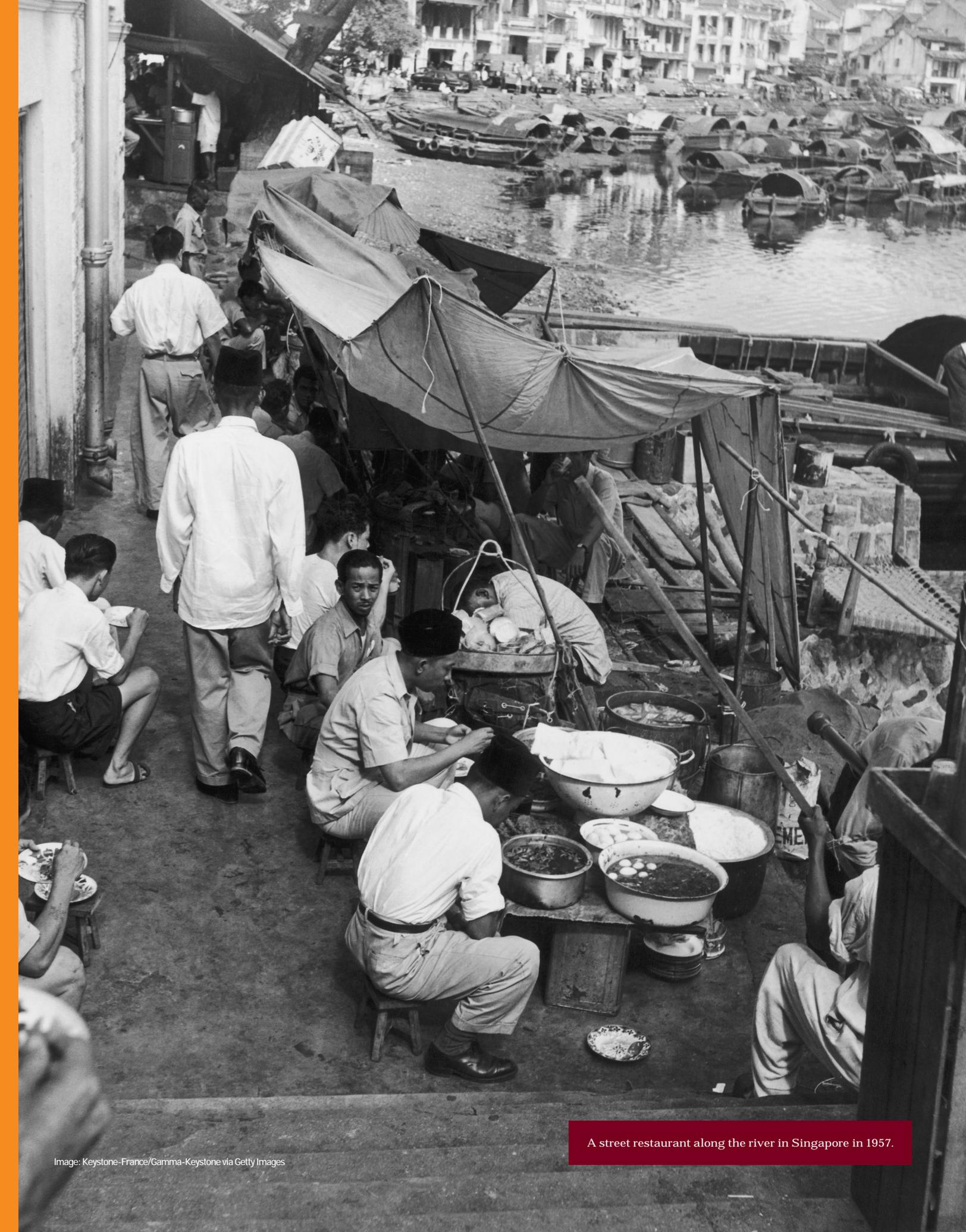


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A street restaurant along the river in Singapore in 1957.

# CLEAN-UP OF THE SINGAPORE RIVER: BEFORE AND AFTER

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For more than a century after the British settled in Singapore in 1819, Singapore River and its banks were the focal point of all global and regional trade passing the island. Trade was actually the basic reason for the British colonisation of the island, and the river was the physical centre of the town as great bulk of goods traded in the settlement was handed in its banks, resulting into a flurry of economic but also social activities.

With time, flourishing trade brought not only wealth but also problems with respect to water pollution. As navigation increased, commercial activities concentrated along the banks of the river attracted more population, squatter colonies, hawkers and backyard industries. Pollution became a major problem very soon, as garbage, sewage and industrial waste were dumped into the river.

Starting in 1822 and for more than 100 years, multiple committees had been established by the different governments to study the state of the river and propose alternatives on improving its navigation and solving pollution. The last colonial commission to clean up the river was set up in 1950s and it estimated the cost to clean the river at about S\$30 million. However, the implementation on the commission's report failed to achieve its targets due to financial difficulties and complexity of the problem. It was only in 1969 that then-Prime Minister Lee Kuan Yew set the machinery that would result into the clean-up of the river as a part of an overall strategy of urban development of the city-state.

The action plan to clean-up the rivers focused on the removal or relocation of polluting sources

(domestic, trade-related or industrial); development of infrastructure necessary for those affected by relocation, including related services such as water supply, sanitation, wastewater treatment, electricity, etc.; strict law enforcement; cleaning and dredging of water ways; and awareness programmes so that the population became aware of the overall development programmes of the city. Since the Singapore River joins with the five rivers of the Kallang Basin (Bukit Timah/ Rochor, Sungei Whampoa, Sungei Kallang, Pelton and Geylang) before discharging into the sea in Marina Bay, the action plan included not only the Singapore River but also the Kallang Basin.

## **Institutional coordination to achieve progress**

Structural, institutional and legal reforms were essential for the development of Singapore and also to reduce sources of pollution going into the rivers. In March 1969, Prime Minister Lee called on the drainage engineers in the Public Works Department and water engineers in the Public Utility Board to work together on a plan to solve the environmental problems associated with the rivers of Singapore, as we wrote in "Cleaning of the Singapore River and Kallang Basin in Singapore" for *International Journal of Water Resources Development*.

Studies carried out identified that the main sources of pollution were domestic, service-related and industrial in nature. Most of the domestic waste was from the people living along the rivers or in the river catchments areas, with old settlements such as Chinatown being a major

contributor. The government subsequently ruled that hawkers, squatters, makeshift industries (with the exception of the lighters), storehouses and others who made their living alongside the river, would have to be relocated in other areas as early as possible.

In August 1969, the boat-builders were among the first to be informed that they would have to be relocated away from the river, along with the firewood and the charcoal dealers, other important sources of pollution. Notices were served to businesses and individual premises all along the river. Provisions were also made through the Housing Development Board (HDB) for affected individuals and businesses to receive housing and commercial premises on priority basis, as noted by Stephen Dobbs, *The Singapore River: A Social History 1819–2002* (Singapore University Press, 2003).

By early 1977, much of the environmental work and control activities of the river polluting sources had already been planned or were under consideration by the appropriate authorities. The cleaning of the various rivers had progressed close to the mouth of the basin, but the mouth itself and the catchment areas still represented a major challenge in ensuring significant improvement in water quality. An estimated 44,000 squatters were still living in unsanitary conditions in the vicinity of the rivers, and liquid and solid wastes from the hawkers and vegetable vendors (numbering 4,926) and markets and unsewered premises, continued representing various sources of pollution. In addition, 610 pig farms and 500 duck farms were still draining untreated wastes

into the rivers, especially into the Kallang Basin, Dobbs reported.

On 27 February 1977, during the opening ceremony of the Upper Peirce Reservoir, Prime Minister Lee gave a definite target to the Ministry of the Environment to clean the Singapore River and Kallang Basin, Joan Hon's *Tidal Fortunes A Story of Change: The Singapore River and the Kallang Basin* (Landmark Books, 1990) noted. This was the impetus to move the gears of the institutional machinery.

### Tangible achievements

The massive operations faced numerous difficulties and challenges but also innumerable outcomes as well as achievements. More than 26,000 families were relocated from slums to high-rise public housing and, in the process, water supply, electricity and gas services were improved. All 4,926 hawkers were relocated into food centres built by the HDB, the Urban Redevelopment Authority and the Ministry of the Environment. By 1986, there were no unlicensed hawkers in Singapore.

In January 1984, the vegetable wholesalers were relocated in a new wholesale market built by HDB at a cost of S\$27.6 million, according to Ministry of the Environment data. More than 2,800 industrial cases of backyard trades and cottage industries were relocated, most of them to the industrial estates built by the HDB and Jurong Town Corporation. By March 1982, the Primary Production Department had phased out all pig and duck farms from the catchment areas.

By September 1983, activities involving an estimated 800 lighters were relocated to a new area where mooring and upgraded facilities were provided by the Port of Singapore Authority at a cost of S\$25 million, a move that facilitated the task of physical cleaning up the rivers. From 1982 to 1984, two thousand tonnes of refuse were removed from the Singapore, Kallang, Geylang and Rochor rivers, as documented by Poon, I. H. in 1986, "PSA's Role in the Cleaning Up Programme", for the Ministry of Environment and United Nations Environment Programme, referring to the Port of Singapore Authority. The Drainage Department dredged approximately 40,000 cubic metres of sediments from the stretch of the Singapore River and about 600,000 cubic metres from the Rochor and Kallang rivers,

Yap, K.G. said in an accompanying paper. In December 1986, the charcoal trade was relocated from Geylang River to a location where appropriate facilities were constructed by HDB at a cost of S\$5.66 million.

The HDB programme had a very visible impact on the provision of water supply. The number of HDB units increased exponentially from 19,879 in 1960 to 118,544 in 1970 since each flat was provided with direct piped water supply which was metered. The number of metered connections increased from 102,819 in 1960 to 264,314 in 1970. The length of water distribution and supply mains also increased from about 1,200 kilometres and 80 km in 1960, to 1840 km and 104 km, respectively, in 1970. More than 65 per cent of the increase in the length of the distribution mains was to serve villages and HDB estates outside the city area. During the same period, the number of standpipes decreased from 2,224 in 1960 to 528 in 1970.

Institutional coordination between HDB and the Public Utilities Board, even before the 1971 Concept Plan and the 1972 Water Master Plan, allowed the Public Utilities Board to develop the necessary infrastructure for water supply. This ensured that the new housing developments were not only available on time but also had better services compared to where the people lived before.

### Calibrating costs

In terms of investments, Chou, L.M. said in his 1998 article, "The Cleaning of Singapore River and the Kallang Basin: Approaches, Methods, Investments and Benefits", in *Ocean and Coastal Management*, that total costs incurred reached S\$200 million. He also cites some of the specific expenditures such as S\$21 million to form beaches in the Kallang Basin, S\$13 million in removing mud and other structures, expenditures incurred by PSA, HDB and other government agencies as discussed earlier. Josef Leitmann, in "Integrating the Environment in Urban Development: Singapore as a Model of Good Practice" (World Bank, 2000), also puts the cleaning cost at S\$200 million, excluding the costs of public housing, food centres, industrial workshops, and sewerage.

According to Tan Yong Soon et al., however, in "Clean, Green and Blue", (Institute of Southeast

Asian Studies, 2009), the clean-up cost the government nearly S\$300 million, excluding resettlement compensations. It is not clear whether this figure includes costs incurred directly and indirectly in manpower, time and education programmes in schools and for the public, etc. This last statistic is the most recent estimate. Therefore, one can conclude that the Singapore government had to pay roughly ten times the original estimated price because of the delay in cleaning its rivers. An important lesson for any governments trying to control pollution from their water courses is that delays, or insufficient actions, increase the total costs exponentially.

When the costs of the rivers cleaning programme are compared with the benefits, it is clear that it was an excellent investment. The river cleaning programme had numerous direct and indirect benefits, since it unleashed many development-related activities which transformed the face of Singapore and enhanced its image as a model city in terms of urban planning and development. Most important, however, was that the population achieved better quality of life.

The prime lesson, however, is the exemplary political will of the leadership in Singapore who envisioned and encouraged a sustained process of social and economic development consistent with environmental considerations. The visionary Prime Minister Lee realised in the 1960s that the development of holistic long-term policies that promote coordination among the different agencies and different sectors in the city-state were worth pursuing in spite of their complexity. This is the only way to achieve economic, social and environmental gains for the people of Singapore not only at present but also in the future. This is one notable lesson in the modern history of Singapore. **GIA**

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