

NOTES

Chapter 1: Reflections on Singapore's Environmental Journey

1. Ministry of Trade and Industry Website, Singapore's Economic History <<http://app.mti.gov.sg/default.asp?id=545>>.
2. *Singapore: My Clean and Green Home* (Singapore: Ministry of Environment, 1997).
3. Statutory Boards are organizations that have been given autonomy to perform an operational function. They report to one specific Ministry and specialize in carrying out the plans and policies of the Ministries. In law, a Statutory Board is an autonomous government agency established by an Act of Parliament that specifies the purpose, rights, and powers of the body. Its overall activities are overseen by a Cabinet Minister. In addition, it has its own Chairman and Board of Directors.
4. *Water: Precious Resource for Singapore* (Singapore: Public Utilities Board, 2002).
5. Mercer HR Consulting's Quality of Living Survey 2007 and 2008.
6. World Economic Forum's Global Competitiveness Report 2007-2008.
7. In petrochemical plants, flare systems are installed to provide a safe means of disposal for the gas streams from its facilities by burning them under controlled conditions such that adjacent personnel and equipment as well as the environment are not exposed to hazards.
8. These are water catchments that are not within the Protected Catchment Areas. Apart from MacRitchie, Upper and Lower Peirce, and Upper

Seletar, the rest are unprotected catchments. In the book, however, we have made a further distinction between unprotected catchments in general, and urban catchments, the latter referring to schemes such as Bedok and Marina Reservoirs.

9. This refers to the total land area that can be developed within water catchments.
10. Land was re-zoned to land use of higher value so as to encourage the redevelopment of sites.
11. 3P refers to Public Sector, Private Sector, and People Sector.

Chapter 2: Achieving Clean Air Quality

1. Anti-Pollution Unit Annual Reports (1970–72, 1974, 1975), Prime Minister's Office.
2. These pollutants were: ammonia and its compound, benzene, dioxins and furans, ethylene oxide, formaldehyde, styrene monomer, sulphur dioxide (non-combustion sources), and vinyl chloride monomer.
3. For more information, refer to the Code of Practice on Pollution Control by the National Environment Agency <http://www.nea.gov.sg/cms/pcd/coppc_2002.pdf>.
4. These facilities are subject to monthly checks on fuel usage and fuel quality to ensure that the cap is complied with.
5. The daily mean for SO₂ exceeded the WHO guideline of 20µg/m³ for 251 days in 2007.
6. Land Transport Authority. Electronic Road Pricing <http://www.lta.gov.sg/motoring_matters/index_motoring_erp.htm>.
7. Vehicle Quota System Review Committee (1999). Report of the Vehicle Quota System Review Committee (SNP Security Printing Pte Ltd).
8. Land Transport Authority. Land Transport Masterplan: A People-Centred Land Transport System.
9. More information on the efforts to address the challenge of transboundary haze can be found in *Linking with Global Community*, Chapter 11.
10. Tuan Haji Ya'acob bin Mohamed, Minister of State, Prime Minister's Office. Parliament No. 2. Session No. 2. Volume No. 31. Sitting No. 8. Sitting Date: 2 December 1971.

Chapter 3: Cleaning the Land and Rivers

1. This introductory section draws heavily from *Singapore Success Story: Towards a Clean and Healthy Environment* (Singapore: Ministry of Environment, 1973).
2. This subsection draws heavily from *Singapore: My Clean and Green Home* (Singapore: Ministry of Environment, 1997).
3. This subsection draws heavily from *Singapore Success Story*.
4. *Singapore: My Clean and Green Home*, p. 67.
5. A term which describes any litter thrown from a high-rise flat that may pose a danger to lives.
6. This subsection draws heavily from *Singapore Success Story*.
7. Patricia Schultz, *1,000 Places to See Before You Die* (Kindle Edition, 2003), pp. 495–96.
8. Joan Hon, *Tidal Fortunes: A Story of Change: The Singapore River and Kallang Basin* (Singapore: Landmark Books, 1990), p. 27.
9. COBSEA Workshop on Cleaning up of Urban Rivers, Ministry of the Environment, Singapore & UNEP, 1986.
10. *Clean Rivers: The Cleaning up of Singapore River and Kallang Basin* (Singapore: Ministry of the Environment, 1987), pp. 16–22.
11. Hon, *Tidal Fortunes*, p. 37.
12. *Clean Rivers*, p. 8.
13. *Singapore: My Clean and Green Home*, p. 30.
14. *Ibid.*, p. 31.
15. Hon, *Tidal Fortunes*, p. 42.
16. *Ibid.*, p. 43.
17. *Clean Rivers*, p. 24.
18. COBSEA Workshop on Cleaning up of Urban Rivers.
19. Hon, *Tidal Fortunes*, p. 73.
20. Regional Workshop on Area-Wide Integration of Crop-Livestock Activities, FAO Regional Office, Bangkok, Thailand, 1998.
21. Hon, *Tidal Fortunes*, p. 93.
22. *Ibid.*, p. 91, and COBSEA Workshop on Cleaning up of Urban Rivers.
23. Hon, *Tidal Fortunes*, p. 82, and COBSEA Workshop on Cleaning up of Urban Rivers.
24. *Clean Rivers*, p. 28.
25. Naidu Ratnala Thulaja, “Clean Rivers Education Programme and

- Clean Rivers Commemoration" (2004). Retrieved from <http://infopedia.nl.sg/articles/SIP_398_2004-12-23.html>.
26. *Singapore: My Clean and Green Home*, p. 32.
 27. *Recipients Appointment in 1987*

Lee Ek Tieng	Permanent Secretary, Ministry of the Environment (ENV)
Tan Gee Paw	Director of Environmental Engineering Division, ENV
Daniel Wang Nan Chee	Commissioner of Public Health Division, ENV
Loh Ah Tuan	Deputy Commissioner of Public Health Division, ENV
Chiang Kok Meng	Head of Pollution Control Department, ENV
T. K. Pillai	Head of Drainage Department, ENV
Tan Teng Huat	Head of Sewerage Department, ENV
Wong Keng Mun	Head of Hawkers Department, ENV
George Yeo	Deputy Head of Environmental Health Department, ENV
Chen Hung	Former Director of Environmental Engineering Division, ENV
 28. Thulaja, "Clean Rivers Education Programme and Clean Rivers Commemoration".
 29. Hon, *Tidal Fortunes*, p. 104.
 30. Information from NParks.
 31. K.L. Chan, *Singapore's Dengue Haemorrhagic Fever Control Programme: A Case Study on the Successful Control of Aedes Aegypti and Aedes Albopictus Using Mainly Environmental Measures as a Part of Integrated Vector Control* (Southeast Asian Medical Information Center, 1985).
 32. K.T. Goh, ed., *Dengue in Singapore* (Singapore: Institute of Environmental Epidemiology, Ministry of the Environment, 1998).
 33. *Ibid.*
 34. Besides the risk of death, dengue causes ill health and serious adverse social and economic losses. The disease is often times a prominent news. The currently available tools in prevention and control of dengue even though not perfect have known to be effective for more than two decades. Dengue control efforts work if it becomes everyone's concern.

Several countries have succeeded in controlling the growing menace of emergence of dengue. Examples are Singapore and Cuba. However, the present dengue control programmes in some countries are inadequately resourced. WHO South East Asian Regional Office, Press Release, 14 February 2007.

Chapter 4: Integrated Solid Waste Management

1. Hazardous waste comprises all toxic chemicals, radioactive materials, biological, and infectious waste.
2. The Joint Coordinating Committee on Epidemic Diseases (JCCED) has been in existence for some time and meets regularly to review diseases with epidemic potential in Singapore. The JCCED is now chaired by the Director of Medical Services, MOH, and comprises representatives from major public health institutes, such as NEA, SAF (Medical Corps), and AVA.

Chapter 5: Ensuring Water Sustainability: The Supply Side

1. United Nations Educational, Scientific and Cultural Organization (UNESCO), 2nd United Nations World Water Development Report (2006).
2. United Nations Educational, Scientific and Cultural Organization, 1st United Nations World Water Development Report (2002).
3. Kwa, C.G. and J. Long, *Water: Precious Resource for Singapore* (Singapore: Public Utilities Board, 2002).
4. K.Y. Choong, *Natural Resource Management and Environmental Security in Southeast Asia: Case Study of Clean Water Supplies in Singapore* (2001), pp. 12–16.
5. K.Y. Lee, *From Third World to First, The Singapore Story: 1965–2000*, Memoirs of Lee Kuan Yew, Vol 2 (2005).
6. K.S. Goh, "Oral Answers to Questions – Punggol Pig Farmers (Dispossession)", on 3 December 1984. Singapore Parliamentary Reports. Accessed on 23 October 2007, from <http://www.parliament.gov.sg/parlwebgu/get_highlighted_content.jsp?docID=20440&hlLevel=Terms&links=PIG,FARM&hlWords=%20pig%20farming%20&hl

- Title=&queryOption=1&ref=http://www.parliament.gov.sg:80/reports/private/hansard/title/19820831/19820831_S0004_T0026.htm#1>.
7. "Multi-storey Farms", *Primary Production Bulletin*, Primary Production Department [PPD], August 1971, p. 10.
 8. The term sewerage treatment plant was changed to water reclamation plant following the development of NEWater. This is important to emphasize that used water is a resource.
 9. Groundwater Replenishment System (2004). <http://www.gwrssystem.com/about/pdf/0312gwrs_whitepaper.pdf>.
 10. Actew's Water2WATER: Global Experiences. <<http://www.actew.com.au/water2water/GlobalExperiences.aspx#2>>.
 11. Estrogenic effects refer to actions or changes that are similar to that caused by the hormone estrogen.
 12. Members of the initial EAP included Professor Joan Rose, Professor Ong Choon Nam, Professor Lee Hian Kee, Professor Thomas J.Grizzard, Mr Michael Wehner, and Professor Ng Wun Jern.
 13. In fact, NEWater has also fared well in blind taste tests overseas In one such test conducted by Australia's *Sunday Mail* newspaper in 2007, a third of fifty-six blind-tasting participants in South Australia picked Singapore's reclaimed water as the best-tasting water, ahead of rainwater, bottled water, and desalinated water.
 14. Paul Tan and Harry Seah, "Impact of Newater as Feedwater for the Production of Ultra-High-Purity Deionised Water and Manufacturing Process", *Future Fab International Issue 16 – Process Gases, Chemicals, and Materials*.
 15. Message left by HE Professor Saifuddin Soz (Minister for Water Resources, India) following his visit to the NEWater Visitor Centre on 15 February 2008.
 16. Asit Biswas, "Water – Managing a Precious Resource", *Pan IIT Technology Review Magazine*, December 2006.

Chapter 6: Ensuring Water Sustainability: Water Demand Management

1. Under this agreement, which will run until 2015, WHO will work with Singapore to strengthen and disseminate knowledge to

developing member states on the procedures for the safe use of wastewater in direct and indirect drinking uses; intra-urban water catchment management; the desalination and advanced chemical treatment of waste/seawater as a source of drinking water; and the ability of a country's drinking water infrastructure to withstand disruptions and restrictions in its water supply.

Chapter 7: Managing Used Water

1. Speech by Ban Ki-Moon, United Nations Secretary General at the Launch of International Year of Sanitation. "UN Launches International Year of Sanitation to Address Global Crisis", New York, United States, 21 November 2007. Accessed on 3 June 2008 from <<http://www.unwater.org/iys.html>>.
2. Excerpt of interview with Chiang Kok Meng, Project Director for Deep Tunnel Sewerage System, Public Utilities Board. *Public Utilities Board Annual Report 2005* (Singapore: Public Utilities Board). Accessed on 20 May 2008 from <http://www.pub.gov.sg/annualreport2004/Future_Lights_Tunnel.html>.
3. Speech by Dr Yaacob Ibrahim, Minister for the Environment and Water Resources, at the Deep Tunnel Sewerage System Pumping Station completion ceremony at Changi Water Reclamation Plant, 28 August 2006. Accessed on 20 May 2008 from <<http://app.mewr.gov.sg/press.asp?id=CDS4176>>.
4. A floor trap is an opening on the floor of the bathroom or kitchen to drain off floor washings to the sanitary pipe. Below the opening is a U-shaped bend that retains some water at its bottom. This retained water acts as an airtight seal (hence the name water seal) to prevent entry of foul air from the sanitary system.
5. "Inadequate Plumbing Systems Likely Contributed to SARS Transmission", Press Release WHO/70, 2003.

Chapter 8: From Flood Prevention and Flood Management to ABC Waters

1. L.Y. Tan, *Singapore's Worst Floods* (Singapore: National Library Board, 1999).

2. Under the Water Pollution Control and Drainage Act (predecessor to the Sewerage and Drainage Act), the Drainage Department was empowered to construct or require others to construct drainage systems.
3. This excludes the cost of drainage works undertaken by other public and private agencies.
4. NParks.
5. *From Garden City to City in a Garden*, MND Corporate Handbook (2008).
6. The Building and Construction Authority's Green Mark Award is a green building rating system to evaluate a building for its environmental impact and performance. It is endorsed and supported by the National Environment Agency. It provides a comprehensive framework for assessing building performance and environmental friendliness. Buildings are awarded the BCA Green Mark based on five key criteria: Energy Efficiency, Water Efficiency, Site/Project Development & Management (Building Management & Operation for existing buildings), Good Indoor Environmental Quality & Environmental Protection, and Innovation.

Chapter 10: Working with People and the Community

1. Peter Teo, "Clean and Green – that's the way we like it': A critical study of Singapore's environmental campaigns", Working Papers Series, Working Paper No. 121, Centre for Language in Social Life, Department of Linguistics and Modern English Language, Lancaster University.
2. This was before the Internet age, so there was none of the convenience of e-consultations.
3. Information from NParks.
4. *From Garden City to City in a Garden*, MND Corporate Handbook (2008).

Chapter 11: Linking with the Global Community

1. As of 11 March 2008, the Ministry of Construction has been restructured to form the Ministry of Housing and Urban-Rural Construction (MHURC).

Chapter 12: A Sustainable Singapore, A Sustainable World

1. All GDP data are based on 2000 market prices and U.S. dollar exchange rate of 3.0612 for 1965 and 1.6644 for 2005.
2. IEA World Energy Outlook, 2006.
3. Michael Porter and Daniel Esty, *National Environmental Performance: An Empirical Analysis of Policy Results and Determinants* (UK: Environment and Development Economics 10, Cambridge University Press, 2005).
4. At present, seawater desalination using reverse osmosis membranes requires 3.5 kWh/m³.
5. This is based on a study conducted by the Centre for Remote Imaging, Sensing and Processing (CRISP), National University of Singapore [Source: NParks].

