

Toward a Sustainable Water Future

Visions for 2050

Edited by

Walter M. Grayman, Ph.D., P.E., D.WRE Daniel P. Loucks, Ph.D. Laurel Saito, Ph.D., P.E.





ENVIRONMENTAL & WATER RESOURCES INSTITUTE

TOWARD A SUSTAINABLE WATER FUTURE

VISIONS FOR 2050

SPONSORED BY Emerging and Innovative Technology Committee

Environmental and Water Resources Institute (EWRI) of the American Society of Civil Engineers

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Foreword

Toward a Sustainable Water Future: Visions for 2050 comes at a very opportune time. The need to go out of "the water box" is greater than ever, as underlined from the third edition of the World Water Development Report series in 2009. The external forces that are impacting the state, use and management of water resources are not only accelerating, but the interactions among them are becoming more complex, be it the growth and mobility of populations, changes in the diets and consumption patterns, the impacts of economic development and the fluctuations in the international markets. The picture is further exacerbated by climate change, the growing and expanding quest for energy and the various incentives and disincentives that nations and supranational bodies implement in support of their various policies. And all these happen in the foreground of continuing crises, economic, financial, food and energy-related and sometimes political. Inequalities also continue to exist and the collective wisdom of the nations is yet to make the collective goals of the humanity materialize in appreciable proportions.

This is also an era in which attempts to move forward and deal with such global issues as poverty, underdevelopment, climate change, environmental degradation, trade and security are taking place, driven by the nations, which make up the international community.

Water is one of the very few, if not the unique, component in this complex picture that cuts across the entire spectrum and link sectors, issues, crises and responses. A possible response to food shortage can link to environmental degradation via decreased water availability for ecosystem needs and increased pollution. Increased storage to respond to climate change can link to increased social and environmental pressures through water and the neglect of the need for water infrastructure and better management can lead to a deepening of poverty and inequalities.

Those in a position to manage water or influence water management operate within a framework established by the decision makers in governments, civil society and private sector, who may not be aware of these interlinkages. Their responses may be limited to the narrow boundaries of the sectors that they operate in while the impacts typically go way beyond.

Toward a Sustainable Water Future: Visions for 2050 will serve as a valuable tool for those inside "the water box" not only to improve the management of our water resources but, and perhaps more importantly, to properly inform those who are making the decisions and hence creating constraints (and opportunities) for them to operate within. Those outside the water box will also benefit from this book by learning from some of the best experts and scientists in the sector what a not too

distant horizon may look like and how best they can tune their decisions for the collective good of our planet.

Olcay Ünver Coordinator United Nations World Water Assessment Programme Director Programme Office for Global Water Assessment Division of Water Sciences, UNESCO

Foreword

This book is a milestone contribution to the literature on water resources management. It is composed of a rich mixture of science and imagination with flashes of well-placed humor. It demonstrates in a qualitative manner how developments in water sciences and engineering might be combined with those of biotechnology, nanotechnology, neurotechnology, and information communications technology to ensure that, in future generations, all will have reliable access to the socioeconomic benefits that only water can provide.

Although the future is ill-defined and impossible to predict, actions today will influence it, for better or worse. The authors start from the often demonstrated premises that all living matter and everything constructed, manufactured, and used require water (precious little, if anything, in our environment can be created without water) and that from a global perspective there is plenty of renewable water on this planet. It just is not always available in the desired amounts or qualities when and where locally needed and at acceptable costs. They proceed to clearly present a wealth of technological information and ideas that chart a path for water scientists and engineers. Undoubtedly, these will be used by others in building qualitative and quantitative scenarios of possible futures for the planet that will inform decision-makers for years to come.

World Water Vision: Making Water Everybody's Business, which was published by the World Water Council in 2000, examined three scenarios qualitatively and quantitatively: business as usual; moving forward relying on technological advances, economics and the private sector; and changes in values and lifestyles. 'Business as usual' will lead to disaster. Under neither of the other scenarios could a sustainable future be achieved by 2025. However, a participatory process involving 15,000 people, right down to the village level in some cases, led to a vision of a healthy, hunger-free world with a sustainable environment.

As is correctly assessed in this book, some progress has been made toward achieving the World Water Vision for 2025, such as building new water infrastructure so that a greater proportion of the world population has access to improved drinking water. However, little progress has been made on other aspects, and accelerating change, including the impacts of climate change, have made the challenges greater while at the same time generating opportunities, including those described in these visions for 2050.

The dedicated authors of this book care about the future and water, because they care about assuring good health, adequate food and energy supplies, employment, and other development needs, while sustaining the environment—for our children and grandchildren. They recognize that the decisions on trade-offs and the setting of