Negotiations that prove to be in the long run the most effective - relevant and efficient - are the ones where through the interests of all stakeholders' are taken into consideration, a process of common need assessment is organised that works out possible measurements for trade-offs to be made and reach an acceptable and owned formula of sharing the resources.

Some word of caution is needed with respect to the so-called informal sector. In countries where the informal economy accounts for one third or even more of the GDP, informal sector is one stakeholder that finds it hard to send representative to the table. Too often only the formal economy is analyzed and regulated, while the damages caused by the informal economy or on it are largely ignored. Inexistent lobbying and voice explain such an absence. However, the experience witnesses how most of the poor sections of societies, having no or uneasy access to public fountains or water distribution schemes suffer from the poor quality of water which they purchase at high rates compared to average dwellers. Paradoxically, the price of a gallon of water sold in plastic

containers or even bottles by water traders exceeds by far the price of water provided through public fountains or distribution networks. It is consequently critical to link the *formal and informal economy*,[57] which complicates, but also enriches, the relationship between macro and micro levels. Specific incentives for the informal sector are not just prudent, they are necessary.

Water users are as diverse as individuals and households for family use and gardening, farmers for cultivating and watering fields, fishermen for catching fishes and other nutrients, tour operators for cruising, industrial plants for processing outcomes, cleaning, refreshing, shipment companies for transporting goods and people, cities for providing potable water and cleaning streets from wastes and littering. The list is far from exhaustive (see synoptic chart above). They could sit around the same table of negotiation.

As water is not easy to transport, negotiations are mainly limited within specific geographical areas: river basin that are shaped by streams, rivers, lakes and low-lying areas, or even dams and canals. But they can refer also to ground water table or aquifers, that in many cases are spreading under several countries and require international settlements.

Multi Stakeholders Consultations or Negotiations. Trade-offs and Priority Setting

International and regional experience provides a wide evidence that those negotiations are either complex and tortuous – as shown for example by the low enforcement capacity and difficulty to reach consensus and take quick action of the Mekong Basin commission – or

[57] See Ostrom, Elinor; Kanbur, Ravi; Guha-Khasnobis, Basudeb (2007). *Linking the formal and informal economy: concepts and policies*. Oxford: Oxford University Press.

bluntly conflictive – as in the management of Jordan, Euphrates and Nile[58].

An additional difficulty may arise from inconsistencies or even divergences between the three main levels of a sound, efficient and effective water governance and management:

1. the policy framework or macro-level setting overall priorities as well as regulatory and institutional frameworks,
2. the regional basin where players' associations and large communities of interests push for obtaining larger shares and where broad allocation formula are de facto imposed or commonly agreed upon– usually named the meso-level,
3. the micro level of individuals, households and groups of users, competing for the "same" water.

Those three levels may converge within a consistent framework or deviate from each other and pave then avenues for conflicts or inefficiencies. Inclusiveness of the dialogue is therefore critical.

Those two consultation or negotiation tracks, horizontal between stakeholders and vertical over the three levels, often record conflictive stages before reaching a kind of compromise. They might follow the rule of the fastest, the most powerful or the technocratic player who can then dictate his/her own interest or view, threaten competitors or leave them with only the remaining drops. Insufficient inclusiveness and weak listening capacity or even unwillingness to dialogue prove the best ingredients that prepare for failures or even conflicts.

Inter-level inconsistencies may lead to dilemmas and shortages because of a lack of proper planning and anticipation, as seen in 2018 in South Africa where the municipal Cape Town authorities have been

[58] see Mark Zeitoun' paper in ch 5. Similarly, for some water tables that are crossing national borders, where only some schemes are working satisfactorily - see my paper in ch 7.

relying on national powers to build dams early enough and could not press the government to implement it in a timely manner. The result is a dramatic shortage of potable water.

Last but not least, water governance does not address only the supply side but also the recycling of used water that is today adding important resources and cannot be left out of consideration in negotiation processes. A responsibility to recycle at an optimal level is becoming integral part of any deal and be considered a solid trump card.

An Ethical Framework

Any process aiming at specifying broad formulas of water allocation is a technical process that needs to collect data and identify available water volumes, their fluctuation between dry and rainy years or seasons as well as monthly fluctuations. They need also to measure respective demands for agricultural, industrial, urban needs and weight their "importance". But should those technical data be necessary, they do not suffice to make suitable decisions. Needs are here a matter of life and death, there a matter of comfort. An ethical assessment is required, and such an assessment cannot be dictated by bureaucrats or autocrats. Should allocation be long lasting and sustainable, the negotiation process is to be an equitable one and the monitoring of its implementation be part of it as well.

It is assumed here that to reach sustainable results any negotiation must consider fairness (justice as fairness) at its heart [59]. Justice is seen as a value to be shared but also as an asymptote that can guide throughout negotiations and adaptations to new contexts.

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[59] John Rawls 1999 *A Theory of Justice. Revised edition.* Oxford: Oxford University Press; John Rawls "Justice as fairness: Political not metaphysical." In *Equality and Liberty*, 1991, pp. 145-173. Palgrave Macmillan, London; Amartya Sen, 2009 *The Idea of Justice,* Cambridge Ms: Harvard University Press; Amartya Sen 1991 *On Ethics and Economics,* Oxford: Blackwell

Fairness is quite rich and comprehensive a concept. It can meaningfully be developed through six key markers that look as follows:

- Equity advocates for an equitable and reciprocal access, not necessarily egalitarian, but respectful of basic needs and requirements,
- Responsibility should stress the accountability of users in terms of quantity, and polluters in terms of quality.
- Solidarity is reminding that specific areas have less water at their disposal, face shortages or seasonal disruptions. Polluted stream waters require specific action, led by solidarity.

- Sustainability should keep the attention on renewing the resource, minimizing waste, rejuvenating rivers, maintaining banks.
- Peace and security help containing making wells, rivers, streams a weapon of submission, a tool for blackmailing and threatening riparian users, or fueling conflicts.
- Unity and diversity can help keeping in one go the unitarian expectation as well as the diversity of uses and interests.

Those six critical values should help negotiating stakeholders to reach some compromise about water allocation. Those stakeholders differ from each other not only with respect to needs and interests but also to knowledge, skills, data. Values should help to organize consultation or negotiation and minimize the risk of a bias taken by strong, knowledgeable, informed, communicative stakeholders.

An Ethical Process

The moderator of the consultation / negotiation process needs to keep all the six values under consideration without downplaying or ignoring some. The moderator should foster the dialogue so that allocation formula to users' diverse clusters does respect the six values in ways that are acceptable. Inclusiveness is key to avoid obstruction by one stakeholder's segment only and later violence by some others. [60]

Those six values do not specify blueprint allocation formula or ready-made decisions but can be taken as key steps or milestones of the consultations or negotiation process. Each cluster of users may be invited to submit its own expectations and fears.

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[60] "We need to ask how diverse polycentric institutions help or hinder the innovativeness, learning, adapting, trustworthiness, levels of cooperation of participants, and the achievement of more effective, equitable, and sustainable outcomes at multiple scales" (Theo Toonen 2010).

That should help the dialogue to gradually reach some level where needs and requests hailing from all stakeholders are set out, discussed among themselves, then weighted and translated into quantitative measurements – for instance spreading the assessment from 1: insignificant, 2: feeble and light, 3: important and manageable, 4: heavy or difficult to 5: breaking balance and risking rupture. That should allow the stakeholders stating or expressing their expectations on each axis, then commenting on others' statements, and facilitate a comparison of consolidated marks per stakeholder. This tool is expected to ease the negotiation, render it as realist as possible instead of finishing abruptly the negotiation. It should also allow to identify critical threshold, and minimal levels. It urges to carry out a larger and deeper analysis than the one based on costs and benefits, although largely considered (CBA).

The following chart is tentative a proposal and could be tailored to local conditions. Additional markers could be added to address the specific features of an individual situation. Academics could provide detailed and verifiable insights and check measurements. So that interactions with pros and cons can be precisely identified.

	Farmers	Industries	Households	Public	Fishers	Freighters
Overall Need of fresh water. Volume: max, min, median, in km^3/year	Measurement guess	Measurement	Measurement	Measurement		
Overall Need of water. Volume: max, min, median, in km^3/year	Measurement guess		Measurement guess	Measurement	Measurement guess	Measurement

Potentials to Control, contain Consumption and Save	2	4	2	4	1	1
Sanitation capacity	2	4	3	4	2	2
Recycling potentials	2	3	2	4	1	3
Damages resulting from shortages, disruptions	4	3	4	3	5	5
Damages resulting from overconsumption	4	3	2	4		
Capacity of anticipating variations	2	3	2	4	3	3
Impact of pollution	3	4	2	4	2	3
Resilience to hazards, climatic changes	2	3	2	3	2	2

The whole system is not supposed to remain static. Environmental changes, contextual transformation of productive activities and social fabric, international relations need to be considered. Lessons drawn out of experiences also need to be incorporated. For such a process to be successful, large consultation and open information form the best assets.

To avoid any capture by vested interests, the moderation of the consultation / negotiation process belongs to the mandate of governmental authorities, at national, regional or local levels, that should remain accountable to all stakeholders for decisions taken and enforced. That presupposes that those authorities can keep some neutral perspective, able to resist or elude corruption and consequently calling stakeholders to realist, practicable solutions.

User engagement and incentives are essential for the management of common resources. Lessons learned from over one hundred conservation projects analyzed demonstrate the importance of local users finding an interest in harvesting and selling a few products and/or being involved in the design and management of such projects.[61] Economist G. Quentin reaches a similar conclusion: effective management of common resources requires the active participation and involvement of users of those resources.[62] Flexible convergence between stakeholders at different levels is more effective in limiting overexploitation and over-destruction of these common resources and controlling plastic litter. Ethics in negotiation helps overcome the inevitable blocking points. The key to success is also to go beyond sanctions, advocacy and individual solutions by developing economic incentives for fair sharing.[63]

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[61] Brooks, J.S., Franzen, M.A., Holmes, C.M., Grote, M.N. and Mulder, M.B., Testing hypotheses for the success of different conservation strategies. *Conservation biology*, *20/*5, (2006) pp. 1528-1538.

[62] Grafton, R. Quentin. 2000. 515: "Each is capable of preventing resource degradation and ensuring the on-going flow of benefits to resource users. A comparison of the bundle of rights of the three regimes suggests that a common factor in ensuring successful governance of CPRs is the active participation of resource users in the management of the flow of benefits from the resources".

[63] In this sense the approach advocated by Race for Water Odyssey 2015 and 2017-21 is exemplary – as are the new modes of industrial design and production: https://www.raceforwater.org/fr/

Two main pitfalls should be avoided: the first one pitfall is the technocratic excesses. In rather open and accountable societies, technocrats might be tempted to argue that settling the complexity of the system' details requires sophisticated technical skills and belong to experts. Instead of clarifying the risks and the terms of alternatives and submitting the decision to the stakeholders – what is expected from them -, technocrats might take decision undercover and call the shots. The second pitfall lies in corrupting strategies to buy votes or blackmail diverging voices. This is mainly the deed of cartels or opportunistic alliances. Anti-social and anti-economic decisions and strategies might provide results, that in the long run will prove disastrous.

An inclusive negotiation process offers a solid opportunity to display also responsibilities by each user and minimize cases where the damages entailed by one stakeholder' use are heavily affecting others. It helps avoiding the blame game or the unilateral accusation against one party only, even demonization that all lead to missing the systemic dimension.

Even if an open information culture might slow down the process, it is more than useful to take some time and help problems to be anticipated and tackled timely, such as seasonal variations, quality, pollution, conflicting interests… and then to speed up the implementation. Time "lost" in the preparatory stages and negotiations will for sure be offset by faster and frictionless implementation. Any over-bureaucratic, perfectionist approach might lose a lot of time in over sophisticated problems, might even tend to conceal real problems and postpone decisions. Inclusive openness is only possible when trust has been built among the many stakeholders and a feeling of ownership and reciprocal responsibility binds them all.

Economic dimension is key: realistic and integral costing of solutions is essential for stakeholders to realize possible consequences of their upfront need assessments. Not only to avoid bad surprises when real costs exceed budgeted ones, but also to deepen stakeholders'

statements and trigger commitments to save or keep ceilings. There is no free lunch. Even if water belongs to natural world, its extraction, channelling, filtering, cleaning, recycling, maintaining have all a cost and over-consumption as well. Any denial of this economic dimension entails a problematic sustainability and undermine equity.

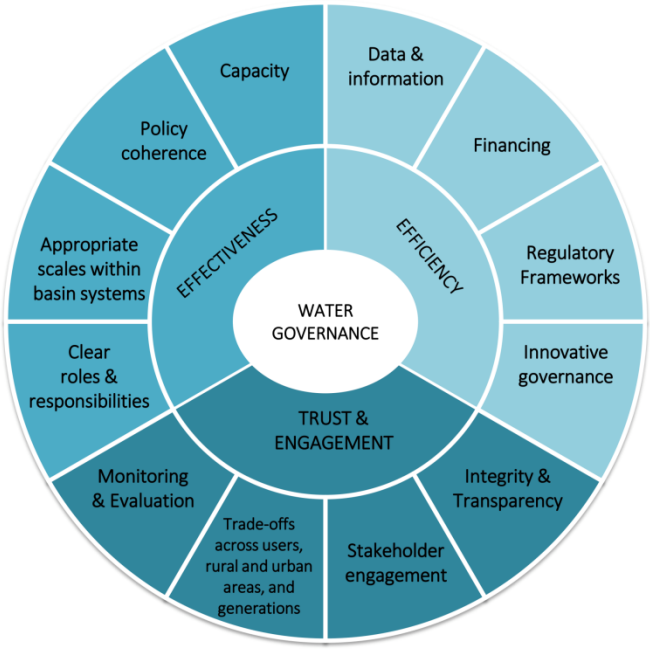
Now like stakeholders' roles that are diverse, financing schemes may be diverse and differ. It is part of the consultation or negotiation. Most effective ones belong to schemes of private - public partnership and cross- or crowd financing. Even poor sectors should contribute, if not in cash for instance in kind through physical work to reduce the costs. Poor sections of population easily understand that safe water will reduce costs of medics and treatment. They anyway often pay the high price to water sellers and would be ready to pay a lower price for a better water supply.

In any case, accountability matters and supposes that respective costs incurred, and commitments made are declared. Decisions need to be taken with an optimal knowledge of pros and cons, today as well as tomorrow.

Even if schemes are on the paper quite balanced, due attention should be paid to inbuilt incentives, incentives for high quality, efficiency and effectiveness, and kind of penalties for poor results. Reciprocal monitoring and peer reviews could be usefully resorted to improve systems without blame game and learn lessons from best practices. The so-called Water, Sanitation and Hygiene (WASH) Performance Index focusing on access and equity of water as well as sanitation could provide a solid, meaningful basis for such implementation monitoring.

To that extent, recent statements on water governance submitted by OECD in its Principles on Water Governance issued in 2015 and more recently Water Governance Initiative, issued in March 2018, - visualized and summarized through the figure hereunder – would prove

meaningful: ethics are, although silently, operating as a ground foundation. A change in paradigm can be observed:



The Principles are clustered around three main dimensions:

1. Effectiveness of water governance relates to the contribution of governance to defining clear sustainable water policy goals and targets at different levels of government, to implement those policy goals, and to meet expected objectives or targets.
2. Efficiency of water governance relates to the contribution of governance to maximising the benefits of sustainable water management and welfare at the least cost to society.
3. Trust and engagement in water governance relate to the contribution of governance to building public confidence and ensuring inclusiveness of stakeholders through democratic legitimacy and fairness for society at large.

The approach developed here, that focuses heavily on multi-stakeholder's trust, engagement as well as trade-offs and convergences, keeps up a dynamic adaptation capacity as well as some learning process from implementation.

The evidence of a change of paradigm[64] is provided by the evolving experience made by international platforms involved in the water sector (UNEP, IUCN, IISD, Water Supply and Sanitation Collaborative Council, Water Integrity Network,...) as well as by parliamentarians, judges, private business, and multinational companies.

Improvements registered thank to the dynamics of the 2015 Sustainable Development Agenda, goal 6, the World Water Forum as well as the transition movement speak by themselves: a new paradigm is surfacing. Confrontation has been substituted by sharing and mutual engagement.

Postscript: Vouchers a Solution for Poor

A minimum of potable water should be secured to everyone, and everyone, also poor, should contribute for such an access. Some optimal solution that reflects responsibility and solidarity might comprise a mix of some work contribution and voucher system. Work contribution might come through physical work, digging, filling, paving, cleaning,

[64] Members of global industry platforms such as World Future Energy Summit / Water; see also Deloitte 2016 *Water Tight 2.0 Top Trends in the global Water Sector*; Global Water Intelligence *Global Water Market 2017*; Water Online 2017 *Seven Keys to One Water.* The multinational Nestlé pays tribute to the same. Although it started with a blunt denial of any human rights to potable water and consideration for local communities suffering from water table' heavy extraction, Nestlé today seems to wish some negotiation with local communities and to recognize some kind of justified expectations on their side. Water filtration for surrounding communities has started in 2014, in Pakistan Punjab province (Bhati Dilwan).

…. Vouchers, to the extent they are linked to identified and duly authenticated poor individuals or households should rule out, trading water rights or selling rights. Biometric recognition may prove quite effective and simple. In India beneficiaries of vouchers hold a kind of credit cards that should match with iris pupil or fingerprint identification. Here also the best protection against misuse is the community itself at local and micro level, as well as the trustworthiness, reliability of water keepers. Selling vouchers against electoral supports should of course be made traceable. In Singapore vouchers are given to poor families by another department than the one which sends them an invoice for the water volume used. In such a way the principle of payment is respected but the weight is quasi nil.

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23

WATER SYSTEMS IN MYANMAR, LAOS AND CAMBODIA DEVELOPED BY CHILD'S DREAM

Marc Thomas Jenni and Daniel Marco Siegfried

Overview

Chronic freshwater scarcity and contamination are among the predominant challenges in the least-developed and remote villages of Myanmar, Laos and Cambodia, posing serious health problems to children and adults. Many schools in these rural villages have a high prevalence of diseases related to inadequate water supply, sanitation and hygiene, and child malnutrition and other underlying health issues are common. These health problems are preventable, but, if not addressed, can disrupt students' attendance at school. Generous financial support from our donors has been facilitating our quick-impact and pragmatic work in contributing water supplies for safe consumptions and sanitation to poverty-stricken communities.

Water Challenges

In Myanmar

The poor infrastructure in remote areas of Myanmar results in more than 33% of the population being exposed to unsafe drinking water (WHO, 2015). Our efforts help provide some solutions such as the means to harvest water from rain, and effective extraction and storage systems for water from natural springs and aquifers.

In Laos

Rural areas of Laos also hampered with life-threatening diseases among children and adults due to poor water management and sanitation, lack of awareness of water safety and hygiene and the common practice of unregulated defecation. There are frequent occurrences of health and nutrition complications such as diarrhoea, stunting and underweight (UN, 2017). Women and young girls still collect water from distant rivers and lakes, a strenuous and dangerous task.

In Cambodia

The provision of sustainable sources of water remains a key challenge in Cambodia's remote areas due to recurrent dry seasons and droughts. There is deficient water quality and low hygiene. These long-standing problems cause many children in rural areas to suffer from the severe consequences of diarrhoea, respiratory diseases, skin diseases and other waterborne infections. The poor management of water systems results in an estimated 10,000 deaths annually (UNICEF, 2015).

Implementation

In responding to these urgent calls for action, we have supported a number of government schools in constructing water supplies and storage systems such as protected wells, electric pumps and pipes connected to natural springs and other groundwater sources, providing water that is clean and accessible to schools and entire communities.

Students, teachers and community members can use the water for drinking or personal hygiene and sanitation.

Process

- A local, professional foreman is hired for the construction work.
- Construction of a concrete water storage system (concrete tank, basin, etc.) usually take 3-4 weeks to complete, and approximately 3 months for a water supply system (water kiosk, system of electric pump and pipes etc.)
- 5% of the total cost will be held back for 6 months as guarantee for the work.
- The school leaders and community members will be responsible for the regular cleaning and the maintenance costs of the water tanks after completion.

Monitoring

During the construction phase, our team conducts regular site visits to monitor the progress of the work and to ensure our high-quality standards are being met.

Once completed, our team regularly returns to the facilities to assess the proper use and the effectiveness of the water tanks.

What Could Be Achieved

- Ensuring that the school and local community have reliable access to clean and safe water for consumption, sanitation and hygiene.
- The improved drinking water source leads to a decrease in waterborne infections, diseases and epidemics.
- Instructions and training on usage and maintenance will result in effective water and sanitation management.

- The projects also strengthen the local community's understanding and participation in improving water and sanitation management.
    - Providing adequate levels of water supply, sanitation and hygiene can ensure better educational opportunities and improve students' success rates, livelihood standards and food security for the many children and families.

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YOUTH PARLIAMENTS FOR WATER, A SOLIDARITY WATER EUROPE PROGRAM

Victor Ruffy

The NGO "Solidarity Water Europe", (SWE) or "Solidarité Eau Europe" (SEE), was created in Strasbourg in 1998, on the initiative of the International Secretariat for Water in Montreal and the Council of Europe.

Its founding document, the Strasbourg Declaration, lists five major challenges it attempts to meet:

- recognizing water's democratic nature,
- better protecting aquatic environments,
- designing water services for a fair economy,
- considering water as a factor in land-use planning,
- making water a subject of instruction.

Youth Parliaments for Water, a specific program of SWE, seeks through its form to address three of these challenges in particular.

Tap water may come from a spring, but it still requires an infrastructure, and even a whole distribution system.

What kind of service is this? Who provides it and how?

What logic guides the creation of the entities responsible for distributing water and for sanitation? What principles govern the development, allocation, and pricing of water?

Such inquiries help us learn how users are involved in managing this shared legacy of water, and whether each person has sufficient access to it to meet his or her primary needs.

On a European scale, what is needed is a preliminary general overview of the resource's distribution and development throughout the continent as a function of climatic regions; the focus can then zero in to cover the country or region where the parliament is being held.

Each country has its own issues; accordingly, each parliament has its own theme and seeks appropriate partners from among public authorities, water agencies, cooperative agencies, and private companies that specialize in water management.

For Switzerland, known as Europe's water tower, this took the form of upstream - downstream solidarity in cities such as Morges, Bellinzona, Samedan, and Chur; for Moldova, it focused on access to potable water and sanitation in rural areas in Chisinau, Vadul lui Voda, and Vorniceni; for Russia, it stressed the treasures of the rivers in Nizhny Novgorod; and for The Netherlands, the challenge of water and climate change along the Rhine in Gelderland.

When we focus on youth, we are banking on energy, the power of imagination, and a willingness to get involved.

To motivate young people, the heads of SWE require each registered delegation to prepare a presentation on the selected theme, which they then give and defend at the plenary session. Once sworn in, the members of the parliament attend presentations by specialists, participate in workshops with visits in the field and discussions with users, initiate debate with local and regional political authorities, and write a final statement which the President of the Parliament submits to the local, regional, and sometimes national authorities.

The parliaments are accompanied by photo and video contests and always include intercultural evening functions.

It is difficult to draw conclusions about the effects of these events, but in Moldova the gradual addition of water supply and sanitation facilities to high schools, the public awareness program, and the Ministry of the Environment's "urban-rural solidarity" campaign should be considered positive results.

The parliament held in Russia made it possible to capitalize on civil society's courage and the commitment of some authorities who were working hard to be heard as they defended an environmental policy that had fallen into disgrace in a hyper-centralized national system.

ETHICAL PERSPECTIVES AND CONCEPTS IN A GLOBALIZED WORLD

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WATER AS A HUMAN RIGHT, WATER AS A PUBLIC GOOD, WATER AS AN ECONOMIC GOOD

Evelyne Fiechter-Widemann

Introduction: Justice for Water

The main goal of this colloquium is to pose the question of *Justice for water*—that is, its fair distribution in a globalized world—as the twenty-first century begins.

As long as everyone on Earth had to go down to the river to quench his or her thirst and wash, such a question never came up. Things changed after the industrial and hydraulic revolutions: humankind's relationship to water was radically changed.

Water's Diversity and Multiple Management Concepts

Water is elusive in its diversity. It is used for many things, for example, as a source of energy or for shipping. However, we are not talking about this kind of water but rather water as a resource that is necessary for life, hygiene, irrigation, industry, and our luxury needs (swimming pools, for example).

Long ago, the Romans were already thinking about the complexity of the legal framework needed to ensure that water would be distributed

wisely. They considered running water to be a common good, while groundwater was private, with rights of *usus, fructus,* and *abusus.*

In our day and age, given the challenges we face due to overuse of resources in general and water in particular, the legal frameworks governments have adopted to date are being reexamined, and new concepts are being proposed. Specifically, in 1992 a new principle, water as an economic good, was embraced by five hundred WMO experts meeting in Dublin to prepare for the Rio Conference on Sustainable Development. Echoing this concept, that of water as a human right was developed and adopted by the UN General Assembly in July 2010. I have learned that outside of the UN context, in 2005, churches in Brazil and Switzerland also issued a Declaration on Water As a Human Right and a Public Good.

In my opinion, these tensions between UN institutions themselves and civil society with regard to their opposing concepts for water, are worth our attention. Indeed, the positions taken have an impact on the decisions made by many players or "stakeholders," as we say these days—that is, governments, businesses, and civil society. Some people deplore the contradictory positions taken by those who support a right to water and the defenders of water as an economic good. The result of such obstructions at the level of theoretical discussions is to make the most interested parties of all, those who are thirsty, wait even longer.

Is there not some way to find a happy medium that would unite the positions of the two sides?

Let us take a look at these three concepts:

Water as an Economic Good, with the Question Tied to Its Value and Its Price

The moment a good begins to become scarce, economic theory enters the picture.

Such was the premise of the 1992 Dublin Statement's authors when they gave water an economic value. Some writers do not hesitate to call the concept proposed for water in Dublin a truly revolutionary one, since until then water had been considered a free good, like air. It was also considered a good of little value, as recalled by Adam Smith's famous paradox of water and the diamond in The Wealth of Nations: despite its usefulness, water has little exchange value, whereas a diamond, which is not very useful, has a high exchange value. The aim of the Dublin concept was to combat waste, especially in agriculture.

What impact did, or might, this new concept have on water? I will answer with three points.

The first is the example of the Aral Sea, which is at risk of drying up. If water had a value, perhaps the irrigation of cotton fields, which require a great deal of water, would be rethought and better water management practices adopted.

The impact on property ownership is certain: this notion legitimizes the private sector.

With regard to its political and psychological impact, this new concept could polarize a globalized world, with worries that the rules of the market would not take into account the social, environmental, spiritual, and cultural significance of water.

This point is important, and to avoid such polarization, it might be useful to distinguish between an economic good and a market good. These concepts are often confused.

In fact, water does not obey the supply and demand principle as does, for example, petroleum, and it is not a market good. In my opinion, the broader notion of "economic good" allows us to take into account a number of factors other than price.

Water as a Human Right

This has become a fixed expression, almost set in stone. But what is its scope and what are the expectations of a thirsty person?

We can consider this using an example: by virtue of the human right to water, could a Bedouin in the desert demand that pipelines be built so he could benefit from the same access to water that we have? First, I will give a legal answer, then an ethical one.

As a human right, water is what is known as a positive freedom, in contrast to a negative freedom such as a prohibition of torture.

This positive obligation implies a duty to help. But to help whom? Upon whom is the obligation imposed? We can instantly see the dilemma and the answer: it is impossible to determine both who is obligated and who should be helped. Governments have clearly understood this and have issued simple statements with no legal force whatsoever.

We find ourselves faced with a prerogative that creates a hope but is not claimable, at least until it is enshrined in a constitution—which, I will add in passing, is the case in South Africa, a pioneer in this area. In other words, in a lawsuit, a court will not find in the desert Bedouin's favor and will not order pipelines to be built.

So, is this concept of a human right to water completely useless?

No, because it raises an ethical question. Water and its unequal distribution on Earth create a deep feeling of injustice. Why do we have sufficient high-quality water here, while in some countries men and women do not have a decent minimum to allow them to live with dignity? Can one then say that if the government here ensures the

minimum basic level of "water security," it should concern itself with this injustice?

Now we are getting into philosophical questions, and I would like to mention the current philosophical debate that brings to light a concern for social justice at the global level.

The question that justice theoreticians are asking is whether the principles of justice that apply within the borders of a country or region, such as Europe, can be adapted for worldwide use. In other words, can the Western world's distributive justice criteria be considered universal?

There are at least two opposing theories, the first espoused by John Rawls and David Miller; the second by van Parijs. The former considers that cultural context and the individual characteristics of each community, such as values, ties of solidarity, customs, language, and religion, shape the criteria for justice, and their scope cannot be universal. In contrast, for van Parijs, globalization has erased borders and one can speak of a global community to which the criteria for distributive justice can be applied—although such criteria must be clarified for the context of the globalized world.

But this difference does not place Rawls and Miller squarely in the camp of those indifferent to the fate of the most destitute. Neither does it number van Parijs among those who empathize with countries whose people suffer from poverty. On the contrary, the former speak of a duty that is incumbent upon liberal societies—which Rawls describes as "decent" (meaning those that recognize the international principles of public reason)—to render emergency assistance to societies whose socio-economic system prevents them from providing their members with the decent minimum. David Miller even sees intervention as a duty of rich countries to ensure that poor countries' minimum needs are met. Such aid cannot be more than supplementary, however, to the extent that the poor countries' governments have done everything possible to improve the lot of those for whom they are responsible. Only in specific

instances where they continue to be dogged by misfortune should action be taken.

Some people ask whether such positions are not more a matter of charity than of justice.

Prof. François Dermange believes that the debate about global justice has reached a dead end, but that Adam Smith's thoughts on the division of labor as the key to the economic system, as discussed in *The Wealth of Nations,* could provide a way out. Even though this theory dates back to the eighteenth century, it remains highly relevant today in the sense that it is an emphatic reminder of humans' capacity to interact according to their abilities.

In Smith's famous example of the philosopher and the porter, both have a role to play in a spirit of mutuality. So, the "Scottish Enlightenment" philosopher is not so very far removed from Amartya Sen's "capabilities." Sen feels that it is important to encourage the development of everyone's possibilities, regardless of what he or she is or the country in which he or she lives.

3. Water as a Public Good versus Water as a Private Good

Water's classification as a public or private good, that is, its class of ownership, is of interest for the water supply issue. The official theory of public goods, first proposed in 1954 by Samuelson, holds that a public good has three characteristics:

- it is not divisible
- insolvency does not exclude its use
- there is no rivalry in the acquisition of it

The typical example is air. In contrast, a private good is divisible, its use by the insolvent is excluded, and its acquisition is subject to rivalry. What is the case for water, which is what interests us here?

As I said at the beginning of my talk, water is elusive in its diversity. If it is abundant and clean, there is no rivalry or exclusion, and it is a public good. But if it is scarce or polluted, the criteria for a private good will come into play.

Should we conclude from this that we should reject the positions of both right-to-water supporters and others who consider water an economic good?

I would answer that we need to weigh interests and find a balance in order to move beyond polemic. Two concepts are possible: that of an imperfect public good and that of a common good.

Economists came up with the concept of an imperfect public good for goods that meet the criteria for a private good but have political, social, and human importance. This is indeed the case for water.

This concept was probably at the heart of the heated debates in Switzerland before that country opted for the public sector in all cantons except Zug. At the international level, we should note that most countries have taken the public approach, with a few exceptions such as Great Britain and Chile.

The concept of a common good is aptly illustrated by two examples, the ancient canals or "bisses" in Switzerland and the similar "aflaj" system in Oman. A common good's advantage is that it allows for shared management and the preservation of mutual interests. These shared interests would serve as the basis for an ethical pricing policy that would consider social, environmental, and research and development costs as well as investment and accident risks.

In my opinion, the best concept to use will be dictated by local circumstances, including geographical and especially political and sociological factors. Supplying water requires considerable financial investment, management of which can be public in the case of a strong government well versed in the rule of law.

On the other hand, in cases where the government is deficient, private or community management could be wise, with the clarification that such management is not possible unless a community worthy of the name actually exists.

Conclusion

Here is my viewpoint on the structuring of these three concepts—water as a human right, as an economic good, or as a public good.

1. Water as a human right is appropriate as applied to the amount of water needed for survival.
2. With respect to the amount of water needed for hygiene and health, the concept of water as a public good is appropriate in a country with a strong government that can maintain the infrastructure.
3. Classifying water as an economic good could guide regulations intended to limit waste, especially in agriculture.
4. For luxury needs, however, there is no reason not to apply market rules.
5. In summary, I think that concepts should inherently enlighten and not divide.

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ON COMMONS, COMMON GOODS, COMMON RESOURCES

Benoît Girardin

Common Resources or "Commons"

Territories or resources such as a watershed to be kept irrigated, a pasture or forests to be maintained, springs to be secured and saved, belong to the common good, known as "commons".[65] Commons differ from open access resources in that they need to be used "reasonably" and "equitably"; whereas the use of open access resources is free and without any set limitations.

Elinor Ostrom, distinguished Nobel Prize winner for Economics in 2009 for her work on the economics of the commons, demonstrated in the cases of forests in Switzerland and South-West Germany, Mongolian grasslands and lobster fisheries in Maine, that the governance of commons managed by communities, which therefore do not count as property in the strict sense, could be better and more efficient. The concept of responsibility does not arise from ownership, an exchange of goods or a lineage, but rather from a collective and lasting

[65] See some works of Elinor Ostrom listed in the bibliography. US businessman and economic journalist Peter Barnes in his analysis of the commons' economic governance, attempted to commodify the sky as a common resource (Sky Trust). See also the Commons platform.

responsibility, which is more akin to stewardship.[66] The responsibility refers to a "reasonable use" that protects the future of the resource.

Granted, these traditional management models date back to a predominantly rural world where the common resources were shared within rather limited territorial communities in order to ensure their survival. The territory or resource concerned was ruled and controlled by local, community rulers or by users' associations rather than by a distant central authority. Nevertheless, In the case of common goods, overexploitation is difficult to check and it is even harder with respect to open access resources, due to the lack of management guidelines and respected authority. Water economist Ronald C. Griffin does not encourage us to adopt a popular term such as "tragedy of commons" to describe that difficulty. The main tragedy concerns indeed the governance of "open access" resource.[67]

So far as plastic pollution of the oceans is concerned, which extends far beyond the limits of territorial or national waters, those maritime areas look out of reach of communities and may seem almost abstract. Common governance or common responsibility of something that is far beyond a common scope appear to be a huge challenge. To what extent a common responsibility could be established and some enforcement implementable?

Therefore, the instruments of commons governance must be fundamentally redesigned. In particular, the ethical governance of commons should be re-articulated: Who is responsible for it? How is accountability framed and sharpened? Reporting to whom? Fostered

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[66] The term "steward" comes from the old English "steward", house guardian, housekeeper. In his book *Pie in the Sky*, 2000, Peter Barnes describes it as a framework for capping and sharing of profits, returns and dividends: cap and dividend.

[67] Ronald C. Griffin 2016, p. 140.

through which incentives? By which enforcement authority? Through which checking?

The current example of shared knowledge and digital commons, such as Wikipedia, could be a source of inspiration: it is not owned by a company or private individual but by a noncommercial community of contributors setting specific quality standards, specifying acceptable and recognizable criteria. Propaganda or defamation, as well as methodological shortcomings, are signaled and this check proceeds according to the set criteria, that are accepted by users. Rules enforcement occurs through the name and shame principle; in worst cases, contributors might even be listed and known. excluded and punished.

However territorial areas and open resources might require some harder ruling. They are indeed exposed to unreasonable capture, theft, wrecking and subversion that might undermine any future.

A framework imposed by international conventions has been sought – see the analysis of Daniela Diz. The closest example is the 1961 Antarctic Treaty, supplemented in 1980 (1982) by a Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR), then by a Protocol on Environmental Protection signed in 1991 and in force since 1998. This triangular institutional system for the Southern Ocean – the Antarctic Treaty System – is an original arrangement with respect to regional fisheries management organizations.[68] In October 2016, a significant step forward was made by a treaty drafted and negotiated under the auspices of the Commission for the Conservation of Antarctic

[68] The Treaty signed by 49 countries makes the Antarctic (land and ice) a demilitarized zone, declares that its sovereignty cannot be called into question and prohibits disposal of radioactive waste (Art. 5); it establishes an Ecosystem Monitoring Program (CEMP).

Marine Living Resources defining a fishing exclusion zone in the Ross Sea covering 1.1 million km^2.[69]

To what extent can such an arrangement be considered effective for managing biodiversity in *commons*, given that no populations live in the Antarctic and that only fishermen venture there? The Contracting Parties can thus come to an agreement without having to consider the needs of residents or regular users and without being able to solicit their commitment. In the case of ocean plastic pollution, communities are actively present: residents, users and even polluters, even if largely informally. They should be involved in containing upstream wastes and collecting downstream ones. Without incentives awarding such containment and collection, the solution would remain optional, carried out by free-will associations, enterprises or States. Free-will solutions so far have proved unable to address long term solutions as in the examples of Mekong or Danube basin governance.[70]

Even if Elinor Ostrom's findings on fluid and efficient communication among users are true and call for an ethical upsurge on the part of the latter[71] one can see the necessity of incentives and rules set and enforced by States or groups of States.

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[69] Article 5 of the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) specifies an obligation with regard to the protection and preservation of the Antarctic environment.

[70] The Mekong River Commission (1995) and the International Commission for the Protection of the Danube River (1994) manage water quality and pollution, as well as issues of quantity, distribution, transport and fishing. The crisis involved mercury pollution in the Danube, in very limited territorial segments.

[71] Ostrom E. 2010, p. 1. *"Simply allowing communication, or cheap talk, enables participants to reduce overharvesting and increase joint payoffs contrary to game theoretical predictions. Large studies of irrigation systems in Nepal and forests around the world challenge the presumption that governments always do a better job than users in organizing and protecting important resources"*

In ethical terms, the challenge has to do with the emphasis set on responsibility. The polluter pays principle is difficult to enforce because here the polluter is scattered, discreet, anonymous and faceless. The most realistic and responsible solution is to encourage upstream trash collection and sorting as well as recycling in order to organize a profitable and job-creating activity, with revenues coming from a combination of fines, free contributions from local authorities or business associations and Governments as well as from the sale of recycled products. In this way, responsibilities could be better identified and monitored. Rwanda' policy, a real win-win, in that regard might inspire others[72]. A *blame and shame* scheme could also be carried out, built on communication, social responsibility and reputation risk.

An upper limit could be agreed on by States or provinces that would entail a "*cap-and-trade*" kind of scheme. Overrun would then be acknowledged, measured and give way to compensatory fines. Enforcement is critical as it relies mainly on measurement of the main steps of the process, from plastic production, to throwing away and littering.

One could also imagine within *ecosystems* a sort of contract or barter between *ecological services* offered by biodiversity and a financial, public and community effort. These ecosystem services are the result of the ecological functions of operation, self-maintenance and resilience of systems, such as oxygen production, pollination or water purification. They have a measurable economic dimension and should be systematically measured.[73] The World Bank now calls for the inclusion

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[72] In 2008, Rwanda banned plastic bags, controls a tiny local production of biodegradable bags and fosters sorting-out, recycling processes that create jobs: https://www.governing.com/topics/transportation-infrastructure/gov-rwanda-plastic-bag-ban.html

[73] The concept of ecological services was developed by US scholars based on the *Study of Critical Environmental Problems*. *Man's Impact on the Global Environment*, published in 1970 by MIT Press, then validated internationally in

of biodiversity loss and climate change costs into national accounts. States should concur with each other in adopting such holistic approaches.

One could also imagine commons that comprise of human as well as non-human agents.

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27

WATER, VITAL NEED AND GLOBAL JUSTICE: ETHICAL PERSPECTIVE

Evelyne Fiechter-Widemann

Introduction

Let us attempt to draw an ethical connection between the two concepts of "water as a vital need" and "global justice."

It is tautological to say that if daily water needs are not met, a host of crises will follow: food and social crises, insecurity, war, famine, and even death. Experts say the threat is very real.

Inequality in human access to water has in fact been documented and acknowledged. UN sources say that a billion people lack access to potable water and 2.6 billion to sanitation. Only one out of every two people has a household tap.

The inequality is growing worse every year. It has multiple causes, of which I will mention only one here: the political system. It is easy to determine that democratic countries such as the United States and Australia have better tools for mitigating water shortages or surpluses than "vulnerable" countries such as some African and Asian nations.

In 2000, the international community set some Millennium Development Goals (MDGs) for poverty reduction and water. Implementing them remains problematic, however.

Should we throw in the towel, or instead explore another path-that of practical wisdom, of an ethic that could guide twenty-first-century humankind in handling the very complex challenges posed by water?

Let us choose this approach-which aims to honor the self, the Other who is close by, and the Other who is far away-in order to give alterity the leading role, a requirement which I believe is vital in this case.

With the aim of discovering a kind of justice, which I would characterize as global, for water as a vital need, I will analyze three values-the Golden Rule, human dignity, and capabilities-in light of this criterion of alterity or "otherness."

The Golden Rule as a Basis for Justice as Solicitude

As explicated by sixteenth-century English pastors, the Golden Rule corresponded to the rule that Jesus placed at the heart of the Sermon on the Mount (Matthew 7) and the Sermon on the Plain (Luke 6): "Do to others as you would have them do to you."

At first sight, the maxim represents justice as equality or reciprocity between the two partners present, the agent and the patient, that is, the person who acts and the person who is being acted upon. This equivalence is reminiscent of the *lex talionis*, "an eye for an eye, a tooth for a tooth."

Paul Ricoeur suggests reinterpreting the Golden Rule to avoid a utilitarian drift into "I give so that you might give to me." Through the lens of love, the formula becomes unselfish: "I give because it has been given unto me."

This French philosopher's take emphasizes generosity and the gift, empathy even, that encourages us to put ourselves in others' place. So in a way, the Golden Rule conceals an obligation, where the agent becomes the patient's debtor. This is also marvellously illustrated in the parable of the Good Samaritan (Luke 10:25-37).

In the context of water as a vital need, the maxim can serve as an invitation not to remain indifferent, and even to seek ways to act toward the billion individuals who struggle to procure the twenty-five liters per day of water they need to survive. Further yet, it can invite us to consider ourselves the debtors of future generations.

In summary, while the Golden Rule demands justice, it also-if we truly put ourselves in others' place-demands acts of solicitude: "Do good, and lend, expecting nothing in return" (Luke 6:35).

Let us again cite Ricoeur, who pleads for "tenacious incorporation, step by step, of a supplementary degree of compassion and generosity in all of our codes."

Even if the task remains "difficult and interminable," it is our responsibility to undertake it in order to acknowledge the dignity that human beings should be accorded.[74]

"Human Dignity" As a Basis for Justice as Equality

There can be no justice without concern for the human being, or even without an "idealized value (…) of the human being."[75]

The concept of human dignity, mentioned by the biblical prophets, was first formulated by Pico della Mirandola during the Renaissance. It was then vigorously defended by Kant, who believed that all individuals should be treated equally simply because they belong to the human race. Equality was becoming a criterion for justice.

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[74] Ricoeur, Paul. 1995. "Love and justice". *Philosophy & social criticism*, 21(5-6), pp.23-39.

[75] This sentence of Mourgeon Jacque is, cited in Xavier Bioy, "La dignité: questions de principes" in. Gaboriau, S. and Pauliat, H. eds., 2006. *Justice, éthique et dignité: actes des colloque organisés à Limoges les 19 et 20 novembre 2004*. Presses Univ. Limoges. p. 59 ; see also Jacques Mourgeon, 2003, *Les droits de l'homme*, Paris : PUF.

"Human dignity" went through many forms before becoming a key value in the Universal Declaration of Human Rights of 1948, the writers of which were still living with the shock of World War II's horrors. Their intent was to protect people against an arbitrary government.

Once the UN General Assembly had given water the status of a human right in 2010, the concept of human dignity was updated to encompass not only rights and freedoms, such as freedom of conscience, but also the real-world consideration of a decent life: quenching one's thirst and enjoying the benefits of good hygiene.

How is a life with dignity defined? Can we accept the fact that Americans consume a thousand liters of water per day while others elsewhere scarcely have access to the basic minimum of twenty-five liters per day? Or does the concept of human dignity depend on context, to the great detriment of a kind of justice that has equality as a criterion?

Let us attempt to get beyond this dead end by exploring a third value, capabilities.

Capabilities as a Basis for Justice as Freedom

The capabilities concept was introduced some years ago by Amartya Sen, the 1998 Nobel laureate in economics.

It allows us to consider that two individuals with access to the same resource, a condition called "formal freedom," will not have the same "real freedom" of converting it into well-being or action. For example, a disabled person will be able to do much less than a non-disabled person, because he or she will have to spend more to achieve equivalent mobility.

In terms of potable water, this new approach to freedom seems to me to be relevant, as illustrated by the case of a village in sub-Saharan Africa. Having been made aware of the water problem, members of the village assembly decided to sell a few head of livestock to buy water pumps. This strategic choice created a new "capability" for women, who

had previously had to bring water to their homes from several kilometers away. The pumps freed up time for other pursuits, for example, devoting more time to teaching the children, or taking training that could help them get a job.

As we can see, capabilities have two essential characteristics. First, they convert expertise or income into accomplishments ("functionings," such as educating the children in the above example, or income). Second, the capabilities approach is directly concerned with the human beings, especially by personally involving them in the issue of access to water, thus giving them a chance to independently set their own priorities.

Conclusion

Would it be better to focus on solicitude, equality, or freedom in trying to best meet the bewildering challenges that fresh water and potable water present today? In my opinion, these three key concepts are essential, but must not become divisive. While equality was given priority in human rights doctrine following the atrocities of the Second World War, we should open a discussion with Eastern thinkers such as Amartya Sen, who seem to favor freedom. Meanwhile I think, along with Paul Ricoeur, that it is absolutely necessary to once again make a place for solicitude and love, especially through the Golden Rule.

In this way, we could lay the foundations for a kind of global justice worthy of the name. At least, that is the prudential path that I suggest for a new ethic of water as a vital need.

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THE DUTY TO PROTECT AS A CONDITION OF POSSIBILITY FOR A GLOBAL WATER ETHIC

Evelyne Fiechter-Widemann

Introduction

Responsibility is an ethical fact that cannot be pigeonholed in a discipline such as law, sociology, philosophy, or theology. From the standpoint of Kant's transcendental philosophy, this ambiguous concept can at the very least be considered as the "condition of possibility" for implementing basic rights and freedoms.

When the United Nations General Assembly gave water human-right status in July 2010, it elevated this natural resource to an axiological level that gave it a value to be defended, and placed it alongside the other human rights in the ranks of inalienable rights (see the preamble to the (1948) *Universal Declaration of Human Rights*).

In so doing, the international community acknowledged—at least implicitly—that the human right to water borders on natural law. Let us recall that the ancient philosophy of Stoicism saw natural law as a principle of divine origin, the *logos* governing the *cosmos.* Christendom restructured these concepts such that the *cosmos* became the creation

and the principles of divine origin became the Ten Commandments and the Law of Christ.

So, given the kernel of natural law that lies at the heart of human rights, it is valid to use interdisciplinary tools to examine the concept of the responsibility to protect water, through the lenses of theology, ethics. and law.

Theological Lens

With support from the teachings of reformer John Calvin, who saw creation as the "theater of God's glory," and theologian Bonhoeffer's extremely humane way of viewing marginalized and suffering people, the principles upon which a global water ethic can and should be based can be named in an authentic and credible way. It is a matter of humankind accepting God's assignment to manage nature responsibly without overusing it, while at the same time taking into account the present and future needs of the poorest. These clearly stated principles destroy medievalist Lynn White's position, which holds that Christianity is at the root of today's ecological crisis.

Ethical Lens

United Nations experts created three concepts for use by governments tasked with implementing the human right to water. They are expressed in the three responsibilities summarized as the "duties to respect, to protect, to fulfill." For the moment these duties or responsibilities, which have no binding legal force, can be clarified from an ethical standpoint. From this perspective, they form a whole, in my opinion, in the sense that respect is the ethical motive for a responsibility to protect, and when the responsibility is fully accepted, the right to water is implemented *ipso facto*.

So it is the motive for responsible action that will interest us here. What is covered by this concept of respect? In the context of water as a vital need, it cannot assume its currently accepted meaning of fear, deference or the distance to be maintained from eminent persons. On the contrary, it is in fact a matter of the consideration due to those in need.

While Immanuel Kant considered the respect due to a person as also primarily the respect due to the law, Paul Ricœur finds that the issue is one of crossing the dialogical divide, the contrast between the agent and the patient, that respect creates. Where water is concerned, a dissymmetry between two entities can be illustrated by, for example, a government that shuts off the water supply of a consumer who can no longer pay the bill. Ricœur feels that by referring to the Golden Rule we can bring the two pans of the scale back into balance. This maxim makes it possible to see an ethical, even theological rule in the duty to "respect" suggested by the UN experts for implementing the right to water.

Legal Lens

South Africa is making an exceptional contribution to the issue of the human right to water and its attendant responsibilities. Its 1996 constitution established the right to water, and in a government order issued in 2000, it set rules for supplying free water to poor blacks in rural areas. The national "Free Basic Water Policy" aims to provide a minimum of 25 liters per day to about 7 million of the country's 23 million residents, to cover their vital needs for drinking, cooking, personal hygiene, and household cleaning. Do not such rules provide a foundation on which to base the goal of the human right to water, namely respect for human dignity? Since the subsidies needed to provide this free water are a burden on the national budget, it will eventually be in the government's interest to see the number of recipients of free basic water decrease, with each user being called upon

to contribute to the water service according to his or her means. Indeed, and the UN experts are quite definite on this point, the human right to water does not mean a right to free water. So the challenge for the government is to pass laws that make water affordable.

Obviously, there is no form of international oversight capable of ensuring that laws to prevent excessive water prices are passed in "failing" States. Furthermore, abuses have very often been seen when water service is entrusted to private companies. It is precisely with the goal of blocking such abuses that the UN experts' directives and the example of South Africa should come into play.

Conclusion

The theological, ethical, and legal perspectives on the duty to protect that I have just outlined relate to a particular type of responsibility, an ethical responsibility, along the lines of a mission to protect water. So, this is not a case of responsibility as attribution of an action that is to be evaluated from a moral or legal point of view.

It seems to me that the example of South Africa's water legislation clearly results from a mission to protect, and therefore leans more toward the ethical than the legal perspective. After all, is not the human right to water itself, and its implementation, related to God's command to protect the weakest of the weak?

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THE SOCIAL JUSTICE FOCUS IN SUSTAINABLE DEVELOPMENT: SOME CHALLENGES OF THE CURRENT PHILOSOPHICAL DISCUSSION

Isaline Stahl Gretsch

Notes of a wrap up speech delivered by prof François Dermange[76] taken by Isaline Stahl Gretsch (W4W)

Social Justice Focus

The "social justice" focus in sustainable development, a link between economic development (the concept of need, especially the needs of the poorest), environmental protection (for example, a government limitation on certain technologies), and social justice.

The Brundtland Commission report (1987) defined social justice as coverage of the essential needs of the poor, to which a preferential option must be given:

[76] François DERMANGE a is professor of ethics at Geneva University's Faculty of Theology. He concentrates his research on Protestant ethical tradition as well as on ethics of economics and sustainable development. Initially he followed commercial studies at HEC Paris and worked as an advisor with Arthur Andersen auditing company.

- Helping the poorest
- Limiting the use of resources.
- Internalization of costs has a regressive effect on the poor.

The 1992 Rio conference shifted the focus (it used the Brundtland criteria but reinterpreted them):

At this summit, the interdependence and indivisibility of the three focuses of sustainable development were stated for the first time. However, social justice was replaced by peace, which became the third focus along with economic development and environmental protection.

As far as distributive justice was concerned, Rio abandoned the idea of giving priority to the needs of the poor, preferring instead to talk about giving priority to development in the most vulnerable countries (principle 6) and eradicating poverty, reducing disparities, and meeting the needs of the greatest possible number of people.

Distributive Justice

Principles of Justice

The 1648 *Treaty of Westphalia*, which ended the Thirty Years' War, created a triple separation between law and morality, law and policy, and domestic and international law. While this system became established in Western democracies, its first principle suffered a gradual erosion. The other Westphalian principles do not seem to have been revisited, especially the idea that the State is the sole source of law in domestic law and the sole topic in international law.

For twenty years, the global justice debate has revolved around the question of knowing whether the models of justice developed within States were also valid between States. At the risk of oversimplification, a single model came to be widely used in Western democracies: that of John Rawls. For the record, in his book: *A Theory of Justice Rawls*

(1921-2002) he explained the following two principles of justice in lexicographical order:

- *The principle of greatest equal liberty*: every person must have an equal right to the greatest fundamental liberty, with the same system of liberty for all.
- *The difference principle*, which allows social and economic inequalities provided that the inequalities are associated with functions and positions open to everyone in a context of fair equality of opportunity; any improvement in the lot of the most advantaged people is accompanied by an improvement in the lot of society's most disadvantaged people (this is called the "maximin principle").

This principle of justice is not applicable worldwide.

Rawls gives an example reminiscent of the grasshopper and the ant. If there are two countries with comparable resources, and one decides on a pastoral lifestyle while the other chooses industrialization, and if the second country then becomes wealthier than the first, the second will not be forced to subsidize the needs of the first, which must bear the consequences of its decision.

From this standpoint, the answer to the widespread poverty in "grasshopper" States lies not exclusively in a redistribution policy that would unfairly transfer the cost to the "ant" States, but instead in how the "grasshopper" States see themselves.

The causes of a people's prosperity are to be sought in its political culture and the religious, philosophical, and social traditions that underlie the basic structure of its political and social institutions, and also in the industriousness and cooperative abilities of its members, with their political virtues being the glue that holds everything together.

Should we impose a global redistribution system? Adam Smith defends this principle: the function of the economy is to create wealth and, to a first approximation, redistribute it.

F. Dermange concludes that the ethics of water is not a question of water, but one of human dignity.

Fairness and Responsibility

The heart of the question [about water ethics] revolves around the concept of responsibility[77]. For what and for whom are we responsible, and to whom? This questions relates to concepts such as fairness and solvency.

There is a kind of tension, or complementarity, among three kinds of responsibilities, two of which come down to us from ancient Rome:

- The Latin *sponsio*, from verb "spondere" means an exchange of consent between two people, with an outside person—the responsor—acting as the guarantor of the exchange and who therefore should not be seen as being in the wrong, but as the person who is responsible. This is the role of the government or supranational authorities, which implies some legal work to envision the entities that will guarantee harmony, especially in relation to the outside.
- In the tradition of the Roman Republic, what really counts is freedom and the refusal to submit. So, it is essential for people to be able to participate in decisions that concern them. Equality and the refusal to submit must be restored.
- There is a thought common to both Gandhi and Calvin. Both saw that there is a dissymmetry between the strongest people and the weakest, between those with more resources and the others. What counts is that the one with power uses it for the good of the others and not for himself. So, we are dealing with a moral requirement and not an economic or legal one.

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[77] Notes of conclusive remarks made by prof François Dermange taken by Isaline Stahl-Gretsch (W4W). See above note 64; Editor note.

Today's presentations all spoke of responsibilities, in complementary and different senses, which is why we have raised some perplexing points.

Similarly, there are so many different uses for water that we cannot manage to be clear as far as essential needs are concerned (drinking, sanitation, agriculture) How far do we go?

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BEAUTY MATTERS TO INSPIRE RESPECT. A FOUNDATION STONE FOR ETHICS

Benoît Girardin

The purpose is to develop an ethic of respect for animal and plant species and their biodiversity and an ethic of responsibility towards the natural beauty of the oceans, the land and the air.

Stabilizing and then reducing global warming as well as containing the rapid decrease of biodiversity call both for emotional sensitivity and even for passion in the etymological sense of suffering and compassion. These two challenges invite the community of nations to reinvent a responsibility of stewardship oriented by a long-term economic rationale stemming from aesthetic and emotional stewardship, drawing its source from wonder and compassion.

Faced with pollution of natural sites as well as losses of biodiversity, we are invited to advocate for the *natural beauty* of the sites, the immense variety of biological species that reside there and to affirm the respect due to them. Part of our inhibition in the face of natural beauty has its origin in the predominant emphasis placed by the modern Western philosophical tradition – starting with the Enlightenment – on aesthetic judgment, the observer's tendency to frame the pleasant and

the criteria of taste[78] while the ancient and medieval traditions articulated beauty to the being – ideal or concrete[79] – and regarded it as an intrinsic quality or category applicable to everything and not relational.

Asserting the subjective or relative character of an aesthetic approach does not, however, negate natural beauties. The same Emmanuel Kant, after insisting on the subjective criteria of taste and the conditions of possibility of practical aesthetic judgment, strongly expressed the feelings of beauty and admiration which the oceans and their depths inspired in him, with no consideration of utility.[80] This

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[78] Going beyond the emphasis placed by the British tradition (Hutchinson, Hume) on the criteria for declaring certain aesthetic judgments erroneous, Kant states that the judgment of beauty is singular, impossible to generalize. The laws of taste cannot be stated under a rule of beauty. The beauty of works of art remains linked to a message of the artist and conditioned by the context.

[79] Let us mention the respective teachings of the Platonists emphasizing the characters of order, clarity, harmony and balance and the Dionysians emphasizing profusion, sensuality and vehemence - see the perceived), while Mary Mothersill 1984 *Beauty Restored* notes the intrinsic quality of beauty, a basic, simple and non-contribution of Prof. Sarah Stewart-Kroeker. The medieval scholastic philosophy gradually agrees to describe the being as one, good, true and beautiful – the four so called "transcendentals". Umberto Ecco in his *Art and beauty in the middle ages*. Yale University Press 2002, (from French 1997 *Art et beauté dans l'esthétique médiévale*, Paris: Grasset, ch. 3, 5) retraces this evolution initiated in the *Summa de bono* by Philip the Chancellor, followed by William of Auxerre before being theorized by Albert the Great, *Super Dyonisium de divinis nominibus.* Ecco shows how Thomas Aquinas *Summa Theologiae* I, q. 39, a. 8, incorporates the stained-glass tradition, emphasizing clarity and transparency, and then he documents the transition made by Duns Scot and William of Ockham who emphasize the link between beauty and unique individual singularity, promoting the intuition of the singular: Ecco U. 1997, ch. 9.

[80] In Book II of his *Critique of Judgment*, devoted to the analysis of the sublime, § 26-30, Kant speaks of the beauty of the ocean depths (§ 29). Another passage

undoubtedly reflects the *sublime* of nature, beyond the beautiful which belongs to the aesthetic sphere and the human arts. The sublime awakens a feeling of inaccessibility, nature is seen as a force arousing not only fear – for example, fear of the raging ocean – but poetry. To see a paradox between subjectivism and realism is therefore only illusory.

Even if traditionally ethics and aesthetics are separate fields, the aesthetic dimension is nonetheless articulated. Aldo Leopold (1887-1948), an American forestry engineer, then professor at the University of Wisconsin-Madison and philosopher, is a pioneer. After realizing the importance of systemic balances between wild predators and victims, he set out to develop an ecological ethic and then add the dimension of beauty, thus articulating ethics and aesthetics: *"A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise"*.[81] Consequently, something that undermines biodiversity by significantly reducing it can be considered here as an attack on beauty or a threat to beauty.

By drawing freely from the innovative philosophical reflections developed more recently by G.E. Moore (1873-1958), Guy Sircello (1936-1992) and Mary Mothersill (1923-2008),[82] who advocate

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in § 30 speaks about the extravagant beauty spread by nature at bottom of the ocean, where the human eye rarely penetrates.

[81] Aldo Leopold 1949. p. 262. See also his reflections on a land ethic on p. 244. "In short, a land ethic changes the role of Homo sapiens from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members, and also respect for the community as such".

[82] G: E. Moore goes beyond idealism and skepticism concerning intrinsic beauty and states in his *Principia Ethica* 1903 that the total value realized during aesthetic appreciation goes beyond the value of the observer and the value of the observed (*Principia* ch. 18: 2). Guy Sircello 1975 *A New Theory of Beauty* characterizes beauty as the absence of impairment (real or analyzable trait of an individual reality. See also the many articles on natural beauty published since 1998 by "*Ethics, Policy and Environment. A Journal of Philosophy and Geography*".

rehabilitating the importance of beauty, we can identify four intrinsic characteristics of the plant and animal worlds to place in resonance with a dimension of beauty: i) diversity, sign of luxuriance, a sort of magnanimity of nature, ii) interactive coherence or the equilibrium in constant motion of a wholeness, iii) innovative and ingenious adaptability, iv) dynamic rhythm and resilience, and consider them as markers of harmony, sublime and therefore, beauty.

There is a reason that these biodiversity hotspots, these sites that are home to specific species as well as the species themselves attract many admirers from all over the world.

We are invited to affirm an *ethic of beauty*, which recognizes values other than economic viability, pure profit or simple biological sustainability.

The main question in ethical terms is therefore to establish what criteria will make it possible to distinguish, on the one hand, the sustainable exploitation of natural resources which does not rule out certain disappearances and, on the other hand, their devastating overexploitation. After all, the history of our planet shows that species have disappeared – such as the dinosaurs - or will disappear while others continue to be born. Biodiversity is neither static nor conservationist. The fracture line of devastating overexploitation can be identified based on the volume and rapidity of biodiversity losses, that which destroys the interdependence between species and their environment, that which irreversibly breaks or permanently weakens the dynamic harmony of natural rhythms, the equilibrium of plant and animal systems and the overall resilience. This can and should also be analyzed from a perspective of animal suffering, animals suffocating after ingesting microplastics or injured by debris. Advocacy against animal suffering

and its consequences as well as the respect due to animals are promoted today by thinkers from very different backgrounds.[83]

Above and beyond the consideration of justice – doing what is right – we are invited to rediscover an *ethic of respect*, which contradicts ultra-anthropocentric ethics. Without going so far as to speak of animal rights, in the strict sense of the term,[84] animal suffering, particularly when it is unnecessary or results from a logic of pure profitability, is increasingly clearly and widely denounced. Those who are indifferent to this suffering, who deny it or perpetrate cruelty are discredited.

The issue is therefore the importance given to respect and aesthetics. It is a matter of shifting from an absolutely anthropocentric ethic, or rather unlimited anthropocentrism, towards a *relatively or moderately anthropocentric ethic*.[85] Modern Western ethics would gain by better integrating the Asian dimension of appreciation of beauty. The influence of Indian philosophies, in particular Jainism, Hinduism and Buddhism,

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[83] We refer to the philosophical reflections of Albert Schweizer (1875-1965), the legal reflections of Cesare Goretti (1886-1952) on animals as legal entities and the "inclusivist" reflections of Spanish philosopher José Ferrater Mora (1912-1991). Tom Regan argues that certain animals have mental capacities (1938-2017, David Sztybel 1998 art. *Encyclopedia of Animal Rights and Animal Welfare*; Peter Singer 2004, pp. 60-70; 1995; Brennan A. & Yeuk-Sze L. 2013, art Environmental Ethics, in *Stanford Encyclopedia of Philosophy*.

[84] In 2003, the Swiss Civil Code recognized that animals are not things and defined animal protection laws: see the government's decision to implement a package of measures on April 1, 2003. The first animal protection laws were enacted under the Indian Buddhist emperor Ashoka (3rd c BC), the Chinese emperor Wudi-Lyang (6th c. AD), the Japanese emperor Tenmu (7th c) the Indian king Kumarapala (12th c).

[85] The term "shallow anthropocentrism" invented by William Grey seems better suited than "human supremacism", which is difficult to advocate. Bio-centrism and physio-centrism can dilute all responsibility and ethics.

which value such respect and are less strongly anthropocentric, could prove constructive and provide balance.[86]

In both cases we will see the value in holding together and refusing to separate, according to the recommendation of Max Weber, an ethic of responsibility, centered on the consequences of our political, social and individual actions, and an ethic of conviction, centered on adherence to principles.

Of course, the ethical approach developed here is centered on the consequences and, therefore, deliberately minimalist. It can therefore be considered as the most practicable and attractive, therefore having the best chance of effective implementation.

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CONSIDER THE DEPTHS: THE ROLE OF MYTH IN ETHICAL ACTION

Sarah Stewart-Kroeker

"How are we to explain why nature has so extravagantly spread beauty everywhere, even at the bottom of the ocean, where the human eye (for which, after all, this beauty alone is purposive) rarely penetrates?"

Kant, Critique of the Power of Judgment

The ocean remains largely mysterious, despite the technologies that allow us to explore its depths. Its beauty, its vital and dangerous nature add to the mystery and make it the stuff of myths and legends. From Homer's Odyssey to Melville's white whale to the Inuit's Qalupalik, the imagination populates the ocean with menacing forces.

Myths (*mythos*) are a form of narrative. Myth as a genre typically refers to a narrative explaining the origin, history or natural phenomenon of the world, often using supernatural figures or events, and often transmitted orally or by tradition. But more broadly, myths can also reflect idealized or figuralized notions of events, people, or other objects – such as the ocean. Melville's white whale is a good example. This creature attains mythic status in the novel Moby Dick through the narrative and characteristics attributed to it. In a broad sense, a myth recounts or explains the world through narratives drawing from the

supernatural, the ideal, the figurative. Mythologies cut across genres and day-to-day life.

What is the connection to ethics? Narratives explaining the meaning of life are an essential part of morality. The interpretation and challenge of the narrative of meaning (including mythic narrative) are in some sense central to the intellectual project of ethics. The mythic register is a cultural vector of the meaning of life and values, according to environmental ethicist Willis Jenkins. As such, mythical narratives are an integral part – even if unconsciously or implicitly – of ethical action. Consequently, philosophy and theology also concern themselves with mythologies. And this is also because myth can equally mean a fiction, a false idea that is propagated through narrative repetition.

One reason that can explain why humans pollute the environment and cause climate change is simply the awareness of the magnitude of our natural world. We act and think as individuals, as if we could expect to see the consequences of our actions in just the tiny area we live in day-to-day. But the consequences of these actions extend far beyond our immediate habitat. And not just because individual energy consumption contributes to global warming, affecting populations differently, but also, more concretely, because the trash thrown away here may eventually end up in a far-off ocean. The scale of action required goes far beyond the individual level.

When addressing the relationship between actions and effects, which is increasingly global and personal at the same time, one of the challenges is reconciling two scales of human action: an individual scale and a collective scale.[87] The difficulty is that this all-encompassing figure of the collective scale is outside personal experience. The mythic register can help create a dialog between these two dimensions. The

[87] Willis Jenkins, "The Turn to Virtue in Climate Ethics: Wickedness and Goodness in the Anthropocene", *Environmental Ethics* 38:1 (2016).

mythic register is a cultural vector of the meaning of life.[88] As such, it enables us to amalgamate these two scales of action, the individual scale and the collective scale. In so doing, the mythic register, blending cultural values and ideals as well as religious and spiritual values and ideals, allows us to recount individual actions in a framework that gives them a meaning that transcends the individual.

We must, however, be wary; for just as the ocean itself is a source of both life and death, myths can both illuminate and obscure, they can arouse us to noble actions and they can drive us into madness (here again, Melville's story is a good example of noble actions and deranged actions induced by a quest for an idealized figure). Faced with environmental challenges, figuring out how to communicate issues to the public means thinking about how to raise their awareness.

Bruno Latour notes that ecologists are often accused of engaging in a strategy of apocalyptic rhetoric.[89] These accusations discredit the message of ecological crisis by associating it with excessive hysteria, turning reality into fiction – a myth, in the pejorative sense. According to Elizabeth Kolbert, a journalist at the New Yorker, this appearance of hysteria reflects the difficulty of representing a reality that is not immediately accessible to us.[90] Both Latour and Kolbert compare the skepticism towards the ecological crisis to the disbelief with which the Trojans met the warnings of Cassandra, a figure of Greek mythology, who had prophesied the defeat of Troy, in vain.[91]

Whether in terms of climate change or oceans flooded with plastic, in addition to the importance of biological, chemical and hydraulic analyses, an ethical reflection must be carried out on the way in which

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[88] Jenkins, "The Turn to Virtue", 87.

[89] Bruno Latour, *Face à Gaïa: huit conférences sur le nouveau régime climatique* (Paris: Éditions La Découverte, 2015), 251.

[90] Elizabeth Kolbert, "Greenland is Melting", *The New Yorker*, October 24, 2016 Issue, http://www.newyorker.com/magazine/2016/10/24/greenland-is-melting.

[91] Latour, *Face à Gaïa*, 283; Kolbert, "Greenland is Melting".

this reality is communicated, in a register no longer strictly informative, but relating to meaning and imagination. For the sources of ethical action lie within the framework that gives it meaning, and this framework stems in one way or another from the narrative of the ideal or the figural. The communication of an ethical challenge should not ignore this aspect of the sources of action. A heavy responsibility accompanies this work of representation. If one myth can have the ability to mobilize, another can lie, shake trust and coerce action.

When we ask ourselves the question "Oceans flooded with plastic: myth or reality?", we might view an opposition between myth and reality, the fictitious and the real. My point is that it may be much more valuable to distinguish between myths that are faithful to reality as we understood it and those that are not.

To support this idea, I will use an example from the Republic of Plato. In this text, Socrates tries to convince his companions that justice is better than injustice. It is immediately apparent that Socrates' companions do not share the same definition of justice. This is shown in the different cities described by Socrates and Glaucon. The city of Socrates is simple and healthy while Glaucon sees only a bestial life, lacking in luxury.[92] He does not see justice where Socrates sees it. To respond to this impasse, Socrates has no better solution than to turn to myth, the stories told of the gods.[93] Socrates suggests shaping values differently by utilizing the mythic register.

How to educate the guardians who will watch over the city with justice? They will have to learn to distinguish truth from lies, true stories from false ones.[94] In order to teach them this, we must start with the fables told to the children. Socrates then enumerates a whole series of stories of the gods and heroes of ancient Greece, and all the aspects of

[92] Plato, *The Republic*, II.372d-374e.
[93] Pla. *Rep.* II.376d-III.403c.
[94] Pla. *Rep.* II.375a-383c.

the stories that are false. As he continues, he strips the representations of the gods of the characteristics usually associated with this mythology: internal quarrels, fights over women, disguises to seduce, etc. Socrates removes from these stories all the excesses of sex and power, precisely those that Glaucon associates with the fundamental desires of human beings. In doing so, he subtly contradicts Glaucon's idea that everyone, if he could, would indulge in the excesses of those desires for sex and power. This idea of Glaucon refers to another myth, that of the ring of Gyges.[95] Socrates wants to show how the stories of the gods that his companions have heard since childhood have distorted their desires.[96] He emphasizes the fact that these myths should correspond to divine truth;[97] they must have a kind of transparency that reveals the real.[98]

What is curious, then, is that the Republic is described as being based on a founding myth understood as a noble lie.[99] This founding myth tells us that every citizen is born with a soul of gold, silver or bronze, a soul that will determine one's place in the city. This myth structures the separation between children and parents and emphasizes the control of the population with respect to function.

But as Socrates says, we must distinguish one myth from another, the true from the false – even when it comes to Plato's own text. There are many inconsistencies. Could that be an irony of the text? Does he implicitly prompt us to see this founding myth of the city in the critical light of Socratic pedagogy – a pedagogy that stresses the fact that the myths of the gods must remain faithful to the truly noble character of the divine? Is this myth truly noble, does it reveal the real, and does it lead to the ethical education of the people? If the first goal of education

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[95] *Rep.* II.359c-360d.

[96] *Rep.* II.377a-378 e.

[97] *Rep.* II.379a-383c.

[98] Lambros Couloubaritsis, *Aux origines de la philosophie européenne* (Bruxelles: De Boeck, 2003), 57.

[99] *Rep*. III.414b-415d.

according to Socrates is to learn to discern the true stories from the false ones, could the myth of the metals be a test of education? This suspicion is reinforced by the fact that, according to the myth of the metals, one would try to convince the first rulers that their education was a dream and that in fact they had been educated underground before being sent to the surface.[100] Is this a counterpoint to the allegory of the cave, where precisely, education consists in escaping subterranean representations?

Setting aside the author's intention, it seems to me that the myth of the metals obscures the world as it is understood today, instead of representing it figuratively. Moreover, this myth supports an authoritarian regime that we would not support in our context. This myth seems to me not only suspicious from a political point of view, but problematic from an ethical point of view. In Plato's text, we can distinguish between types of myths: myths that reveal, and myths that conceal.

The mythic register is powerful, and it is precisely for this reason that we must proceed with caution in the understanding of the world that it communicates and the values that arise from it. However, we cannot do without the mythic register, if we see it as a vector of meaning and values, capable of captivating the spirit and mobilizing action.

Let us return to the question of how the mythic register is used to communicate the meaning and value of an issue such as the pollution of the oceans, those depths that are outside (for most of us) our direct experience. One way of communicating reality in the mythic register is, of course, through artistic representations. One example of this is the aboriginal art exhibit that will be presented in Geneva in September 2017 in connection with the exhibition "The Boomerang Effect – The Aboriginal Arts in Australia" at the Museum of Ethnography of Geneva. The Torres Strait Pormpuraaw Artists GhostNets Project consists of sculptures created from lost or abandoned fishing nets, known as ghost

[100] *Rep.* III.414d.

nets.[101] Thrown into the sea and carried away by the ocean currents, ghost nets are harmful to marine life.

A team of researchers, rangers, volunteers and artists has been formed to help deal with these ghost nets.[102] The clean-up work led to the creation of sculptures of marine animals. This artistic movement seeks to raise awareness of the problems caused by pollution, not just for the ocean ecology but also for the people who rely on the sea for their subsistence. Apart from the economic challenges, many marine animals affected by pollution have a totemic value for the aboriginal people. Ocean pollution also threatens the mythic foundations of certain cultures.

The connection between danger and mythic significance is emphasized by the fact that the nets are called "ghost nets": the term is not only figurative but supernatural – one might say, mythic. The nets pose a real danger, but this danger is also represented figuratively, as are the mythic creatures of another aboriginal people, the Inuit's Qalupalik. Qalupalik is a human-like creature that lives in the sea and that steals children who wander to close to the shore. The Qalupalik represents a real danger – drowning – but in mythic form. This myth aims to keep the children of the community safe by communicating a danger in a figurative form.

The ghost nets project communicates a concrete danger through figurative representation, but in this case the narrative is aimed at a much wider audience than the community, because the ethical responsibility for the safety of this ecosystem and those who depend on it transcends the Aboriginal community. It could be said, moreover, that this project goes even further than the figurative representation of a

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[101] http://www.artsdaustralie.com/pdf/Presentation-oeuvres-Pormpuraaw.pdf.

[102] The following information on the ghost net exhibit was provided by the UNIGE Communications Department. See also http://www.artsdaustralie.com/pdf/ sculpture-ghostnet-aborigene.pdf.

concrete danger. The project transforms harmful substances into objects that not only raise awareness of danger, but are also objects of beauty. Through artistic creation, the artists found a way to transform materials harmful to the ocean, not just by recycling them, but by creating objects that can convey their message in order to raise awareness about a situation that is unfamiliar and far removed from the target audience. This awareness develops through both the senses and the imagination. We see the nets in their materiality, but we see them also transfigured into representations of the animals that they harm. And in this way, finally, the totemic value of these marine animals can emerge through the artistic creations that are both concrete and symbolic.

Another way of communicating in the mythic register is of course through speech. What words, metaphors or narratives could help us consider the depths and the plastic pollution that threatens them, without obscuring reality (whether by exaggerating or minimizing it)? As of now, I dare not rush to give a concrete answer to this question, because this, like the ghost nets project, would take multidisciplinary collaboration, among researchers in the sciences, humanities, arts, journalism, and more. Given this, I am very pleased to be able to participate in this colloquium that brings us together from various fields, providing an opportunity for me to learn more about the reality of ocean pollution[103].

[103] Stewart-Kroeker S. (2017): *Pilgrimage as Moral and Aesthetic Formation in Augustine's Thought*, Oxford: OUP.

ANNEX

WATER ETHICS
PRINCIPLES AND GUIDELINES

Endorsed by Globethics.net Board

Preface

The formulation of the Water Ethics: Principles and Guidelines was submitted to Globethics.net by a Geneva based Association, Workshop for Water Ethics (W4W), under the conceptual and editorial guidance of Dr Benoît GIRARDIN. The Principles and Guidelines have been circulated to Globethics.net partners and members as a discussion paper. The present text has been significantly enriched by the comments that were submitted by experts in the field. Particular thanks are due to W4W members (Dr Dr Evelyne Fiechter-Widemann, Dr Gary Vachicouras, Dr Annie Balet, Dr Laurence-Isaline Stahl Graetsch and Dr Christoph Stuecki), Dr Ignace Haaz, Prof. Emmanuel Ansah, Prof. Susan Lea Smith, Prof. Christoph Stückelberger, the Ecumenical Water Network, Mr Richard Helmer (former World Health Organization employee in the environmental health department), Bread for the World, Waterpreneurs, the International Committee of the Red Cross and the Commonwealth of Learning as well as others. The final consolidation of the text was then entrusted to the initial authors.

The text was approved by the Globethics.net Board of Foundation
in August 2019.

A. Introduction

Water is essential for all life. It is a key element for a life with dignity and a condition of all human rights because without water, and food, no other rights can be implemented. Water is a critical common need for all human beings and all forms of life, including plants, animals, and the atmosphere.

There have been many international statements on water: the United Nations Human Rights Declaration 1948, Art 3 and Art 25; the International Covenant on Economic, Social and Cultural Rights (ICESCR), 1966, Art. 11; the International Covenant on Civil and Political Rights (ICCPR), 1966, Art. 6; the Mar del Plata Action Plan issued at the 1977 United Nations Water Conference; the 1992 Dublin Principles from the United Nations International Conference on Water and Sustainable Development; the United Nations Economic and Social Council (ECOSOC) Commentary No 15, 2002, Art 1 et al; the July 2010 United Nations General Assembly 64/292 resolution on access to water and sanitation. Water for all is also at the core of the United Nations Sustainable Development Goals (SDGs, Goal 6). Other United Nations agencies, including the World Health Organization (WHO), United Nations Children's Fund (UNICEF), the Food and Agriculture Organization (FAO, Right to Food Voluntary Guidelines 2005) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) have also issued declarations, not to mention the Water for Life statement issued in 2006 by the World Council of Churches/Ecumenical Water Network and the Ecumenical Swiss-Brazilian Water Declaration in 2005.

Globethics.net seeks to complement and complete these international statements in stressing the ethical considerations related to water, including the operational and practical dimensions of the management and use of water.

Globethics.net with its focus on Ethics in Higher Education contributes to the discourse on water as a cross-disciplinary topic affecting all lives as well as those of university students and staff. Ethical considerations of water use and management is a teaching and research topic in many faculties, from agriculture to the environment, from architecture/housing to urbanization, from anthropology and theology to economics and political science. Water is already featured in the Globethics.net Academy online courses on sustainability and other topics as well as in the Globethics.net Library resources and among the volumes available in the Globethics.net Publications series.

The sustainable use of water resources at local, regional and global levels requires a differentiated and integrative responsibility on the part of all users: individuals, households, public authorities, the private sector, and policy makers.

B. Current Water Issues: Cases and Challenges

1 Awareness of All Kinds of Users

Freshwater resources have always been limited, in some places they are insufficient, often unequally distributed and inequitable in access. An awareness of an overall limitation is emerging. More and more users are aware that drinking-water limits, waste water challenges linked to health as well as watercourse limits will soon be reached and that we cannot continue to believe, or make believe, that all water resources are simply available to all those who want to use them. This awareness affects all users, from individuals, families, local and regional authorities, watershed residents, farmers, industrialists and private sector actors to States and more generally to the international community.

2. Global Responsibility and Solidarity

The use of water brings together residents of the same watershed, riparian residents of the same watercourse or water surface, users of the same well or the same source. It thus induces co-responsibility and requires political will and geographical solidarity. However, such solidarity has been and still is ignored by some individual riparian communities who are unwilling to cooperate.

3. Historical Evolution

The use of water has evolved over the course of history, particularly in the wake of droughts due to climate changes in the distant past, and more recently industrialization, intensive agriculture and exponential urbanization. Floods, droughts and water shortages have been mitigated by building dams and protective dikes. Extreme events such as floods, droughts and contamination have awakened the need to manage water resources better, regulate flows, and be better prepared for water related disasters. However, these mitigation measures and interventions may not be adequate, and implementation may be delayed by insufficient capacity.

4. Differences in mentalities. Waste and Ignorance

Some of the current problems are related to mentalities shaped by traditions, cultural values, and perceptions forged in a rural or urban context of relative shortage. These mentalities are ill-adapted to the current context of water supplied through networks, pipes and taps under regular pressure — in other words of relative abundance. This is evidenced by the extravagant use of water in urban networks, excessive irrigation in agriculture and some overuse in industries, as well as insufficient awareness that any use requires treatment. In addition, age-

old models persist, attributing heavy tasks such as fetching and supplying, cooking, washing to women, while men sail, fish and irrigate.

5. Complexity and Fragility. Exposure and Vulnerability

Nowadays, the understanding that water is part of a highly complex and relatively fragile system is becoming clearer. There is a better understanding that the water cycle should be considered from upstream to downstream, from extraction of springs or groundwater, to the treatment of wastewater and contaminated water. Due to the dramatic consequences caused by pollution or simply by the transport of pathogens, the diffusion of micro-pollutants and micro-plastics, the importance of water in the food chain is more clearly understood now than in the past.

6. Overexploitation of the Resource and Efforts to Contain it

Increasing demand for water due to urbanization and population growth, as well as intensive agriculture and industry, hydropower and other uses, has put great pressure on this resource. This might lead to a more distinct differentiation in valuating water depending on its origin: whether it is groundwater or runoff drainage or if it is desalinated, or whether it is water from rivers, lakes, swamps, or seas. Fresh water is used abundantly much too often for agriculture, irrigation and industries that could better accommodate used water.

7. Technological and Economic Efforts to Contain Water Overexploitation

In terms of the use of resources, there is a tendency to disassociate or even to separate specific uses of drinking water, bathing and washing of

clothes and cleaning water compared to the water used for flushing, cooling, irrigating, heating, transporting or generating electricity. Reclaimed water use needs to be further optimized. Separating wastewater collection systems from rainwater systems contributes to more efficient use. Treating wastewater contributes substantially to increasing the volume of usable water that is available. Technological solutions can be introduced to detect water leakages and measure and invoice water use in a more efficient and fairer way.

8. Political and International Dimension of Water

The management of water resources has led in the past to frequent conflicts, both between families of the same village or bordering the same watercourse or lake, between rural areas and agglomerations, as well as at between regions or states located up and downstream. The potential for conflict is high and some observers today predict that future conflicts will find their roots in the way access to water resources is managed. Already today, many areas in the world are affected by water conflict. Access to water thus has a political dimension at both local and national levels through the way in which priorities among users are negotiated or imposed by the strongest.

It also has an international dimension in that many rivers and aquifers traverse several countries and that pollution by one might affect others. A multilateral dimension can be added insofar as erosion resulting from deforestation, pollution of streams, seas and oceans, global warming and the resulting ice melting exceed the responsibility of riparian countries and concern the entire international community.

Although the water footprint can be easily figured out at a local level, the extended impact of water use, or misuse, also has an international dimension when crops that are grown, or livestock that are raised using a considerable amount of water locally are then exported by water stressed countries to countries endowed with abundant water. The

level of damage due to water scarcity is not the same across all terrains and territories. A rebalancing scheme needs to be developed internationally as well as remedial measures specified and implemented to ensure equity.

9. Religious Dimension of Water

Water is a key element for all world religions. Water is a symbol of life, of renewal, of purification. It is used as a symbol in religious acts such as baptism, ritual washing and it is to some extent seen as holy. This is evidenced by many tales and myths in which water is associated with life or danger, as well as with rituals of purification and blessing in ancestral religions, such as Hindu bathing practices in the Ganges, Christian baptism, ablutions prior to Muslim prayer, aspersion in Judaism and Sikhism. In African traditional religions, streams and lakes are often dwelling places of goddesses or gods, and statues of Hindu goddesses or gods are immersed in water.

C. Ethical Values and Principles

Water, its use, allocation, management, treatment, recycling and reuse, must be informed and led by values and principles. Water ethics is a part of global ethics across cultures and religions as water is a common need for all human beings and all forms of life, including plants, animals and the atmosphere.

10. Ethical Values

Water ethics must be based on values such as *equity* (e.g. providing water as a basic need in a fair, impartial and inclusive way), *equality* (of

affordable access to water[104]), *freedom* (of access), *responsibility* (e.g. in use and recycling), *peace* (e.g. in distribution mechanisms), *respect, inclusiveness* and *community* (in the sharing of limited water resources), *solidarity* and *sustainability* (in long term preservation of access to water) and others.

Water ethics is relevant across domains of ethics such as business ethics, political ethics, environmental ethics, bioethics, innovation ethics, ethics of technologies, cyber ethics, etc.

11. Ethical Principles

Water management must respect the ethical principles of sustainability, justice, equitable rights to access, responsibility and solidarity. These values frame and ease the peaceful management of water resources, for example in cases of conflicts of interest, to promote a sense of security and ensure equitable rights between protagonists as well as an economic and sober use of the resources. A key dimension of its implementation lies in the governance and the process of considering the needs of the various users.

11.1 Principle of Justice in Access for All to a Vital Minimum of Water

States must give priority to access to drinking water for communities over other uses, and thus ensure that water management and

[104] See in Globethics.net publications: *Global Ethics for Leadership. Values and Virtues for Life*, 2016 (Global Series 13); Christoph Stückelberger, *Das Menschenrecht auf Nahrung und Wasser. Eine ethische Priorität* (The Human Right to Food and Water. An Ethical Priority), 2009 (Focus Series 1); and *Globethics.net Principles on Equality and Inequality for a Sustainable Economy*, 2015 (Texts Series 5).

infrastructure is sufficiently robust and adequately maintained as well as better differentiate water according to whether it is drinkable or not. It should maximize the use of recycled water for other uses.

Public authorities must ensure that the price of supplied water is based on the fair use of meters, that it is affordable and accessible to all groups, including the most vulnerable, disadvantaged, women and children and that minority groups are not discriminated against.

11.2 Principle of Sustainability and Responsibility to Protect

Water must be managed following the principle of sustainability, in order to avoid overexploitation, and depletion beyond the point of any possible recovery, with distribution measured and released on the basis of supply. Pollution must be prevented and any damage caused by contaminants mitigated and effectively treated as a matter of utmost urgency. Sustainability refers also to the ability of the resource to regenerate, the so-called resilience of aquatic ecosystems.

Dual use, recycling and reuse strategies and initiatives must be implemented at all levels of society.

Management structures and strategies to protect and conserve the resource must be enforced to ensure sustainability.

11.3 Principle of Equitable Rights to Access Drinking Water and Responsibility to Protect

Access to safe drinking water was recognized by the United Nations General Assembly and the Human Rights Council in 2010. Everyone everywhere must have equitable access to safe drinking water.

Governments, the private sector, civil society and water users must share the responsibility of ‘leaving no one behind’. The risks of leaving behind smallholder farmers, small herders, fisher-folk cannot be ignored and need checks, as well as remedial measures.

Terms of implementation, including management arrangements and allocation arbitration between users must be specified accordingly.

11.4 Principle of Sobriety

Sobriety in the use of water by individuals, families, households and institutions deserves to be encouraged. Economic and financial incentives, as well as management instruments, must discourage the misuse of water, foster sober use of the resource and rule out making high consumption an attractive or viable choice. This requires promoting changes in behaviour and in the development and use of water fittings, appliances and technology designed to optimise water use.

D. Innovation Ethics: Solutions to Take into Account

12. Technical Solutions

The capacity to recycle polluted, waste, saline or brackish water has greatly improved in recent decades. Innovations — particularly in filtering membranes, ionization, double osmosis, oxygenation and so on — are promising and need further improvements as well as open sharing of research.

Similarly, techniques to conserve water or reduce demand in agriculture and industries and to differentiate more effectively between the supply of fresh drinkable and non-drinkable water and used water needs continued refinement. Technologies to detect water leakages in pipes and water meters in households combined with bills based on water meters can substantially increase efficiency and decrease corruption in water management.

Innovations with respect to less water-intensive crops represent an incentive for agriculture to adapt to the decreasing volume of available water.

Replacing water-intensive crops with less water-intensive ones – for instance rice replaced by millet, or maize by sorghum – are important. They need further investigation with regards to its feasibility and acceptance by producers and consumers.

13. Scientific Innovation

The measurement of the water footprint locally tapped and processed, as well as the water footprint of goods grown with quantities of water and exported between regions sharing diverse levels of water scarcity through international trading of commodities needs to be further researched. This is in order to supply proper instruments in the processes of attributing a water scarcity footprint to regions, that might be set nationally or through international negotiations.

A mix of criteria to assess allocation claims by users and stakeholders and weigh them in terms of equality, effectiveness, sustainability, solidarity and inclusiveness needs to be further articulated and specified. Also, ways to secure proper acceptance of allocations by all must be identified, tested, analyzed, documented and disseminated.

Further research should also focus on the feasibility and positive benefits of behavioural changes, to ease adaptation of ancestral and modern day habits in the use of water.

14. Institutional Innovation

Successful negotiation processes aimed at fair allocation among stakeholders need to be analyzed, documented and shared. Avoiding traps, as well as identifying incentives towards fostering sustainable and sober water use need to be further analyzed and documented. Best practices once confirmed need to be disseminated and the means put in place to implement the learning as appropriate. The state authorities for

water management play a key role and have to increase procurement transparency and anti-corruption mechanisms.

15. Ethics of Innovation

Innovation must align with responsibility and meet the ethical requirements of open sharing, it must be evidence based, checked against the reality, use solid methodologies and be open to frank debates with the common good put above the interests of the different parties.

E. Economic Ethics: Public Good and Economic Market Value

16. Free Water and the Potential for Misuse

Water is fundamentally a public good but it also has an economic value, which is determined by the level of scarcity/availability, seasonal variations, water quality, infrastructure for distribution and the competing needs of local populations, industry and agriculture in the different regions around the world. When water is simply free, the door could be opened to profligate usage - faucets that flow uninterrupted, irrecoverable losses - or to water resources being commandeered for the exclusive use of the most powerful or most influential users, without regard to limits or costs to the environment or ‘local communities.

17. Cost of Water

Water as such is priceless, but using it has a real cost, including investments related to extraction or collection, upstream filtering, pipeline routing, instruments for measuring quality and volumes consumed, equipment for waste reduction and wastewater recovery, treatment and recycling. There are also costs related to the maintenance

of the entire system and the administrative costs required for this management, whether it is carried out by public authorities or subcontracted to private operators or associations. All of this involves investments, maintenance and research and exploration expenses to expand or develop new modes of use and savings in consumption.

18. Calculating the Price of Water

The price of water must be calculated in the most transparent way possible taking into consideration all the costs involved: initial investments, operation and maintenance, new investments as well as research and development, in order to show the profit margins realized by the operator, if any. This "true" price can be accepted all the more easily since users realize the benefits of quality water, considering the savings made on the cost of purifying water and treating waterborne diseases. This supposes that the volume consumed can be measured and invoiced, and that the tariff structure and tiers are set in a straightforward way.

19. Encouraging the Economical Use of Water

Establishing the price of water based on the volume consumed can easily be an incentive leading to more sober usage, and savings in energy. This is true in both publicly administered and informal jerry can water delivery systems. Reverse-tiered tariffs meant to discourage over-consumption while pricing high consumption at a higher level has proven to be a solid tool in that respect. New technologies such as ‘water ATMs’ combined with tokens and instant payment via mobile phone are low cost methods for increasing the accessibility and affordability of water.

20. Polluter Pays Principle

Costs related to decontamination, or at least the containment of pollution must be borne by those responsible for this pollution. It is only when those responsible cannot be identified that public funds and donations should be solicited.

21. Imperative for Decision-makers to Provide Subsidies or Vouchers for the Poorest

It is up to the political decision-makers to define the limits of possible subsidies or vouchers for disadvantaged groups as well as equalization systems making these subsidies or vouchers possible and measurable. They should also be responsible for defining the price modulation criteria according to the level of consumption, in order to differentiate between big consumers (industries, institutions, irrigation) and the more modest uses of households and small businesses. Decision-makers must do this while keeping in mind the principles of cost recovery within the overall water supply and treatment budget, as well as prioritizing the use of drinking water for individual users and encouraging savings in consumption.

22. Water Infrastructure: Establishment, Maintenance and Renewal

Construction costs of infrastructure designed to extract and collect water, protect sources, treat and store water, such as dams and reservoirs are quite expensive and might incur loans or grants that must be paid back over time. There are similar costs related to the infrastructure needed to keep regular pressure in the network, collect used water, treat and possibly reclaim it. On top of the construction costs, the infrastructure needs to be maintained and renewed. The whole pipe

network needs to be extended and replaced when heavy leakages are traced. Responsible budget and financial planning should keep in mind amortization costs, maintenance and renewal.

F. Peace Ethics: Managing Conflicts of Interest and Conflicts between Users

23. Volumes of Water Available: when Demand by many Users Exceeds Supply

Conflicts of interest between types of use and conflicts between users are involved in any form of access to water by human groups. Householders expect to be able to drink, cook their meals, wash themselves and their clothes and evacuate sewage. Farmers want to water their crops in a timely manner. Industries expect to be able to use water to add to products, to clean and to cool or heat installations during their production processes. Fishermen want to ensure that streams are not diverted to the point of drying up. River boatmen and river carriers are concerned about low water levels preventing any transport or reducing the volumes of goods that can be loaded. Cities try to avoid epidemics caused by waterborne infections, manage resources and supply residents, industries and public fountains, and clean public roads, water public parks, secure water for fire hydrants and fire departments. All these expectations may be hard to meet at the same time or in the expected volumes.

24. Spreading Pollution of Surface Water and Aquifers

Conflicts may also arise about water quality, as can be seen in polluted rivers. They may concern surface water but also groundwater, also called aquifers. It is a characteristic of water to facilitate a rapid

diffusion and expansion of pollution, unlike soil in which pollution can be more easily isolated, circumscribed and controlled.

25. Water as a Weapon

In some cases, water even becomes a weapon of pressure, blackmail or threat by one group against another, especially groups living upstream acting against those living downstream, or groups bordering a lake on other riparian area. Water may be used by terrorist groups or even regimes at war. Deliberate poisoning of wells and streams is an ancient practice, a practice that is still carried out today as a weapon of war.

26. Arbitration among Different Users

The main issue is not about the possibility of avoiding conflicts, but about the optimal way to manage them. The management of water conflicts implies first that one acknowledges that they exist, and that available resources are assessed in the short, medium and long term, and then communicated among the parties involved with a view to finding solutions and to resolving conflicts.

It is important that the most neutral authority possible - or the least subject to particular or vested interests - is identified and agreed on to arbitrate disputes. Then, the parties must reckon with the interests and needs of the different stakeholders/users (households, industries, farmers, communities) and work towards consensus. In order to achieve this, there must be convergence with regards to prioritizing the needs of users and weighting them, to more efficient management as well as to transparency and accountability. Consequently, the level of flexibility can be enhanced in terms of timely and seasonal adaptation by type of

users. Trans-border lakes and rivers water agreements should follow the same process.[105]

27. Priority to be Given to the Assessment of Available Water Volumes

The assessment that must be made first and foremost concerns the volume of drinking water available compared to the volume of water that is not necessarily potable, taking into account the seasonal variations of both.

28. Promote an Open and Informed Debate

It is then essential that the main principles of water resource management are defined by the public authorities, not by technocrats, and that the inputs expected from experts be limited to establishing water management procedures and evaluating the consequences of choices made. The criteria for valuing and prioritizing the various needs must be the subject of an open and informed debate. Vested interests should be kept under check and named. Too often the power given to experts is excessive and risks opening a wider door to targeted corruption.

29. Scarcity of the Resource and Reasonable Consumption

Paradoxically, it is the recognized scarcity of the resource that facilitates the process of prioritization and global distribution. So long as

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[s] See Globethics.net study on the Great Lakes region: Lucien Wand'Arhasima 2015, *La gouvernance éthique des ressources en eaux transfrontalières. Le cas du lac Tanganyika en Afrique*, Globethics.net Focus 25, 2015.

the resource seems unlimited, the need for prioritization seems to be an artificial and even unnecessary exercise, and users seem unwilling to reduce their consumption.

30. Virtual Water Cost Fully Considered in International and Interregional Trade

With regards to fresh water consumed in the growing of agricultural commodities and livestock that are traded between regions and countries, the resulting water scarcity footprint should be adequately taken into consideration by the exporting countries and acknowledged by importing countries. Costs incurred by deforestation, soil impoverishment, groundwater depletion and decreasing biodiversity cannot be ignored or downplayed. Overall sustainability as well as damage caused to vulnerable smallholder farmers need proper consideration, which should be an integral piece in international trade arrangements.

G. Governance Ethics: Regulating and Managing Water

31. General Debates on Water

Regional and national political authorities have every interest in convening general debates on water, inviting representatives of all users and stakeholders to sit around the same table. The purpose would be to learn about current and future available resources regionally or nationally as well as about the quantities consumed or required by the various user groups, households and individuals, firms and industries, farmers, the transport industry, fishermen and public institutions including fire departments. The state of play drawn up by this type of multi-stakeholder platform must be as precise as possible, and solidly

documented. Seasonal variations as well as historical records and prospective trends should also be considered.

32. Towards Zero Tolerance of Corruption

Corruption related to water shares, water infrastructure projects, water legislation, etc., not only entails serious breaches of equity and sustainability, but also results in wasting water and in the non-economical use of the resource. As a consequence, local, regional and national authorities need to make it their priority to minimize impunity and impose serious sanctions on abuses; in other words, they must adopt a policy of zero tolerance of corruption.

33. Mode of Management Debated and Adopted According to a Consensual Alternative to a Majority Judgment

A series of essential criteria for water management must be identified and endorsed by the entire multi-stakeholder platform. The main criteria refer to equality of access, sustainability and recycling potential, production and growth, potential to anticipate and adapt to change, pollution impacts and effects exacerbating climate disruptions. Risks incurred due to shortages and breaks in supplies must be discussed and assessed by the platform.

The assessment of all these values and risks is then carried out, if not by consensus, at least by a qualified majority of participants. The framework of a management system can thus be assumed and owned by all stakeholders.

Such a hierarchy makes it possible to face situations of scarcity and exacerbated competition between users according to the seasons or changes of context. It is not a miracle cure, but provides guidance to

absorb shocks, prevent overly destructive conflicts and punish offenders. It has the advantage of being dynamic, flexible, adaptive and innovative.

34. Fair and Credible System to Settle Divergences

Governments must represent the interests of the whole human population of a country/legal entity and of the environment. They must also respect the interests of human beings and the environment in neighbouring countries. In addition, when States act as neutral arbiters, inviting protagonists to join inclusive platforms and encouraging everyone to be realistic and respectful of the needs of others, they reinforce the interdependencies between different uses and user groups. In this way States strengthen the foundations for solidarity. States must ensure methodical rigor and that every stakeholder is listened to. They are well placed to point out the terms of arbitration and weight of the respective interests. States that are engaged and assume their responsibilities as decision-makers can capitalize as much as possible on convergences and the understanding of interests in competition. States must keep in mind that corruption that favours the interests of a single group breaks the trust required for the implementation of the process and the need to commit to aim for zero tolerance of corruption.

35. Decisions Taken to be Implemented under Penalty of Punishment

States ensure that a legal frame is established and enforced, within which effective remedies and punishments of offenders are enacted by a judiciary system that is as impartial as possible. In this way all stakeholders can develop a solid trust in the judiciary and see the risks of violent antagonisms being minimized.

36. Holistic and Interdisciplinary Approach to Be Promoted at the Local Level

The State also ensures that the different dimensions of water management — technical, social, legal, ecological — can be part of a holistic approach and that its interdisciplinarity be ensured by the help of various specialists and community representatives. It avoids an exclusively technical approach and avoids asking questions about the use and distribution of water in purely technocratic terms.

37. Holistic and Interdisciplinary Approach to Be Promoted at the International Level

A similar approach can be implemented in cases of water management in an international setting. The role of arbitrator must then be devolved to a continental body (European Union, African Union, regional cooperation) or to the United Nations. Promising multi-stakeholder alliances have been established (by the United Nations Environment Programme for example) and need to be strengthened, such as the World Water Quality Alliance, the Circular Economy Alliance, the Global Waste Water Fund, the Water Branch of the Global Compact and others.

H. Religious Ethics: Spiritual and Religious Traditions and Beliefs

38. Symbolic Significance of Water

The great religious and spiritual traditions all recognize the symbolic importance of water vis-à-vis purification and regeneration, as well as its general utility [see § 8 above].

39. References to World Religions

World religions speak of the gift of watering the earth to fertilize it, to allow it to bear fruit and to regenerate (Bible Genesis1; Job 5:10; Quran Surah 21,30; 22,63; 24, 45). However, it is also seen as a real and potential danger in the event of floods (Bible: Genesis 8; Jonas 1). The Hindu god Narayana is said to live on water; in Buddhism, Bodhisattva is sitting on the lotus, a water plant. Taoism compares man's path to life with a stream of water (Zhuangzi 19/ i / 49 – 54). In ancient Greek and African world views, goddesses often dwell in seas, lakes and streams.

Many religions stress the importance of purification by water. Hinduism considers rivers, particularly the Ganges, as sacred. Water is associated to purification in Jewish washing rituals and Muslim death rituals as well as to conversion and regeneration in Christian baptism and blessings. In Islam ablutions form the first step of each of the five daily prayers. Shinto rituals such as *misogi* refer to water. Major holy places in Sikhism and Hinduism have a link to water pools where purification rituals take place. Monotheistic religions highlight water as a divine gift and emphasize respectful use and adequate management of the resource.

40. Duty to Give Water to the Thirsty

Abrahamic and Dharmic religions regularly stress the duty to provide the thirsty with water. Nowhere in the sacred texts can refusal to give water to those who are thirsty be justified. All water deprivation is forbidden, even the enemy cannot be deprived of water (Bible: Proverbs 25:21; Romans 12:20; Hadith al-Bukhari 3.838), thirst should be quenched.

41. Call to Stewardship

Judaism, Christianity and Islam all stress humankind's responsibility with respect to stewardship and custodianship of water as a resource and public good.

42. Lack of Attention to the 'Socius'

Although spiritual and religious traditions recognize their neighbour's thirst and are obliged to ensure that their neighbour's thirst should be quenched, they have not really addressed the economic value of water and have downplayed the dimension of costs and markets. The importance of reaching a fair market value for water has been minimized and that could pave the way for overexploitation or pollution following the logic of power and irresponsibility. 'Objective solidarities' with others or 'mediated solidarities' with other humans that one never meets, but with whom water is shared through watersheds, systems, networks and institutions, need to be kept in mind.

43. Conclusion

Both states and local authorities, as well as religious, academic, private sector, civil society and individual voices must call for a responsible, respectful and sustainable use of water, join hands and challenge each other to improve sustainable, equitable and effective water sharing.

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Blue Ethics

Ethical Perspectives on Sustainable, Fair Water Resources Use and Management

Benoît Girardin is presently lecturing at the Geneva School of Diplomacy and International Relations. He worked five years in a slum upgrading project in Douala, Cameroon where access to water, floods, tides, sanitation and drainage represented critical challenges. As director of the Swiss Cooperation Agency in Pakistan, Romania and Madagascar, as Swiss ambassador, he has gained large field experiences in the water and sanitation domains.

Evelyne Fiechter-Widemann, formerly barrister at the Geneva Court, lives presently in Singapore where she is researching water ethics. Her thesis in Theology: "Human Right to Water: Justice or…Sham?", was presented at the University of Geneva in 2016; she is president of the Workshop for Water Ethics (W4W).

For many policy makers, urban managers, water experts, technicians or activists, ethical perspectives in water management are not important or do not bring any added value. A debate seems to be locked between those stressing mainly the right of access to water for all and those who cannot go beyond economic realism. The sustainable use of a resource that becomes under growing pressure, in terms of extraction, allocation and recycling looks as a technical issue, not to say a technocratic one.

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