Case study: Makoko floating school
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Makoko is a slum community living in wooden buildings on stilts over the water of Lagos Lagoon in Nigeria, and canoes are the residents’ primary means of transportation. The challenges are significant, socially, economically and not least environmentally in view of changing climate and frequent flooding. In search of an appropriate solution, Amsterdam-based architects NLE have demonstrated a new form of floating buildings for Makoko and similar water cities in Africa and elsewhere. The first prototype is a Floating School, addressing appropriately not only building technology but also environmental issues and the everyday lives of people living in Makoko.

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The rapid urbanisation of coastal cities in Africa, in combination with the effects of climate change, such as sea level rise, underlines the necessity for innovative development and adaptation of these expanding cities to become more resilient to frequent flooding and other effects of the global environmental changes. Makoko, a slum community on water in Lagos, Nigeria, has become a model for such creative and contemporary solutions to the urban challenges facing the approximately 100,000 people living in the area. Population numbers are uncertain, but the growth rate is estimated at around 7.5 percent per annum.

Makoko is a highly urbanised part of Lagos, but without roads, land or modern infrastructure and with the fishing and sawmilling industries as primary sources of income for its inhabitants. Traditionally, Makoko houses are built on stilts, using canoes on waterways as the means of transportation. Makoko faces a number of challenges: on the one hand practical ones like education, housing, sanitation and utilities. On the other, the effects of climate change, increasing rainfall and rising sea levels. Once a fishing village, Makoko is now part of the ever-growing and sprawling Lagos urban area. In that sense, Makoko is now a regarded as a slum in an attractive waterfront area. Government services are very limited and most internal community issues are addressed by the Baale — the most respected person, the chief, in the community.

However, the economic development of Nigeria has caused some unexpected public interest in the area. Now, the Makoko community stands in the way of the expansion of Lagos, furthermore in a location ripe for high-value redevelopment. This led the Lagos authorities to destroy dozens of residences in 2013, but so far the rest of the community and its residents remain in situ. The actions were followed by considerable social unrest in the community and protests leading up to the fatal shooting of a community chief by the police [1].

Lagos is one of the largest and fastest-growing cities in the world. It is on its way to becoming one of the world’s largest megacities; some estimates suggest that it may have a population of 25 million by 2025, and the number may increase further to 40 million although most informed sources estimate the current population at 18–19 million [2]. The State government’s capability to manage the rapid growth has been inadequate, due to lack of funding and institutional capacity. This has led to overcrowded slum areas, lack of basic services, crime, poverty and diseases in many areas, including Makoko. As one blogger puts it, ‘while Lagos bubbles with life and lots of commercial activities, you need just a drive around town, especially to Makoko, to see the other side of the ‘City of Excellence’, where livelihood is on water and residents truly living below one dollar a day’ [3].

A large proportion of Makoko residents are tenants; only ten percent own their houses. However, as the quality of the buildings and of the environment are perceived as quite low, most residents are not particularly interested in obtaining legal ownership status, which also includes costs and administrative work.

Half of the households comprise four to six members. One in five adults in Makoko is unemployed; the most common work is in fishing or in one of the local saw mills. The average education level is low — only one in four has any education above secondary level. Many children don’t go to school at all and young boys who drop out of schools form small gangs, misusing drugs and alcohol and causing social tensions.

The waste disposal system is underdeveloped and causes blockages, which in turn leads to overflow of water channels on a frequent and regular basis. Residents of
Makoko estimate that major flooding occurs 3–4 times a year, lasting up to four days.
Several organisations offer various programmes in collaboration with the Makoko community.

**Overcoming the challenges**
Amsterdam-based architectural practice NLÉ has a particular focus on rapidly growing cities in developing countries, with several assignments in Africa and Asia, including a number of projects in Lagos. Since project inception in 2013, NLÉ has adopted a socio-technological approach to the community of Makoko and their buildings on stilts over the waters of Lagos Lagoon. By demonstrating the feasibility of a new form of building on water — a floating school — other long overdue improvements and adaptations in the community may become possible. If the trial period of use proves successful, the results may also serve as a model for the benefit of other vulnerable communities in African coastal cities, many of which show similar characteristics of rapid urbanisation and economic growth but at the same time an increasing concern with environmental change and projected climate change effects such as rising sea level, heavy rain and frequent flooding.

The Floating School is a prototype structure that addresses physical and social needs in view of the growing challenges of climate change. It is a movable ‘watercraft’ located in the centre of the community of Makoko. It is built like a pontoon on a series of plastic drums or barrels, making it less vulnerable to flooding and extreme weather. It is also designed to harvest rainwater, to recycle organic waste and to use renewable energy.

There has only been one English-speaking primary school in Makoko. The school in question is built on reclaimed land, but the constantly changing water conditions have made the children’s access to education uncertain. In response to this, and in collaboration with the Makoko community, NLÉ launched the idea of the Makoko Floating School.

The floating prototype structure for a school is scalable and adaptable for other uses, such as community hub, health care clinic, market or even housing. The structure, with a triangular frame, is safe and allows a large degree of flexibility for customization for specific purposes. The size of the suggested triangular framework is 10 × 10 meters at the base and 10 meters high. A low centre of gravity makes it stable even in heavy winds, and it has a capacity to support 100 adults, also in more extreme weather conditions. The total size is 220 square meters.

The building has three levels, the 1st being on open play area for school breaks and assemblies, which also serves as community space after hours. The second level is an enclosed space for two to four classrooms, with enough space for up to a hundred pupils. The third floor is a workshop space. A staircase on the side connects the three levels (Figure 1).

The simple but innovative structure adheres to standards for sustainable development with technologies for renewable energy, waste reduction, water and sewage treatment. Eco-friendly bamboo and wood from a local sawmill were used.

The buoyancy system consists of 16 wooden modules, each containing 16 recycled empty plastic barrels — easily

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**Figure 1**

Image NLÉ Architects.
The Floating School prototype also became a point of departure for the ambitious ‘African Water Cities Project’ with NLE’s partners beyond Lagos. This project seeks to combine international expertise on water management with local and indigenous techniques, in order to create innovative and sustainable urban solutions for adaptation and resilience to climate change effects. A large area of the continent lies within zones with high and very high risks and at least 20 large cities are seen as potential ‘water cities’, including Cairo, Kinshasa, Luanda, Abidjan and Dakar, with hundreds of vulnerable waterfront communities.

The Makoko Floating School and the African Water Cities Project have been acknowledged internationally as examples of appropriate and sustainable urban development and building design with the potential to address the real needs of communities vulnerable to floods and inundation. The floating school has also encouraged engagement by both the local community and Lagos State in the long-term design and development processes for building and living on water.

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References


For further reading


