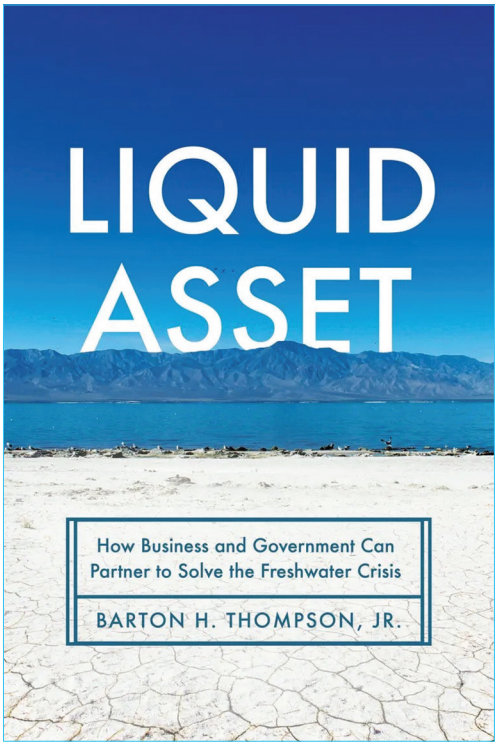
Thompson, B.H. Jr.: Liquid Asset: How Business and Government can Partner to Solve the Freshwater Crisis. Redwood City, California, Stanford University Press, 2023. 320 p.

This book from Barton H. Thompson, a Professor of Environmental Behavioral Sciences of Stanford Doerr School of Sustainability, provides a comprehensive analysis on environmental, social and economic values of water, and emphasizes the need for sustainable and equitable water management through innovative solutions and partnerships. The book examines the following primary questions: Does the private sector promise anything unique in solving the global water crisis? What are the potential risks of growing private involvement; and how do the risks vary among the different roles that the private sector is playing? What are the challenges that private organizations face with working in a historically public sector? Finally, how can private businesses and governments better partner together to address the freshwater crisis?

The volume consists of eleven chapters organized into four main parts. Part I gives a contextual view of private sector's role in water management. Part II revisits commodification debates while offering insights to think about water as asset. Part III takes a look at the transformation of freshwater management, discussing the role of technological and financial innovation as well as human agency. Finally, Part IV discusses corporate water stewardship and explores the possibilities of a sustainable water future.



Chapter 1 provides a useful introduction to some of the global water challenges and the solutions the private sector might provide to help address them. Thompson employs the story of Cape Town in South Africa and its brush with "Day Zero" (an impending water crisis due to severe drought between 2015–2018) as a case study to stress the importance of resilience and conservation. Population growth called for action about the growing local demand as the South African Department of Water and Sanitation had reported Cape Town would run out of water by 2015 if demand continued to grow unabated and local supplies were not supplemented (Lavanchy, G.T. *et al.* 2019). Thompson gives detailed narration of water management in Cape Town from the time it enjoyed pleasant Mediterranean climates when Portuguese explorer Bartolome Dias became the first European to arrive at the Cape in 1488, and even had it named the "Cape of Storms", to the city winning national and international prizes for its water management and water conservation during "Day Zero", in particular in 2018.

Thompson later highlights some of the major water challenges facing the United States and the world like water scarcity, groundwater overdraft, degradation of freshwater ecosystems, climate change, lack of adequate access to safe drinking water, water pollution, and the growing infrastructure gap.

In Chapter 2 Thompson discusses water scarcity and other freshwater challenges that pose a growing risk to business highly reliant on water, particularly to sectors like agriculture, energy, mining, and beverages. For instance, in northern Mexico many breweries attracted local protests particularly which led to the Mexican president announcing that he would end beer production (Agren, D. 2020). In the first year of California's 2014–2016 drought, hydroelectric power fell by almost half from 18 percent of the state's total power production to only 10 percent, and in the second year, it dropped again to 6 percent (Gleick, P.H, 2016). Thompson says businesses must address and manage all of their environmental, economic, and social impacts. They have to reduce not only their water footprint but also their carbon and ecological footprints. He also describes water challenges as opportunities, not risks, and that these opportunities are the driving force for the growing involvement of the private sector in freshwater management.

Chapter 3 examines private water suppliers, the oldest private involvement in water management as

well as the largest, and this constitute about half of global and US revenue from water businesses. The case studies are context-specific in showing whether private companies are able to improve the provision of domestic water, or privatization being beneficial in some settings, while backfiring in others.

Privatization has generated fierce opposition in recent years, particularly from advocates of the human right to water and of environmental justice. Thompson looks at the history of private water companies, stressing previous studies disagreeing on the number of privatized water systems globally and in the United States. Due to poor data for many parts of the world, studies also use different definitions of privatization. History reveals that private involvement in the supply of domestic drinking water has waxed and waned over time. In the United States for instance, private companies ran 50 of the 83 water supply systems in 1850, and in Europe, the Compagnie Générale des Eaux (now Veolia) was formed in 1853 to furnish water to Lyon, France. Recently, there have been arguments across the globe by proponents for, and critics against, privatization to be considered over municipalization i.e., putting water supply in the hands of municipal governments. For privatization to win these arguments, it must bring several benefits to the table (Williamson, O.E. 1999), outweighing the advantages of full municipal control.

Chapter 8 explores the private sector's help in increasing the financing available for critically needed water infrastructure. A case study of Washington D. C. shows how a new "green" approach to stormwater was financed (Henderson, K. *et al.* 2020). A growing set of cities from Seattle to New York has therefore turned to green infrastructure to help solve their stormwater challenges (Chunhui, L. *et al*. 2019). Despite the successes of the green infrastructure, financing still falls short of the needs of critical infrastructure development in the United States by billions of dollars as 99 percent of the funding still comes from a combination of government coffers and traditional municipal bonds, and there are lots of bureaucracies in accessing these funds which many times exacerbate water crises. The municipal bond sector, while often viewed as overly cautious by investors, has engaged in significant innovation over the last two decades.

Thompson further looks at financing infrastructure through public-private partnerships (PPPs). PPPs can provide funding for water suppliers who are unable to use municipal bond due to bond limitations. The water industry has high capital needs and many water agencies operate close to their capital limits restricting how much debt they can incur. Therefore, Thompson argues that PPPs should be explored as water suppliers have become increasingly international, with China developing into a major player. In 2021, Chinese companies constituted three of the top five water companies in the world and thirteen of the top twenty. No USA company placed in the top twenty which also included companies from Brazil, India, the Philippines, and Spain, all of which have aggressively pursued privatization (Turkic, N. and Burgess, M. 2016).

Chapter 3 focuses on public policy to ensure optimum success in privatizing drinking water as policies play essential roles. In Chapter 11, Thompson reflects on four important policies that businesses and governments can improve on due to the contributions private sector is making to water management while simultaneously protecting the critical public interests in water. Firstly, the need for reforms in the public sector as the structure and practices of the public water sector both drive and impede private involvement in water management should be addressed. Secondly, regulatory policies are also essential to the effective involvement of the private sector in solving today's water challenges, and are critical to ensuring that private businesses do not negatively impact the human right to water, the environment, and other public interests. Thirdly, there is need for ethical businesses as successful water businesses will not be cowboys out for a fast buck. Instead, they should be businesses that seek to improve water management and recognize and reflect the ethical dimensions of the water field. Lastly, the need for strong public-private collaboration is crucial as the growing role of private organizations in water management tends to attract strong views about the comparative merits of the private and public sectors. Critics often see the private water sector as commodifying water to the detriment of the inherent public interests in water, as both critics and proponents pit private against public (Bakker, K. 2010).

Today's freshwater crisis, however, calls for private and public engagement, as solutions will require more effective collaboration between both sectors. As Chapter 7 describes, Singapore uses public-private partnerships to design and construct its recycling and desalination facilities, funds both basic and applied research on innovative technologies, and creates a global "hydrohub" to encourage collaboration across the technology sector. This collaboration leads to a formidable water technology sector that has both allowed Singapore to meet its water needs and create a business growth area for the island nation (Toh, M. 2021), as water is uniquely a matter of national security to Singapore (Liem, D. 2020). The story of how Singapore is addressing its dearth of natural freshwater illustrates how the public and private sector can work together to produce the type of water innovations needed to meet water challenges around the world.

Chapter 4 explores the rise of water markets, their documented benefits, and the concerns they generate. Thompson discusses two types of water markets, formal and informal. *Formal* water markets exist in only a few regions and countries such as Australia, Chile, China, South Africa, the western United States, and

limited parts of Europe (England, Italy, and Spain). *Informal* markets, in which water users trade water outside of formal governmental frameworks, exist in a larger set of countries, including parts of both India and Pakistan, but are still limited geographically. According to Thompson, several factors determine the viability of formal water markets in a region, and such markets make sense only in areas with high water demand and limited availability. There are no water markets in the Amazon, nor in the United Arab Emirates (Endo, T. *et al.* 2018), and none in most developing countries. As climate change, population and economic growth, and governmental regulation shrink the amount of water available for consumptive use in a region, water markets will become increasingly important. Thompson notes that droughts have consistently increased market activity and state efforts often lead to the creation of local groundwater markets to reduce groundwater use to sustainable levels. The spontaneous development of markets in response to shortages is perhaps the best proof of their value to water users and the economy.

In Chapter 5, the Murray-Darling Basin (Australia) case study describes how nonprofit environmental groups like Nature Conservancy, the Murray-Darling Wetlands Working Group, and Kilter Rural created the Murray-Darling Basin Balanced Water Fund in 2015 to provide water for degraded wetlands in the Murray-Darling Basin while protecting both the wetlands and the dozens of imperiled birds and other species reliant on the wetlands. By furnishing water to needy wetlands, the Balanced Water Fund helps reduce the conflict between agriculture and the environment, provides water to farmers, and makes money for its investors. The Murray-Darling Basin, as Chapter 4 explains, is home to perhaps the most robust water market in the world.

Though the Murray-Darling Basin recorded many successes, like many freshwater ecosystems of the world, it is struggling for water. Most governments have ignored environmental needs in allocating freshwater to consumptive users for decades. For instance, the western US has seen government actions causing rivers and wetlands to dry up or dramatically shrink over the past century and a half (Thompson, B.H. *et al.* 2018). Thompson also describes the rise of impact investment funds seeking to protect and improve the environment while making money for their investors.

In Chapter 6, San Joaquin's story in central California illustrates the value of thinking of water specifically as an asset and the way the western United States has long engaged in "managed aquifer recharge" (MAR), in which water managers take excess water available in wet years and store that water in underground aquifers for later use in drier years. In this part of the United States, MAR is a crucial method of ensuring sustainable water management and will become even more important as the region continues to get drier (Choy, J. *et al.* 2014). MAR has been taken a step further with AgMAR or "agricultural managed aquifer recharge. However, AgMAR can also present risks if not carefully regulated and implemented.

Thompson investigates the concerns of water users over the risks of physical water shortages. Chapter 10 discusses the risks businesses give to their business reputation and social license if others view them as using water unsustainably, and the ways businesses are addressing their own water use. As Chapter 2 explains, businesses are the largest users of water, and their engagement in water management is therefore essential to a sustainable freshwater future. Furthermore, Thompson discusses the various risks that water scarcity and pollution pose to businesses. He explains that some large corporations are adopting water stewardship programs to reduce and offset their water use and improve the quality of their wastewater, and many corporations are working with nonprofits and governments to improve water management outside their corporate walls. These corporations recognized that even their best internal programs will fail to reduce corporate risks if external governance is inadequate, and these stewardship programs, if meaningful, promise benefits to both the corporations themselves and society.

In Chapter 9, Thompson discusses the critical role that consultants, private foundations, and nonprofits can play and have played in helping California address its unsustainable use of groundwater by presenting the history of California's Sustainable Groundwater Management Act. The organization's advice and influence on the water sector provide effective solutions to change agents who then overcome political inertia and foster support for necessary new approaches, thereby changing freshwater management and contributing to solving the world's freshwater crises.

When an average person hears the phrase liquid asset, probably cash, cash in a bank deposit, or assets that can be quickly converted to cash come to their mind first. This also was my thought when I first stumbled upon the book *Liquid Asset*. However, going through a part of it I realized liquid asset in this context means a resource and this caught my attention to review the book. Relative to my previous knowledge of literature, this volume gave newer and deeper insights, dimensions, understanding, and a different perspective on water and the several opportunities water as an asset offers. The case studies, although predominantly focusing on specific regions, mobilize theoretical backgrounds, practical and applicable research results, and relevant stories which make this volume a vital resource to students, researchers, professionals, and policymakers in water-related sectors.

Owing to these novelties and pros, readers will better understand the private and government sectors, and the relations between economy, policy, environ-

ment, and society. Another merit of this volume is emphasizing that water as a liquid asset requires an interdisciplinary perspective. Collaboration between institutions, stakeholders, and effective governance are crucial for the water sector in order to curb water scarcity and ensure sustainable management.

Contrary to these merits, while the volume covers various aspects, most parts of it primarily focus on water as an asset. There are limited discussions on effects and impacts of global issues on water. In my view, the book pays less attention to water rights and environmental justice discourses than what they would deserve, and the discussions of social and cultural components is limited either. In addition, while Thompson provides many case studies, these mostly focus on the western US, especially California.

I expected more case studies from both the Global North and Global South as water challenges are global. Another key limitation, in my opinion, is the moderate attention Thompson gives to rural and indigenous communities as the numerous water challenges faced daily by these people, especially in developing countries in both the Global North and Global South, are being neglected and not properly captured in the water discourse. Notwithstanding, these limitations are an avenue for future research which will definitely improve and deepen the body of knowledge by academics, stakeholders, experts and professionals on water.

In conclusion, *Liquid Asset* is an eye-opening interdisciplinary volume. It puts business and government partnerships in a new angle, advocating for a collaborative method in fusing freshwater-related issues with environmental, societal and economic targets because of the complexities of freshwater management. It highlights that if good and effective governance and management, implementable policies, sectoral collaborations, and government-private cooperation are ensured, water can be accepted as an asset, scarcity can become a thing of the past, and sustainability can be achieved. Therefore, I recommend this book to every water user.

Joseph Jonathan Igbinedion[1]

REFERENCES

Agren, D. 2020. Mexican city rejects plans for giant US-owned brewery amid water shortages. *The Guardian*, 23 March 2020. https://www.theguardian.com/world/2020/mar/23/mexico-brewery-mexicali-constellation-brands

Bakker, K. 2010. *Privatizing Water: Governance Failure and the World's Urban Water Crisis*. Ithaca, NY, Cornell University Press.

Choy, J., McGhee, G. and Rohde, M. 2014. *Recharge Area Identification, Utilization, and Protection Resource Management Strategy California*. 1–68. http://www.Programs/California-Water-Plan/Docs/RMS/2025/Recharge-Area-RMS

Chunhui, L., Cong, P., Pen-Chi, C., Yanpeng, C., Xuan, W. and Zhifeng, Y. 2019. Mechanisms and applications of green infrastructure practices for stormwater control: A Review. *Episode* 568. 626–637.

Endo, T., Kakinuma, K., Yoshikawa, S. and Kanae, S. 2018. Are water markets globally applicable? *Environmental Research Letter* 13. (3): 034032.

Gleick, P.H. 2016. *Impacts of California's Ongoing Drought: Hydroelectricity Generation 2015 Update*. Oakland, Pacific Institute.

Henderson, K., Lackey, K., Denecke, A. and Prouty, C. 2020. *The Economic Benefits of Investing in Water Infrastructure: How a Failure to Act Would Affect the US Economic Recovery.* Reston, Virginia, American Society of Civil Engineers and Value of Water of Campaign,

Lavanchy, G.T., Kerwin, W.M. and Adamson, K.J. 2019. "Beyond 'Day Zero": Insights and lessons from Cape Town (South Africa). *Episode* 27. 3–4.

Liem, D. 2020. *Water Security for a City-State: Growing Pains*. 9 December 2020. https://storymaps.arcgis.com/stories/9fcc94e68f1544fc94cba91a250e5f10

Thompson, B.H., Leshy, J., Abrams, R. and Zellmer, B.S. 2018. *Legal Control of Water Resources: Cases and Materials*, 6 – 9781683289838 – West Academic.

Toh, M. 2021. *Singapore Water Exchange: A Global Marketplace for Innovative Water Companies. Water and Wastewater Asia.* https://waterwastewaterasia.com/singapore-water-exchange-a-global-marketplace-for-innovative-water-companies/

Tukic, N. and Burgess, M. 2016. China's role in Africa's water sector: Mapping the terrain. *Waterlines* 35. (1): 18–36.

Williamson, O.E. 1999. Public and private bureaucracies: A transaction cost economics perspective. *Journal of Law, Economics, & Organization*. Episode 15. (1): 306–342.

[1] ELTE Eötvös Loránd University, Institute of Geography and Earth Sciences, Department of Social and Economic Geography, Budapest, Hungary. E-mail: joigbinedion@student.elte.hu