

[Source: 'A Dirty Story' in "Tidal Fortunes – A Story of Change: The Singapore River and Kallang Basin" by Joan Hon, Landmark Books, January 1989, pages 65 - 70]

## **Chapter 8: A Dirty Story**

This chapter tells an absolutely dirty story. The squeamish of mind and heart are well-advised to skip this chapter which will dwell on pig and human waste and go on to the next. For the stouthearted, read on.

The originator the Dirty Story is, of course, **Chen Hung**, Head of the Sewerage Department during the River Clean-up. Those used to his after-dinner speeches warn that he would be crude but good. And that sums up this chapter.

Chen Hung spent the first 23 years of his working life dealing in dirty business. Whenever he attended dinners where acquaintances asked him what his job was, he would say, 'Please let us finish dinner first!'

'The first day I reported for work, and I went home, my father asked me, "Where have they assigned you?" and so I told my father "They've put me in the Sewerage Department."'

'My father said, "You mean, I've spent all my money educating you and you're in the shit-house now?"'

'To me, cleaning the river is the least important thing,' maintained Chen Hung. 'Because,' he hastened to explain, 'cleaning up is a physical job. Cleaning up is the last thing – the least as far as I'm concerned. The most important thing is pollution control.'

Pollution control, which includes educating the public, and enforcing prevention measures is vital to the Clean Rivers effort since the rivers will never be clean if the pollution of the rivers is not stopped. The responsibility of the Sewerage Department, in this respect, was to ensure that human and animal wastes did not flow into the river systems.

One major problem faced by the Sewerage Department was the pig farms found in Ponggol area and all over Singapore. As an interim measure, very crude cesspits were constructed for the collection of pig waste. These cesspits were designed only to collect the solid part of the waste while the liquid part overflowed into streams. Thus, clearly, the water in the streams could still not be allowed to flow into the reservoirs. The PUB built settling tanks and water from the streams was pumped into them and kept till it could be safely channeled into the reservoirs.

This method was not ideal and since one pig gives out five times the volume of waste of a human per day, the government ultimately decided to phase out all pig farms. Processing pig waste by the cesspit method was not seen as a viable long-term solution.

Now for human waste. According to Chen Hung, the cheapest way of disposal was to dig a hole and put the waste in. When the hole was filled up, another hole would be dug. But where is the limit to this?

The solution is the R2, the waste treatment system installed in rural unsewered premises to treat the household and human waste. It was introduced in the Seletar area when the catchment of the Seletar reservoir was being expanded.

'The R2 is my invention,' said Chen Hung. 'You can see my signature there. And my signature is still on the plans.'

'Now why R2? I first studied the soil conditions of the area, and so forth. My original drawings were supposed to be for one hole, but we found one was not adequate, so that's why the model changed from R1\* to R2. Two is a better name anyway, just as you have the Jaguar Mark II. You never find things with Mark I because Mark I never works. 'R' is for rural, you see. So R2 is Rural System No. 2.'

\* The R1, or water-sealed latrine, was an improvement to the pit latrine. The R1 pit was a water-sealed closet covered with a slab. A bend was built into the design to ensure that gases would not escape from the system. To flush it, water was poured into the pit. The R1 was introduced in the Changi Airport area before the kampongs there were resettled.

'The R2 system was a simple tool for simple needs. We have the jamban – the toilet – and we also have a flushing system. But we make sure the flushing system uses only the minimum amount of water. We don't want a 3-gallon flushing system, we just need the bare minimum – maybe half a gallon or so – just enough to flush. And then you have also the kitchen waste. All of it will be channeled into the first concrete pit where all the solids will settle, while the liquid part will go to the second tank. Then, as this second tank overflows, the liquid goes through a subsoil drainage system as it soaks into the ground. That's how the R2 system works.'

This, since the ground itself was used as a filtering agent, it was important that bacteria would not get to the water table. Happily, this is the case since the die-off rate of any bacteria is exponential, that is, half the bacteria would die at regular intervals. Studies have shown that very few bacteria would survive more than a hundred feet of ground filtration and will die off by the time the waste water finds its level. Because of this, no chemicals were required in the R2

system although the rate of rainfall and the nature of the terrain are still important points of consideration.

Chen Hung emphasized this point. 'Even having the well next to the toilet is not so bad provided the water table is on the lower level of the slope. In other words, if the well is on high ground and the toilet is below it, and since the water cannot go uphill, it will be all right. But you don't put the toilet up there and the well below, because all the germs will go down into the well. So you must know where to locate the R2. The site instructions are very important. All these little considerations must be decided on site.'

The cost of each system was about \$200, and therefore affordable by the poor rural families. But where the kampong folk wanted them sited makes another story.

'They think it's smelly,' narrated Chen Hung. 'So I get told, "Wah! Mai cher tow, ah! Ee peng!" ("Not here. Over there!")

'So I started from afar. I told him, "Boh chow, eh-ah!" ("It's not smelly!") But he answers, "Mai-mai" and points out "Ee peng!" ("No thanks! Over there!")

'I put the thing 30 metres away. As I went further inside the rural areas, it got sited nearer and nearer to the homes. Because, when we finished the thing for the first fellow, he said, "Wah! Swee-li!" ("Wow! Beautiful!"), and when I finished putting the last R2, it was already next to the bedroom!'

This was in the Mandai Kechil area.

The R2 system would not work in urban areas because of congestion. Its operation depends on having a lot of soil for the water to seep away from the system. And in town, the waste would invariably seep from one system to a neighbouring R2.

The success rate of the system was high – more than 90 per cent. In some cases, it did not work because the ground was too impervious, but on the whole, it worked very well, in fact, beyond the Ministry's expectations. Initially, it was thought that each R2 would fill up within one or two years, but when the installations were checked after 5 or 6 years, they were still found to be working.

Chen Hung explained why this was so. 'The thing is not arithmetically built up. It builds up slowly because there is decomposition of the human faeces. There's a biological process happening all the time. Let's say you put some human waste in a bottle and look at it every week – after two months – the water becomes totally clear. The worst is the first three weeks when you get pungent smells and you get all the gases – methane, carbon dioxide. After that it stabilizes and becomes clear.'

'So supposing every day there is a layer of one inch added. It doesn't mean that in thirty days, you get thirty inches. Thirty days may add only fifteen inches. But if you add another thirty days, it should not add another fifteen inches. Over the years it builds up so slowly.'

'It depends on the number of people in the household, it depends on the soil, it depends on the bacterium: some go chomp-chomp-chomp which are quick-reacting, some are slow-reacting – it depends on the species you have. And they do all the work.'

'We cultivate the bacteria at the Sewerage Department. That's why I find sewage treatment work very interesting! It is the same as food processing only in this case it is food waste – that's all. In fact, in some countries, they use the sludge to feed fish. It's also used as a fertilizer.'

The R2 has been so successful that many countries in the region have implemented the system.

Few people realize that purified water is being re-used in Singapore. For example, final effluent from the Bedok Waste Treatment Plant is being used to wash the driveways and for watering the plants at the Tanah Merah Golf Course.

Similarly, the final effluent from the Ulu Pandan Treatment Works is being re-purified at the Industrial Waterworks and the water is being used as industrial water in the Jurong industrial area. Some blocks of the Housing Board flats in the Pandan area also use it for flushing.

'This is what we want,' said Chen Hung. 'To conserve precious drinking water and use secondary water for secondary uses. Try to make it a policy: that means you use first-class water for first class use, second-class water for second-class use.'

The success of the move to provide modern sanitation to all households triumphed on the day the last nightsoil bucket was taken away for good. Gone now is the familiar sight of the compartmented truck (jokingly referred to as the 'honeycart') doing its round – new buckets provided to the latrines, dirty ones taken away, and showing up at places one would not expect to have this sort of primitive system – the Rochore area, Duxton Road in Chinatown, and Bugis Street.

Singapore has now achieved the high standard of modern sanitation it has set for itself. It remains now for the population to learn how to use their modern toilets properly and maintain them in a high sanitary condition.

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[Source: Excerpts from “Tidal Fortunes – A Story of Change: The Singapore River and Kallang Basin” by Joan Hon, Landmark Books, January 1989]

## Chapter 5: Propelled into Action

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A Steering Committee was formed with the Permanent Secretary, Lee Ek Tieng, at the helm to look into aspects of the Draft Plan. The details were refined into a Master Plan for submission to the Cabinet. Once approved, the whole matter would become a government edict to be carried out by various bodies and co-ordinated by the Environment Ministry.

The First Meeting of the Steering Committee, chaired by Lee Ek Tieng, was attended by Lee Yong Siang (Director of Environmental Engineering), Goh Tock Eng (Commissioner of Public Health), Chen Hung (Head of Sewerage Department), Tan Gee Paw (Head of Drainage Department), Tan Teng Huat (Chief Engineer, Pollution Control), and Wong Keng Mun (Head of Hawkers Department).

## Chapter 10: Marina Bay

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The next decision was to clear the island entirely of pigs. As Chen Hung was quick to point out – the waste coming from the pigs alone is five times the total waste produced by all the human population. Chemical treatment would be costly, and out of proportion to the income the pigs would generate for the farmer. Hence, says Chen Hung, you had only two choices for the future – either you have fresh pork and dirty water, or frozen imported pork and fresh water. It was clear what it had to be!

**Comment [HY1]:** After reading this section, I now realized the real reason why the Farm Licensing System, an application that I was developing at MND Information System Dept, was canned. This was the first huge application that I worked on in 1983 and it never saw light ☹ At that time, I had no clue who Chen Hung was.  
- Hing-Yan Lee

## Chapter 11: The Race is Won

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The last job done by the Environment Ministry on the rivers was the laying of sand on the Kallang riverbed. T. K. Pillai, then Head of the Drainage Department was at the time organizing the dredging of the river.

He made the decision that the beds of the rivers and certain sections of the Kallang Basin had to be covered with sand to give the riverscape a fresh, new face.

Chen Hung remembers examining the sand and exclaiming, ‘But this is not white sand – it is yellowish!’

Unflapped, Pillai had told him, 'Of course! Haven't you heard of golden sand?' The cost of the golden beaches, made with enough sand to fill 500 Olympic-size swimming pools, was \$21 million.

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In September 1987, the Environment Ministry celebrated their success with an event they called the Clean Rivers Commemoration.

The Prime Minister, on this occasion, was brought on a tour of the River. It was then at its best, newly beautiful with sandy beaches gleaming in the sun.

True to his word, he presented solid gold medals to the men in charge of this mammoth project. Some of them expressed immense surprise at the number of medals conferred. They had never expected to get a medal.

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Chen Hung searched the drawers in his office and finally came up with his medal. 'See?' They've inscribed my name on it.' He was clearly proud of winning it and said so. His father, he said, would have been so proud to see what working in the shit-house had gotten his son. But unfortunately, he has passed away, Chen Hung said sadly.

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