

## BOOK REVIEW

**The Singapore water story**, by Cecilia Tortajada, Yugal Joshi and Asit K. Biswas, Routledge, Abingdon, UK, 2013

When Singapore seceded from Malaysia in 1965, it soon became evident that water security would form a central element in the city-state's future evolution. *The Singapore Water Story* covers the first 45 years of Singapore's journey from political independence towards water independence in eight chapters, several of which serve as stand-alone studies. These eight chapters cover the initial development of Singapore's water infrastructure, how water relates to urban development, pollution control, water demand, education, river restoration, the media and water policy, and a brief look towards 2060.

One of the strengths of this book lies in its recording of the development of water and environmental policies back in the 1960s and 1970s, when Singapore was a developing economy. It is tempting to forget how swift the city-state's development has been and how closely intertwined its water policies have become with its overall economic development. As soon as Malaysia's stance became clear, water self-sufficiency became a national priority. At the same time, long-term independence depended on economic and demographic advancement, which (given that land is scarce) immediately called for detailed planning.

Self-determination confers obligations; while the colonial population had enjoyed a healthy physical environment, this was not the case for the rest of Singapore. The government realized that with a universal franchise, all had the right to enjoy such amenities as household access to safe water and sanitation, which remains an exceptional approach to this day. Policy initiatives examined include the introduction of rising block tariffs (1973), demand management (1981) and full cost recovery, allied with the end of cross-subsidies (1997). These, combined with a continuing public-awareness campaign to encourage prudent behaviour and the adoption of water-efficient white goods, have helped to ease per capita consumption in recent years.

The original Master Plan of 1955 was approved in 1958, when Singapore was still part of Malaysia. The 1971 Concept Plan and 1972 Master Plan saw the appreciation that if more of the island was to serve as a catchment basin, this would be more effective if the basins were more amenable to water storage. This meant looking at the island as a resource, in the sense that the catchment areas needed to be clean enough to draw water from and from, there considering the benefits of areas of attractive landscape and water as part of creating a desirable place to live in. This reflects the fact that enhanced physical landscapes also enhance the desirability of the properties in the area and that Singapore has been moving inexorably towards a wholly urbanized society, whereby elements of the urban environment have to provide other utilities such as aesthetics and recreation. As a consequence, the area of green cover has materially increased in the past two decades despite population growth and urban development.

Inland water pollution was identified as a particular concern in 1969, and it is interesting to note that in Singapore there were 29,525 prosecutions relating to environmental offences in the 32 months between 1968 and 1971, decades ahead of its

Asian peers. Later on, the threats of heavy fines and imprisonment curbed non-compliance. Even so, 13% of trade effluent-discharge tests failed between 1986 and 1993. So, it is interesting to see the continued improvement in inland water quality from 2002–05 to 2006–10. This is in the wake of 822–1047 surprise visits each year and acting on 95–391 complaints each year between 2003 and 2010. Five per cent 5.0% of sites visited were found to be not in order; 0.5% of such visits resulted in legal action; and 8.5% of 1866 complaints were corroborated, suggesting that Singapore is a society where environmental compliance is now seen as a societal and business norm.

Despite the increase of hard-standing associated with urbanization, the 3178 ha of flood-prone land noted in the 1970s had been reduced to 56 ha by 2011. This is a notable feat and will be of additional importance with climate change.

One quibble is how politics between Singapore and Malaysia after Singapore's independence is not dealt with in detail until Chapter 7, some two-thirds of the way into the text. This matters because Singapore's almost unique geo-political circumstances are a crucial driver of its water policy and the consistency of this policy. The existential threat to Singapore's well-being that stopping the pipelines would have entailed was used by Japan in 1942, as well as by Malaysia. People who wonder why the British government handed over Hong Kong Island, where it enjoyed a freehold, as well as its Kowloon leasehold in 1997, forget how taps may lubricate foreign affairs.

It is evident that much research into water relations between the two countries is (over-)reliant on media sources, and thus an intensive investigation into what has been written is of particular value. Paraphrasing media coverage is especially welcome, as such media "debates" are usually examined in a partial or piecemeal manner. Here, every intervention is mentioned, allowing the reader to examine how coverage has evolved. Between 1997 and 2009, media coverage regarding the Johor water deal can be seen as diverging between the two countries, moving from reporting of negotiations to commentary about the merits of current and proposed agreements. With the improved relations between the two countries since 2003, media interest in perceived water disputes has eased, especially as both countries realized that using unofficial media briefing about water negotiations can be a fraught process.

The authors assessed 193 articles, out of a total of 418 noted regarding water supplies in the Singapore and Malay press, as being positive, negative or neutral for relations between the two countries. Forty-three appeared between 1997 and 2001, 145 in 2002 and 2003, and 5 between 2004 and 2009. Twenty-four were seen as positive, against 131 seen as negative. In the "media frenzy" years of 2002–03, Sixty-nine per cent of the 87 articles in the Singapore press were seen as negative, while 83% of the Malay media's 58 articles were negative. In other years, 37% of Singapore media articles were assessed as negative and 60% of Malaysian articles likewise. The frequency of the articles assessed rose from 8.6 per annum in 1997–01 to 72.5 in 2002–03, before falling to 1.3 in 2004–07.

There are a few typos to point out. For example, on page 6 it is likely that "eighteenth century" ought to be the nineteenth. It is somewhat confusing to have gallons and litres in the same table (e.g. on page 9).

Throughout this study, future population is the grand imponderable. Broadly speaking, during the period covered, population growth has continued ahead of expectations, albeit with further imponderables from demographics (an ageing population) and the ever-evolving problem of reconciling the needs of the city-state's citizens with the need to attract people with specific skill-sets to work there for a suitable period of time. This highlights just how important forecasting future demand is, as well as reconciling the competing narratives of supply and demand management. An interesting point raised is

that Singapore has become a business hub despite its relatively strict environmental legislation, which dates back to the early 1970s. Even so, only from 1972 was it fully appreciated that there is a linkage between industrial development and future water use, one which will be of considerable importance in the coming decades.

Moving towards water independence has been challenging, especially when you consider that consumption rose from 70 million gallons per day in 1965 to 380 million by 2011. Water has been imported from Johore since 1932 per the 1927 agreement, supplemented by the 1961 treaty between the Singapore City Council and the State of Johore (to 2011) and the 1962 treaty (to 2061). Seeking water security has been a balancing act. On the one hand, public confidence in the security of water supplies needs to be maintained, while on the other, the options necessary for ensuring water security needed to be developed. By continuing to develop the Johor River scheme in the 1990s, the Public Utilities Board was giving itself the time to allow the technologies needed for unconventional water supplies to become suitably reliable and commercially feasible.

The government looked at conventional and unconventional sources, showing how the utility and the state can assist in the development of new approaches. A non-potable reused industrial water scheme ran from 1966 to 1990, but was undone by the high costs of providing the service; likewise, the utility produced potable water from wastewater as far back as in 1974–76, but again costs were prohibitive. Unconventional water moved up the agenda as demographic and economic growth exhausted local supplies in the late 1980s. Reverse osmosis played a major role in allowing this to happen at an affordable price, especially the commercial development of the membrane bioreactor in the early 1990s.

Is this a case of seeking water independence irrespective of cost? I doubt it. One of the undercurrents in this study is the pragmatic nature of water policy in action. For example, the 4–6% of unaccounted-for-water figure since 1996 is not particularly low, but it fits comfortably with accepted best practice.

The development of Singapore-based water and sewage operations and technology companies has been driven by a policy of combining water self-sufficiency with nurturing a regional presence in the water sector. It also goes back to the appreciation that a comprehensive water, sewerage and sewage-treatment infrastructure is an essential element in what we now understand as a developed economy. While there have been 12 tariff increases since independence, there have been none since 2000; but a water-conservation tax allows for some flexibility in overall tariff setting.

This book is of particular use as an extended case study about how to develop a comprehensive water management system in a developing economy and how doing so plays a central role in driving economic development. It provides interested parties with a detailed understanding of how policy developed and was implemented and how these processes interacted with economic, technological and demographic developments over nearly five decades. It has succeeded in doing this in an accessible manner, drawing together a broad variety of narratives into a single volume. It benefits greatly from access to politicians and officials spanning the city-state's history.

Singapore's water story clearly remains a work in progress. The authors are to be commended for the up-to-date nature of much of their data, allowing readers to engage in current developments rather than debate about past dialectics. Indeed, the study is a pragmatic one, keeping references to academic theory to a bare minimum in order to stick to the functional narrative. The book's tone makes it fairly clear that its authors are favourably inclined towards Singapore's water policy. Given the politicized nature of geography as a discipline when it comes to water management, this is perhaps a contrarian approach. This reviewer is inclined to side with the authors, because Singapore's water

story since 1965 is a remarkable and indeed inspiring one and because it is clear that the authors' sympathetic stance has allowed them considerable access to those involved in shaping policy, especially in the earlier years, where the genesis of this story may otherwise have been lost.

With the publication in 2010 of Singapore's plans for 2060 and the lapsing in 2011 of the 1961 agreement, this book takes the reader to the point in Singapore's water story where the city-state is in a position to actively contemplate a water-sufficient future. That is one of the more remarkable stories in the history of water management and one which will merit revisiting as the 2060 plans become new realities.

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