BACKGROUND DOCUMENT

Water and the Future of Humankind

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TIME FOR **SOLUTIONS**

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The views and opinions expressed in this report are those of the authors and do not necessarily reflect the position of the International Forum Committee or its member organizations.

1. Introduction

The 'Think Tank on Water and the Future of Humankind' is formed by eleven prominent persons in the water field invited by the Calouste Gulbenkian Foundation (Lisbon, Portugal) to analyze noticeable features of the dynamic interactions between water systems and society in the XXI century

The aim of the Gulbenkian Think Tank is to enhance knowledge on the role of water in the world, by reflecting on the use of water till 2050 and the state of water resources in the planetary environment. It will reflect on the possibility of water constraints creating serious barriers to development.

The Gulbenkian Think Tank is expected to examine likely trends, in terms of water availability and management of water, on the one hand, and how these trends compare with the growing demand for additional water from various sectors and interests, on the other. The Think Tank should conduct analyses that will pay attention to main driving forces and formulate visions about what kind of human effort is likely, possible and desirable.

The analysis undertaken by the Gulbenkian Think Tank is presented at the World Water Forum, in anticipation to the final preparation of a book, expected to be published by the end of 2012.

The members of the Think Tank are highly respected personalities from the science and the water management communities of different regions in the world. They have a good knowledge and experience as well as a broad vision of freshwater issues and development. The members of the Gulbenkian Think Tank are the following (in alphabetic order): Prof. Benedito Braga *(Escola Politécnica da Universidade de São Paulo, Brazil)*; Dr. Colin Chartres *(Director General, International Water Management Institute - IWMI, Colombo, Sri Lanka)*; Dr. William J. Cosgrove *(Honorary President World Water Council, Montreal, Quebec, Canada)*; Prof. Luis Veiga da Cunha *(Universidade Nova de Lisboa, Lisbon, Portugal - coordinator of the Think Tank)*; Dr. Peter Gleick *(President, Pacific Institute, Oakland, USA)*; Prof. Pavel Kabat *(Director, International institute on Applied Systems Analysis - IIASA, Laxenburg, Austria)*; Dr. Mohamed Ait Kadi *(President, Conseil General du Développement Agricole, Rabat, Morrocco)*; Prof. Daniel P. Loucks *(Cornell University, Ithaca, USA)*; Prof. Jan Lundqvist *(Stockholm International Water Institute - SIWI, Stockholm, Sweden)*; Ms. Sunita Narain *(Director, Centre for Science and Environment, New Delhi, India)*; and Prof. Jun Xia *(Director, Key Laboratory of Water Cycle and Related Land Surface Processes, Chinese Academy of Sciences, Beijing, China)*.

The members of the Think Tank were invited on a personal capacity and not as representatives of any organizations or institutions to which they are or have been associated. Reflections on the Gulbenkian Think Tank agenda are always provided with full independence.

2. Rationale

There is a considerable body of literature on the nature of world's water problems and the main challenges and issues related to water issues in this regard. The Gulbenkian Think Tank briefly describes the main problems, using material from existing assessments.

Existing forecasts concerning water availability and use primarily cover comparatively short periods, typically up to 2015 (the reference for the compliance of the Millennium Development Goals) or 2025/2030. For the horizon of 2050 studies are scarce. When looking at the expected changes from now up to 2050, the Gulbenkian Think Tank has extended the projection time of most of the previous analyses, while at the same time built on existing knowledge.

An estimate of the global direct and indirect water demand in 2050 (including direct water consumption and indirect water use) is made with reference to changes in population and GDP in countries, grouped into seven regions of the world. The demand will be compared with water availability in order to identify areas which will be exposed to growing water stress and areas

which have the possibility to meet domestic multiple requirements and even be able to contribute to development in water deficit regions, e.g. through trade.
Examples are provided to illustrate how changes in food production, supply and intake and waste patterns may contribute to save water (as well as having other benefits, e.g. reduced greenhouse gases emissions and environmental benefits).
The analysis covers both water availability and water demand of the different social and economic sectors. Another factor considered is the growing risk of changes to water systems from climate change and the associated increasing climate variability and unpredictability. Expected changes, such as the acceleration of the hydrological cycle, in terms of the speeding up of return flow back to atmosphere, will make food/agricultural production and water management more challenging in large parts of the world, while improving conditions in other parts. Thus, the review of existing assessments of climate change impacts on water at global and regional scales is important.
Like climate change, demographic growth, from the current almost 7 billion inhabitants of the Earth to 9.3 billion or more by 2050, will be a major driver of changes in water use. Changes in water demand will substantially increase the pressures on water systems towards 2050, with special implications for urbanization, water and food, water and energy, and the environment.

A significant and multiple driver relates to what is referred to as an expansion of the 'urban culture', as a feature in mushrooming cities. Currently about half of the world's population live in urban centres and with a projected urban share of some 70 to 80 percent of world's population in 2050, the demand for food, water, energy, etc. will generate footprints far outside the boundaries of the urban centres themselves.
Many argue that the pressures of climate change and demographic and economic evolution on freshwater could still be accommodated, with the help of the expected scientific and technological developments, economic incentives such as pricing water and the mobilization of sufficient financial resources. Indeed, the increased efficiency in water production, transport and use, and the implementation of sound water governance systems will certainly help to reduce the severity of many serious anticipated problems. The Think Tank argues that institutional arrangements and modification in human behaviour will also be essential.
However three aspects of future water problems are often neglected in current prospective studies, and deserve careful consideration.
The first aspect relates to the way we understand individual water consumption. There is a tendency to consider only the amount of water directly used (e.g. an average municipal use of around 200 L/person/day in the developed world and 40L/person/day, as a minimum amount considered by the United Nations for covering the individual basic needs. In many countries the actual supply is much less. The amount of water indirectly used, i.e. the water which is consumptively used in connection with production in the open landscape, especially food, is considerably higher: on average, around 2,000 - 3,000 L /person/day. Water balances should, thus, take in consideration the direct and indirect demand for water.
The second aspect deals with the fact that, globally, on average about 70 per cent of the water withdrawn from river systems, lakes and ground water sources is allocated to the agricultural sector. In domestic or industrial sectors, technological developments may significantly reduce the water use in relation to level of production. In agriculture and forestry sectors there are generally technical limits to the reduction of the consumptive water use in terms of the evapo-transpiration process involved in plant growth. An increase in the agricultural production often implies an increase of water consumption although there is often scope for improvements in water use through institutional arrangements. The Think Tank gives particular emphasis to the water use related to agriculture and food production and food security concerns.
Finally, the third aspect is related to expectations from citizens of less developed countries to improve their standard of living. In countries with a rapid economic and/or demographic growth we can expect a high increase in water demand for direct and indirect uses, in particular water to meet an increasing need and demand for food. This is the case, for example in China and India

whose total population corresponds to more than one third of the world population. This development is natural and eradicating poverty and reducing socioeconomic disparities globally and at other scales is in line with the Millennium Development Goals. This development will, at the same time, substantially augment pressure on water systems and could undermine prospects for a continuous and stable development.

With increasing demands for water and with more irregular availability, environmental water requirements will be a hot topic. The demand for water has often been considered to be at odds with the need for water to maintain life of other organisms. In addition, discharge of human waste, and in particular wastewater into the environment has often continued without concern for its impact on ecosystems. We will have to address to what extent depriving ecosystems of water essential to life and poisoning them with waste would feed back to impact on human life and development.

The discussion above raises a number of aspects which should be a source of great concern. The availability of water can definitely become a constraint on development. Moreover, this limitation may become serious in a comparatively short period, without people in general being aware of the danger. As some have already claimed, the water crisis could even impact humankind more than the much discussed climate change crisis. However the public and political concern with global warming is currently much stronger than the concern with a global water crisis.

It is extremely important to recognize that these two crises are closely inter-related. Global warming will impact water supply and demand, as well as water quantity and quality. At the same time, water is clearly the main mediator of the impacts of climate change in the economy, the society and the environment. Obviously, this concern with water and climate change cannot leave aside other agents of the oncoming global change process, with special relevance for energy and food production.

There is thus a clear need for an inter-disciplinary and inter-sectorial reflection on the processes and issues involved in the anticipated global water scarcity and security, which should include the important interactions and feedback effects with energy and food security.

An important concern is the formulation of a positive vision of a desirable future for 2050. The desirable 2050 situation will certainly look different from where current trends would take us, i.e., existing trends should not determine or be a guide to the future. The Think Tank tries to identify approaches that reduce pressure on finite and vulnerable water resources.

A basic premise of the Think Tank Study is that with appropriate technological and economic measures combined with behavioral change and political commitment there will be enough of water, globally, to feed and meet the needs of a growing and wealthier population and to sustain vital life support systems. To achieve this, it will be essential to widen the notion of 'more crop per drop', to include multiple water-related benefits; 'more jobs per drop', 'better environment per drop', 'improved nutrition per drop', etc. Many of the current trends imply, however, that we are heading towards escalating problems.

The de-coupling between increased purchasing power and water pressure is a huge challenge. Many people will be richer while poverty is likely to haunt a large number of people. Societies, as a whole, will have to be prudent in water demand and use.

3. Layout of the Gulbenkian Think Tank Book

The book which is being prepared by the Gulbenkian Think Tank is still in construction. For instance, the discussions to take place in the Special Session of the WWF, although only related to a part of the issues covered by the book, may still influence and enrich the book. The tentative table of contents of the book presented below, although not final, reflects in a satisfactory manner the overall architecture of the book:

1. Changing future and pathways to the future
2. Drivers and consequences: projections and change of course
3. Climate and water
4. Water for a healthy environment
5. Water and the urban future
6. Water and food for nine billion people
7. Water and Energy
8. Moving to a sustainable water future
9. Conclusions and Recommendations