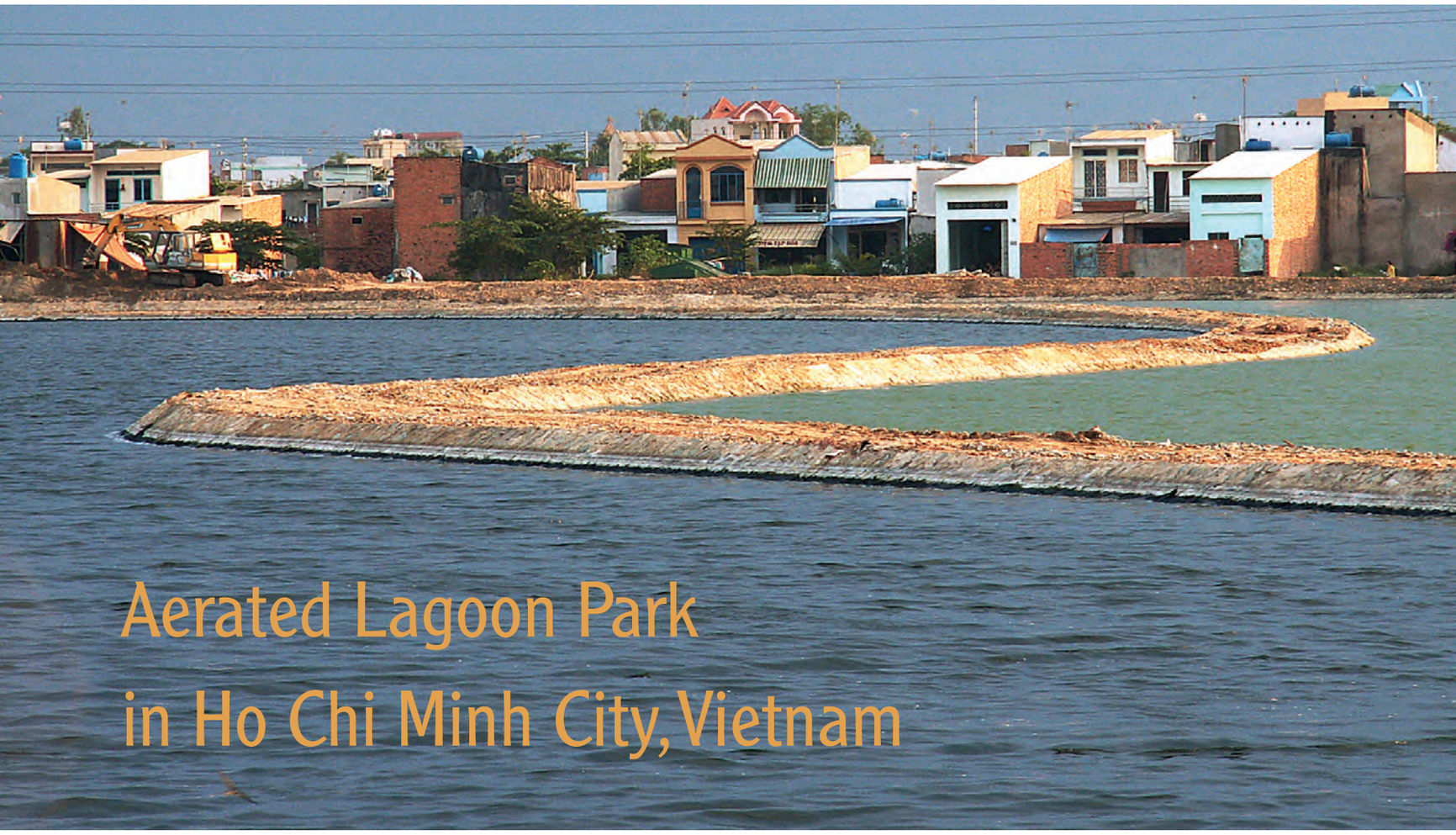
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Aerated Lagoon Park in Ho Chi Minh City, Vietnam

The construction of an aerated lagoon in Ho Chi Minh City has shown that such interventions can improve the environmental conditions of polluted water courses and also reserve open space in mega-cities where land is at a premium.



The expansive landscape of the lagoon is a rarity in Vietnam's mega-city of 6 million people (8 million including illegal residents). The maturation ponds, separated by small dykes, are ringed by sites-and-services and informal housing neighborhoods.

The relation of urbanization to water holds a privileged position in Vietnam. In fact, the country was originally referred to as *dat nuoc* – "earth and water" – the phrase referring to both the trickle of water through one rice field and the "mountains and rivers" of the nation. The interdependency, yet autonomy, of "earth and water" is essential for both a pragmatic and cultural understanding of Vietnam. A 1490 map of Vietnam under the Le dynasty renders only the inter-connected waterways and the numerous mountain peaks, accentuating their importance. The lowland plains (and wet paddy civilization) are dependent upon the mighty rivers descending from the mountains. As well, ancient traditions of *phong thuy* (Vietnamese for feng shui) have a special reverence for water bodies and the relation of settlements to them. The northern capital city of Hanoi is structured by a network of man-made and natural lakes; the ancient imperial capital city of Hue occupies one side of the Perfume River and the post-colonial city the other. As technology and money now allows, bridges are spanning the country's numerous rivers and the relation of city to water is acquiring yet a new meaning. At the same time, water bodies are under threat as lowlands are inadvertently filled to support urbanization. As well, illegal encroachment on

AERATED LAGOON PARK, HO CHI MINH CITY, VIETNAM
Client: People's Committee of HCMC, Binh Tan District
Planning: Black & Veatch (detail engineering design); Prof Vasel, Liège University and Prof De Pauw, Gent University, Belgium (engineering follow-up)
Completion: 2006
Area: 32.2-hectare lagoon within 36.6-hectare area
Costs: 2.5 million euros (construction), 5 million euros (land acquisition)



water bodies further alters ecologies and inevitably affects the severity and frequency of flooding, not to mention the increase in environmental degradation and pollution.

Water in the contemporary Vietnamese context is often regarded merely from a technical and engineering aspect. The reflective, symbolic and spatial qualities are frequently sidelined for more "pressing concerns". A pilot project in Ho Chi Minh City, the first of its kind at such a scale in Vietnam, is unique for the fact that it addresses simultaneously several aspects of water and the urban context. The 33.2 hectare aerated lagoon (located within a 36.6 hectare area) is a low-cost alternative for wastewater purification, a place of decongestion ("green lung") in an otherwise dense and rapidly urbanizing district and a reservoir for the seasonal monsoon rains; also, its edge serves as a programmed recreation area and free open space for nearby residents. By the very nature of it being a large, defined and partially controlled water body, it is also nearly guaranteed to remain an expansive open space – a rare fact in the periphery of Vietnam's rapidly (and horizontally) expanding southern mega-city.

The project was part of a larger bilateral development cooperation (1998-2006) between Vietnam and Belgium which included a series of linked strategic urban projects that stemmed from the up-grading of one of the city's most polluted canals. The Tan Hao Lo Gom Sanitation and Urban Upgrading Project, managed by the Project Management Unit (PMU) 415, implemented three pilot projects in Ward 11 of District 6 and another two in the rural Binh Tan District (Binh Hung Hoa Ward). The project widened and embanked a portion of the canal, and in the process 180 families were relocated, of the estimated 2,500 households which had encroached on the polluted canal. The families were given the choice to inhabit new, on-site, mid-rise apartment blocks (inclusive of a hawkers' market and community



hall) or to move to a sites-and-services project (which improved and built upon a pre-existing informal settlement comprising new social services such as a school) in Binh Tan. The first site also incorporated a slum up-grading project for the households adjacent to the canal and the apartment site (previous agro-industry site). The second site included the large-scale aerated lagoon.

The lagoon treats wastewater of the Den Canal (literally translating to black canal), a four-kilometer long arroyo located north of the Tan Hao Lo Gom basin, flowing through the rural district of Tan Phu and the urban district of Binh Tan. The site of the lagoon, already a natural wetland, was identified in 2000 as one of the last remaining open spaces in the northwestern urban periphery. It was slated to be a park in the city's approved master plan; however, it was only a matter of time before the existing lotus ponds were informally appropriated by uncontrolled urbanization. The objective of the project was therefore twofold: to explore an alternative solution to wastewater treatment of a polluted canal of the city while freezing the urbanization of a large plot of land for eventual future uses.

The constructed project utilizes aerated lagoon and stabilization pond technology, which capitalizes on natural processes and low-tech techniques; the system boasts low investment, operation and maintenance costs and low production of sludge.

Technically, an aerated lagoon is a holding and/or treatment pond with artificial aeration, to speed up the natural process of biological decomposition of organic waste by stimulating the growth and activity of aerobic bacteria to degrade organic waste. The energy for the process is harnessed from the intense sun and wind – therefore, while such a system requires at least twelve square meters per inhabitant in Northern Europe, this technology requires only one square meter in Ho Chi Minh City. Nonetheless, its main disadvantage remains

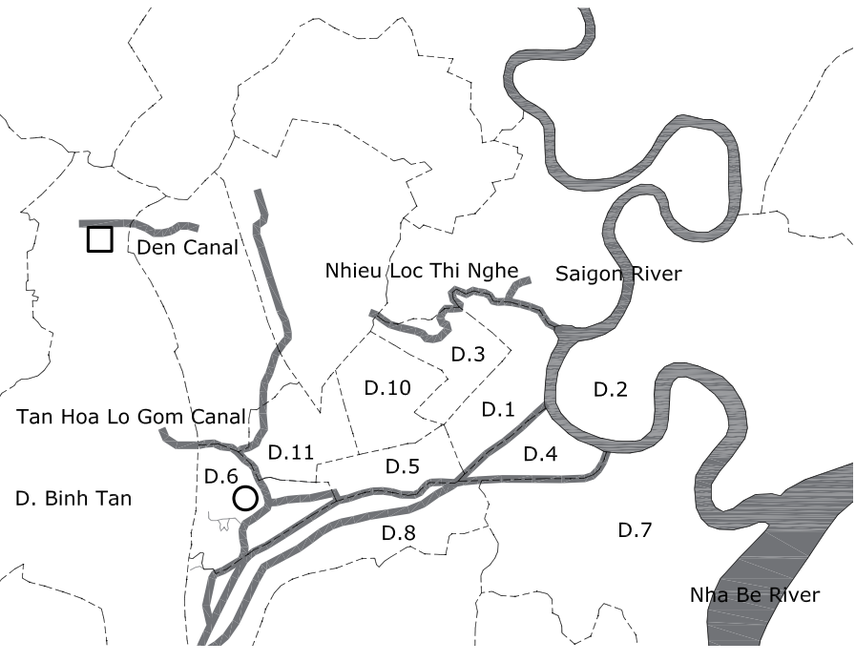


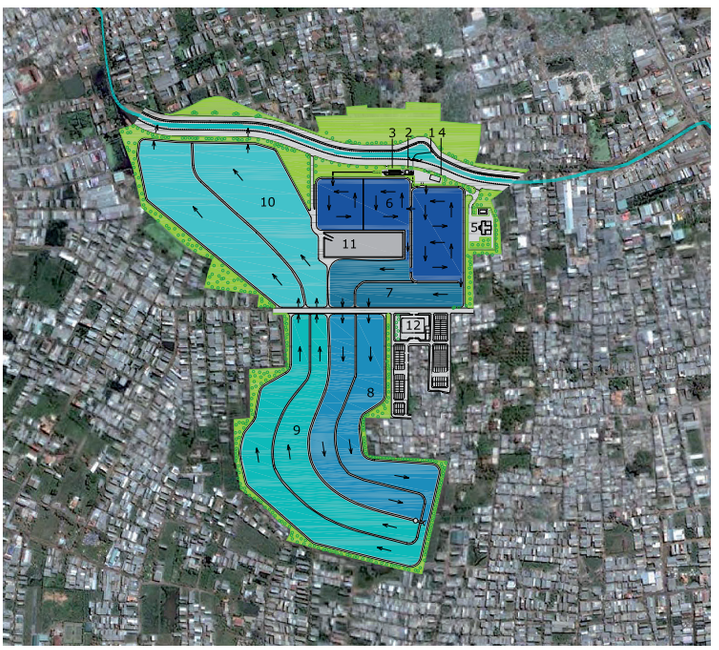
The lagoon and stabilization pond technology capitalizes on natural processes and low-tech solutions. The aerators are didactic and reveal the process of cleaning.

the fact that it requires relatively large surface areas – between 0.7 to 2.8 square meters per inhabitant in tropical countries.

Two parallel systems were designed to treat the domestic wastewater of presently 120,000 inhabitants in the Den Canal vicinity (the estimated number of residents in the area is expected to reach 200,000 by 2020 and the lagoon has been designed to this capacity), as well as the area's industrial waste (primarily from textile dying, seafood processing and paper mills). The black water of the canal is firstly pumped up to a pond, two meters higher than its original level, where aerators hasten the first respiration process. The water then flows across a sedimentation pond followed by three consecutive maturation ponds. The entire process takes a total of eleven days. The cleansed water is then suitable for irrigation purposes and local residents also use the last maturation pond as a fishpond. Neither odor nor noise pollution is generated by the facility.

The lagoon has been operational since December 2005 and, as an experimental project, is monitored by both Belgian and Vietnamese universities. After only a few months of operation, all Vietnamese standards were already met, and the Belgian evaluation team declared that there is further room for improvement by adjusting





The project is located along the Den Canal, northwest of the Tan Hoa Lo Gom watershed. Right: 1 weir intake; 2 pumping station; 3 grit channel; 4 workshop; 5 office; 6 aerated lagoon; 7 sedimentation pond; 8, 9, 10 maturation ponds; 11 sludge drying bed; 12 sites-and-services housing project

the management of the process. This indicates that eventually more water/worst quality water could be treated in the future.

The site was designed with a 20-meter linear park along its perimeter. This buffer zone includes parts of the lagoon which have been discretely fenced for security purposes and programmed as a recreation area for local inhabitants. The eastern portion of the lagoon has been developed by PMU 415 as a sites-and-services area for 119 families who were relocated from the Tan Hao Lo Gom catchment area. It appears from interviews with the population living around the lagoon that the inhabitants are satisfied with the project. The former lotus ponds which were sources of rats, snakes and regular flooding have disappeared. The new landscape setting reflects local tastes perfectly, and the community is enjoying the green spaces and recreational facilities. This partially explains the land speculation that is now taking place around the lagoon. A 15 square meter plot that could be sold for 18 million Vietnam Dong in 1999 is now valued at 250 million Vietnam Dong.

Although the potential of urban design combined with engineering logics did not reach their



zenith in the aerated lagoon project, the effort is laudable and results are respectable. As space is an absolute luxury in Ho Chi Minh City, the available surface area of the ponds required to reach treatment standards was tight and therefore excluded larger areas dedicated solely to recreational activities; urban project integration was thus limited in the spatial sense. Nonetheless, further collaboration between the disciplines – particularly at the beginning of the process when the plan of the lagoons was being established – could have no doubt resulted in a more nuanced intervention where the lagoon and surrounding urban fabric truly complemented one another.

Nonetheless, the Den Canal aerated lagoon project is impressive for the fact that it exists in a city where land is being consumed at an unbelievable rate and where green (or blue) open space is vanishing. Due to the speculation pressure, it is expected that this type of project will eventually be adapted to secondary cities, although it gives the opportunity to a mega-city to freeze a portion of its open space in a productive way.

The 20-meter buffer zone between the aerated lagoon and the sites-and-services housing project serves as a neighborhood park.