

Water Driven

*Revolutionary Cultural Landscapes*

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# 1

## *Introduction*

Water makes a world of difference to this 'third rock from the sun'. It covers over two-thirds of earth's surface, making us look like an enormous blue marble from space. Perhaps a more appropriate name for our watery planet would have been Oceanus, after the Greek god who personified the sea or simply Big Blue. The earth has a delicately balanced ecosystem, being located in what astronomers refer to as the Goldilocks Zone.<sup>1</sup> This means that we are neither too close to nor too far from the sun to create conditions that are 'just right' for water to exist in liquid form and support life. Closer to the sun, water would boil off. Farther away, water would freeze.

The salty oceans account for 97% of all our water. The remaining 3% is fresh although 99% of that is not readily available to us, being held in the atmosphere, glaciers, ice caps, and underground; a predicament lamented by Coleridge's Ancient Mariner while becalmed mid-ocean, 'Water, water, everywhere, nor any drop to drink.'<sup>2</sup> The precious 1% of fresh water that sustains life can be found mainly in lakes and rivers. It is sobering to think that our water is a finite resource. The water we use to make a cup of tea could have once gurgled along an ancient Roman aqueduct, hissed from a steam train's boiler, or powered a turbine in the Three Gorges Dam. Our planet is a closed system, so the water we have today is what we will have tomorrow, next year, next century. Not a drop more, not a drop less.

About two-thirds of the human body is water which needs to be replenished regularly. In addition, each one of us needs air to breathe and food to eat, as well as shelter from the elements. The degree to which we depend on these resources can be described in threes. In most circumstances, humans will perish if they are deprived of air for three minutes, water for three days, or food for three weeks. These times may be extended or shortened depending on our ability to find shelter from excessive heat or cold.

Today, over half the world's population lives in cities and enjoys the convenience of water that flows with the turn of a tap and food that is only a corner shop or a phone call away. For many other communities in less developed parts of the world access to these basics for survival is less certain. One in three people do not have access to safe drinking water.<sup>3</sup> Many millions who rely on seasonal rains to irrigate their fields are vulnerable to changing weather patterns like El Niño and La Niña that can either fail to bring the life-giving rains or bring too much with resulting floods and loss of crops.

The farmers of the first agricultural civilisations understood intimately how valuable water was for their harvests and their families' survival. They respected and even revered water, taking care to protect every last drop. By comparison, the modern urban dweller is complacent. He is so far removed from the source of the water flowing from his tap that a limitless supply is taken for granted. It takes headline news to remind us of our vulnerability. When Cape Town announced to the world in early 2018 that the city would run out of water by the summer, the public responded with disbelief. However, Cape Town's water crisis has been many years in the making due to prolonged drought, ageing infrastructure, and increasing consumption by a growing population. Other cities—such as Mexico City, Jakarta, and Beijing—have been sinking for years because of excessive pumping of ground water from aquifers below the urban areas and will continue to do so until the aquifers eventually run dry.

Whether we realise it, the world is facing a water crisis. Our demand for fresh water has never been higher and the planet's oceans and freshwater resources have never been more polluted. Rising sea levels from global warming are lapping at our shores, threatening to inundate coastal communities and contaminate farmland and fresh water held in aquifers, rivers, and lakes. As competition increases for a share of finite water resources, so too does the potential for conflict. Ethiopia's recent construction of a dam across the River Nile to power the nation's development plans has been condemned by their downstream neighbour, Egypt. Even cities like Hong Kong and Singapore that depend heavily on importing water from China and Malaysia, respectively, have come to realise in recent years just how vulnerable they are to volatile climatic, economic, and political forces.

However, the object of this book is not to arouse alarm and engender despondency but rather to inform and inspire. Throughout history, humankind has learned to adapt to an often-hostile environment and use ingenuity to survive. The idiom 'necessity is the mother of invention' expresses well the stimulus that has driven people to be creative in times of need to find water, food, and shelter. Of these, securing a safe supply of fresh water has always been the most critical. If water runs out, nothing else matters.

Civilisation has made huge advances during three main periods of revolution—agricultural, industrial, and technological. Each advance was only made possible by humankind shaping, manipulating, and sometimes abusing the natural landscape to solve water-related problems. Identifying the circumstances and actions that created these water-driven cultural landscapes provides valuable insight into human progress and how our relationship with water and the natural environment has evolved over time. Technical advances in water management may have brought a better standard of living for many but progress has come at a heavy cost. With each revolution, our demand for water and the scale and complexity of successive engineered solutions to harness it has increased dramatically. The humble irrigation channel dug by an ancient Egyptian farmer is a far cry from today's multi-billion-dollar concrete and steel hydro-electric dams.

As humankind shapes and reshapes the land, the result can always be defined as a cultural landscape. It is a dynamic and complex interaction involving many different factors. The more obvious ones are climatic influences that result in a particular landform, river pattern, or ecological habitat and the human interventions that exploit those same landforms, rivers, and habitats to meet basic survival needs, such as clearing a forest, ploughing a field, or digging an irrigation ditch. Subsequent layers of intervention may indicate more subtle, ethereal influences, such as artistic expression and a spiritual relationship with nature.

It is possible to categorise water-driven cultural landscapes into three types.<sup>4</sup> They may be intentionally designed for a specific monumental or symbolic purpose. For example, the urban landscape settings of the ornamental public fountains and baths in ancient Rome delivered fresh water as well as a reminder to citizens of the empire's wealth, power, and technical superiority. Some cultural landscapes may be associated with sites of mythical or religious significance. The sacred river and mountain landscapes of the Incas and feng shui landforms in China were of profound spiritual importance to the local communities. Most cultural landscapes, however, are organically evolved products of a dynamic two-way interaction between people and the natural environment. Farming communities living off the land, industrial mills powered by the flow of a river, and hydroelectric dams producing electricity to power a city are all organic cultural landscapes with varying degrees of sustainability. Alternatively, a cultural landscape can be a combination of two or all three of these categories. For example, Machu Picchu in Peru comprised a monumental citadel, built on a sacred mountain top, supporting its occupants with its own terraced fields and source of fresh water.

The cultural landscape is a valuable tool to help us study how civilisations have managed water. It provides a holistic view of a culture, combining tangible and intangible elements, using a common 'language' to make meaningful comparisons between the relative sustainability of different cultures' water solutions throughout history. During the Agricultural Revolution water management schemes were simpler and more sustainable. Hand-built levees, aqueducts, and paddy fields of farming communities blended sensitively with the natural landscape. In contrast, the enormous increase in demand for water to power factories and supply the rapidly expanding urban populations during the Industrial and Technological Revolutions required engineering solutions that passed an environmental tipping point and had increasingly damaging impacts on the landscape.

To this end, each of the case studies introduced in the following chapters—from ancient Egypt to the present day—will be interpreted as a cultural landscape with the focus on the role played by water in driving its form and function. There is a plethora of historical water management solutions to draw upon. However, to achieve a more fluent narrative and avoid repetition only one example of each distinct type is presented.

This is a timely exercise. It is projected that two-thirds of the world's population will live in cities by 2050,<sup>5</sup> and water management is already a topic of concern to our city planners, urban designers, and landscape architects. The pressure is now on to find alternatives to relying on one-off, mega-engineering projects that often create more problems than they solve. We need to build smarter not bigger with an eye carefully focused on the broader cultural landscape.

The final chapter suggests that nothing short of an Environmental Revolution will be necessary to create the sustainable water-driven cultural landscapes of the future. To stimulate discussion, innovative ideas are presented from around the world to use freshwater resources more wisely. These include an amalgam of traditional skills in water management, practised by past civilisations, lateral thinking in how we plan urban landscapes, and innovative high-tech design. Most important, this revolution will require not only a change of technology that works with rather than against the forces of nature but also a change of attitude to replace hubris with humility and an informed respect for water.

Although this book is written to capture the attention of an international audience of professionals and authorities responsible for water management, it also personalises the issue by tracing the experience of one water-stressed city, Hong Kong, in dealing with these issues. By so doing, the individual reader is challenged to consider their own community, rural or urban, and find creative ways to use water wisely in their everyday lives.

## Notes

1. Angus Stevenson, ed., *Oxford Dictionary of English* (Oxford: Oxford University Press, 2010).
2. Samuel Taylor Coleridge, 'The Rime of the Ancient Mariner' (lines 117–118), *Lyrical Ballads: A Scholarly Electronic Edition: 2003*, accessed on 26 March 2018, <http://www.rc.umd.edu>.
3. United Nations, 'UNWater: Coordinating the UN's Work on Water and Sanitation', accessed on 26 March 2018, <http://www.unwater.org>.
4. UNESCO, *Operational Guidelines for the Implementation of the World Heritage Convention* (UNESCO: 1992), para 39.
5. United Nations, 'UNWater'.

a sink only to gurgle down the plughole before being able to wash the vegetables or clean the dishes. And yet this is what happens every day when we leave taps running in unplugged sinks.

Table 5.1 shows that the reduced quantity of water used would match Singapore's recent achievements. Although 145 litres still exceed the global average, the 7.5 buckets (75 litres) of water saved per person every day would be an excellent start to changing perceptions and establishing a more responsible use of water.

Hong Kong has made good progress with other environmental initiatives such as 'Bring Your Own Bag' to cut down on plastic usage. The thought of receiving scornful looks from fellow shoppers at the supermarket checkout for using a plastic bag, and the subsequent walk of shame to the exit, can be an effective deterrent. To conserve water, out of sight, in the privacy of one's home, will be a different kind of challenge. It will require more self-discipline and a family team effort to keep to the bucket list and observe the basics: take shorter showers or shallower baths, put in plugs, and turn off taps.

### *Putting water into words*

It is only fair to conclude this critique of Hong Kong's extravagant use of water with a few words in the city's defence. During the hardship of frequent rationing in the 1960s and 1970s, a colourful vocabulary of Cantonese slang evolved that correlated water scarcity with money and business practices.<sup>82</sup> For example, the phrase 'to stroll towards water' meant to request or borrow money. 'To pillage water' meant to make money in a questionable manner, and 'to drink water' was to receive kickbacks. When the rationing was most severe, the phrase 'when there is no water, every drop is precious; when there is water, there is not enough to wash' indicates that people took every possible step to conserve and reuse water to get by.

When the taps were turned back on for a few hours, they would 'pounce on water' in a manner similar to panic buying and eke out their carefully stored rations until the next supply time slot. Once rationing finally ended in the 1980s with an ample supply of water from mainland China secured, there was no longer any need to 'pounce on water.'<sup>83</sup> As the years passed and memories of the austere years faded, Hong Kong residents understandably made the most of the cheap and plentiful supply.

Another difficult period that has influenced water use in Hong Kong was the SARS outbreak in 2003. This had a profound effect on society and led to hygiene campaigns to wear face masks and regularly clean floors and surfaces with 1:99 bleach and water solutions in homes. Advice was issued to wash hands frequently and for longer with the added suggestion of humming the 'Happy Birthday' song twice to get the timing right. With taps running, each hand wash could use two to three litres of water. Flushing used tissues instead of throwing them into bins also contributed to the high rate of water consumption, at around five to ten litres a flush.

These accounts are not quoted as excuses for wasting water. Instead, their message carries an encouragement to Hong Kong to draw upon past experience and save water. The rich lexicon of water slang proves that residents do have a tangible and intangible relationship with water and appreciate its value.

If the true scale of the water crisis facing the city, and other urban centres within the macro-cultural landscape of the Dongjiang Basin is clearly understood, and realistic water tariffs are imposed, Hong Kong residents will adapt and do their bit to achieve a more sustainable water budget. They have done it before and can do it again. Perhaps Cantonese slang will also evolve in coming years to reflect this necessary change of heart. Since 'water pouncing' could lead to 'water wars', an attitude of 'water wise' would hopefully become the norm.

### Conclusion

This book has endeavoured to present water crises and inventive solutions using the medium of cultural landscapes to express the full extent of our dependence and influence on the natural environment that provides our water. It suggests that on a local and global scale it will take an Environmental Revolution to return to a more humble and sustainable relationship with nature.

The case studies provide a broad range of innovative ideas to manage water resources and create more sustainable cultural landscapes. They signal that attitudes are changing for the better and that communities around the world understand that we cannot continue solving water crises with hard technology. In an era when mega-engineering, funded by national budgets, has taken centre stage in water management, it is encouraging that many of the new projects are grass-roots initiatives. This demonstrates the value of local knowledge in solving water crises and that less really can be more.

In the African and Indian studies, farmers rejected the water technology and farming traditions imposed on them for generations by colonial governments. These were inappropriate measures introduced by foreigners with a superiority complex who did not take the time to understand the local culture and site conditions. As a result, their interventions damaged the landscape and depleted water resources. By returning successfully to their tried-and-true technologies, evolved over centuries, the African and Indian farmers have experienced a boost to their self-esteem and discovered that, given time, in their capable hands, the landscape can recover a sustainable balance.

The most challenging reversal of inappropriate intervention discussed was the proposal to undo the conquistadors' destruction of Mexico City's ancient chinampas cultural landscape. Drastic problems require drastic solutions, and Mexico City is in need of a profound Environmental Revolution to return its citywide water catchment to a sustainable condition. Only time will tell if the city authorities will grasp the nettle and begin the healing process of reinstating Lake Texcoco and its chinampas. Progress sometimes benefits from taking a thoughtful backward step.

Other case studies demonstrated that progress can also come from a bold forward step to introduce new technology with the caveat that, in an Environmental Revolution, the new technology must be rigorously tested to ensure it is sustainable. At one end of the scale are the simply ingenious fog nets installed by Peruvian farmers to capture moisture from the clouds and mist in Lima's water-stressed landscape. At the other end are the shade balls installed in Los Angeles' reservoirs and eccentric proposals to tow icebergs to Cape Town. Such solutions are very appealing, and new ideas should always be encouraged. However, a look-before-you-leap approach would be wise to ensure new technologies, intended to solve water crises, do not exacerbate the problem.

Whether progress towards sustainable water management is achieved by adopting a backward or forward technological step, participation and collaboration between the different stakeholder groups to take responsibility for their water management system is vital for success. The different dynamics discussed in the Vietnamese mangrove, New York Big U, and Great Lakes studies demonstrated how important this is. In Vietnam, the principles of the mangrove conservation and shrimp farming cooperatives are sound but may not be sustainable as international NGOs drove the project and national government authorities did not fully engage in or endorse the process. In contrast, the New York Big U storm protection scheme went through an intense public and government consultation exercise to reach broad consensus on the design. The main challenge in New York is not to undo the good work by diluting the scheme through budget cuts.

By far the most challenging study of participation and collaboration was the Great Lakes Water Agreement. Water management in this vast cultural landscape is too complex for any one authority to oversee effectively and, over time, the management system has incorporated a relatively healthy cross-section of stakeholders. What was most interesting in this study was the potential contribution of the First Nations to the debate. Although there is now an abundance of pragmatic legislation to help conserve and enhance the ecosystem of the Great Lakes Basin, there is another intangible relationship with the water that is enjoyed by the First Nations that illustrates elegantly the sense of respect and responsibility for the natural resources that every Great Lakes stakeholder should aspire to have.

Finally, the Dutch and Israeli case studies demonstrate how all the foregoing characteristics of an Environmental Revolution can come together to manage sustainable water-driven cultural landscapes. Hard and soft technologies have been employed to tackle rising sea levels as well as overcome floods and drought. Top-down directives are complemented by bottom-up initiatives. The quintessential elements that bind the diverse water conservation projects together are awareness and attitude. Both societies understand why achieving a sustainable water management system is important. In Israel, decades of water conservation education have made good water practice second nature to everyone. In the Netherlands, a nation of water warriors, there has been a profound change in perspective and attitude towards solving water crises that best expresses an Environmental Revolution—that is, it is better to work with nature than to battle against it.