
Preface

*The future does not belong to anybody.
There are no precursors, only latecomers.*

Jean Cocteau

The Calouste Gulbenkian Foundation in Lisbon, Portugal, decided to create an international Think Tank to analyze noticeable features of the dynamic interactions between freshwater systems and society in the twenty-first century. This book is the result of such an initiative. I was honored by the invitation of the Foundation Board of Trustees to advise on the composition and working rules of this Think Tank and, later, to act as coordinator of the Think Tank activity.

The aim of the Gulbenkian Think Tank was to enhance present knowledge on the role of water in the world. Its reflections addressed water use until 2050, as well as the state of water resources in the planetary environment. The Think Tank has also reflected on the possible creation of serious barriers to development, caused by water-related constraints.

The Think Tank has examined likely trends, regarding water availability and management, comparing them with the growing water demand from various sectors. The Think Tank has also analyzed the main driving forces at play, in order to access the kind of human effort that is feasible and desirable to cope with future situations.

The members of the Gulbenkian Think Tank are (in alphabetical order): Prof. Benedito Braga (*President, World Water Council; Professor, 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, Canada*); Prof. Luis Veiga da Cunha (*Professor, Universidade Nova de Lisboa, Lisbon, Portugal*); Dr. Peter Gleick (*President, Pacific Institute, Oakland, USA*); Prof. Pavel Kabat (*Director and CEO, International Institute for Applied Systems Analysis—IIASA, Austria; Professor of Earth Systems Science, Wageningen University, the Netherlands*); Dr. Mohamed Ait Kadi (*President, Conseil General du Développement Agricole, Rabat, Morocco*); Prof. Daniel P. Loucks (*Professor, Cornell University, Ithaca, USA*); Prof. Jan Lundqvist (*Senior Scientific Advisor, Stockholm International Water Institute—SIWI, Stockholm, Sweden*); Ms. Sunita

Narain (*Director General, Centre for Science and Environment, New Delhi, India*); and Prof. Jun Xia (*Chair Professor and Dean, Research Institute for Water Security, Wuhan University, China*).

The members of the Gulbenkian Think Tank have assumed collective authorship of the whole book. Obviously, the members agreed to initially distribute the preparation of drafts of the book chapters, which were subsequently discussed in depth by all group members. The book is, thus, a true collective work. The book went through three successive editing processes: first, a scientific editing by Professor Daniel P. Loucks, member of the Think Tank; second, a professional editing by the London firm Scriptoria; and third, the final editing undertaken by the publishers of the book.

The global direct and indirect water demand in 2050 was considered, with reference to changes in population and GDP of countries, grouped into seven regions of the world. Global demographic growth, from the current more than seven billion inhabitants of the Earth to more than nine billion by 2050, will be a major driver of changes in water demand. These changes will substantially increase the pressures on water systems towards 2050, with special implications for food, energy, and the environment.

A host of multidimensional drivers is related to an expansion of the so-called *urban culture*, a feature in mushrooming cities. Currently, about half of the world's population lives in urban centers. By 2050, more than 70 % of the world's population will be living in urban areas. The impacts of the corresponding shifts in demand for food, water, and energy will be felt far beyond the boundaries of the urban centers themselves.

Considering increasing demands for water in line with its more uncertain availability, environmental water requirements will become a hot topic. The demand for water has often been considered to be at odds with the need for water to maintain the life of multiple organisms. In addition, human waste, and particularly wastewater, has been discharged into the environment with little concern for its impact on ecosystems. Depriving ecosystems of water, essential to their life, and poisoning them with waste would feedback negatively on human life and development.

The availability of water can become a serious constraint on development. This may happen in a relatively short period. Thus, the danger of insufficient timely awareness is very real. As some have already claimed, a water crisis could negatively affect humanity, even more than the much discussed climate change crisis. However, the public and political concern with global warming is currently stronger than the concern with a global water crisis. The Earth may be quickly approaching critical tipping points related to water, food, and energy security. It is important to recognize that the water and the climate crisis are closely interrelated. Global warming will affect water supply and demand, as well as water quality. At the same time, water is clearly the main mediator of the impacts of climate change in the economy, society, and the environment.

There is a clear need for an interdisciplinary and inter-sectorial reflection on the processes and issues involved in the anticipated global water scarcity and security problems, which may seriously affect the future of humanity.

Concerned with the different aspects referred to above, the Gulbenkian Think Tank has proposed a “Message on Water and the Future of Humanity,” which is presented just before the book text.

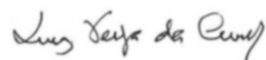
The book consists of nine chapters. The two initial chapters address, in an introductory manner, a number of issues particularly related to future water problems. These include the relationship between development, environment and water, the increasing water crises in the Anthropocene, water and globalization, and water governance (Chap. 1), and also the drivers of water demand, course changes, envisioning the future, projecting water demands and the need for a change of human behavior, involving modified social and environmental concerns (Chap. 2).

The following six chapters deal in detail with a number of critical factors already present but deemed to increase in the future. They relate to water in a variable and changing climate (Chap. 3); water, the environment and ecosystems services (Chap. 4); water in an urbanizing world (Chap. 5); water and food security (Chap. 6); water and energy nexus (Chap. 7); and water projections and scenarios (Chap. 8).

The book concludes by reviewing the main water-related challenges confronting humanity, followed by the consideration of ways to respond to these challenges, emphasizing the role of leadership, commitment, and responsibility (Chap. 9).

The book is intended to present the current knowledge about the challenges, risks, and opportunities present in our path to a future water sustainable world. Water sustainability is something much too serious to leave to politicians, managers, and scientists alone. It is a crucial issue for our emerging globalized world. It concerns everybody and will strongly condition the quality of our lives and even our survival.

The Gulbenkian Think Tank on Water and the Future of Humanity has aimed to offer a scientifically sound book and, at the same time, a readable and motivating one for the public in general. If the business-as-usual approaches, currently adopted to cope with water problems, are not drastically changed then the future of water and, as a consequence, our own welfare may be seriously threatened. We must take care not to be latecomers to the Future, as mentioned by Cocteau in the opening quote of this Preface.



Luis Veiga da Cunha
Coordinator of the Gulbenkian Think Tank
on Water and the Future of Humanity

Water and the Future of Humanity

Revisiting Water Security

Gulbenkian Think Tank on Water and the Future of
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