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Jan 1, 2019, 12:23pm

Architects Worldwide Invent Groundbreaking Waterborne Solutions To Climate Change, Part 7



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Korean-born American architect Charles Wee, founder of [GDS Architects](#), says, “There is still a lot of work to be done in this arena, because floating habitats have yet to be pioneered in a scalable and replicable manner. Technology that would support this new life on water continues to improve at a rapid speed, but policies and public opinions that would allow for cities to be built on water are still far behind. Currently, even in flood zones in America, it is difficult for homeowners to invest in buoyant retrofits for their existing homes, because of the limitations of insurance companies. However, as we continue to innovate in this area, we believe policy changes will come and public opinions will shift as we continue to educate people.”



LifeArk community on the water

PHOTO COURTESY OF GDS INNOVATION LAB

Rethinking conventional ways of practicing architecture in recent years, Wee founded [GDS Innovation Lab](#), the social innovation R&D arm of GDS Architects, in 2014 after learning about his missionary cousin living on Santa Rosa Island along the Amazon River near the Brazilian, Peruvian and Colombian borders, where the indigenous population's entire existence revolves around fighting rising water levels and flooding – trapped in a cycle of poverty generation after generation as most of their time is spent simply surviving – and about the worldwide need for prefabricated floating housing. “For many years, I participated in this race to create new megacities, blanketed with towers, without much regard to what it was replacing,” Wee notes. “In the process, I witnessed thousands of years of history, culture, environment and people literally bulldozed away. Architects trained to solve complex societal problems became active partners in leaving a long and wide path of destruction, driven by the greed of developers and governments. I had to jump off the bandwagon and seek something new. Floods cause more damage worldwide than any other type of natural disaster and cause some of the largest economic, social and humanitarian losses. Over the last 20 years, flooding has affected 2.3 billion people, 95 % of whom live in Asia. In the process of wrestling with the problem of river communities like those along the Amazon River for the last four years, I realized there was a global crisis at an unprecedented scale that could be solved through design and engineering.”



A floating architecture and buoyant solution, LifeArk is a prefabricated, modular building system for mass-produced, affordable, safe, sustainable and easily deployable and assembled housing

PHOTO COURTESY OF GDS INNOVATION LAB

Considering floating architecture and buoyant solutions, LifeArk – a prefabricated, modular building system for mass-produced, affordable, safe, sustainable and easily deployable and assembled housing – resulted from trying to solve this issue. Designed for disaster relief and refugee or homeless housing, these self-sustaining, life-saving homes for water or land that will mobilize economic development and regeneration for millions of slum dwellers and displaced peoples worldwide can be scaled up into communities in different configurations: a school, hospital, livestock or hydroponics farm, or community center for small businesses. With the option to operate 100 % off grid, allowing units to be moved around as needed, LifeArk’s modular roof can be fitted with photovoltaic panels, a rainwater harvesting system where a single-family home can store over 30,000 liters of filtered drinking water, a filtration system so that water needed for all other uses can be pumped up from the river, and a portable sewage treatment system. It was selected as one of 17 semifinalists in the 2017 Buckminster Fuller Challenge, an annual honor known as “socially-responsible design’s highest award”.



Aerial view of a LifeArk community on the water

PHOTO COURTESY OF GDS INNOVATION LAB

Wee discusses the need for affordable floating architecture, “There are many floating structures being built around the world to address rising water levels. However, many of them are still extremely expensive and are essentially conventional homes being built on buoyant foundations, and mainly serve a high-priced waterfront housing market. Several factors inhibit existing solutions to truly scale as a solution for communities most affected by climate change: speed, cost and policies. Often, existing floating structures require a significant amount of site preparation, much like that of a conventional home – the speed of delivery and assembly cannot

adequately address the rapidly-growing need. Additionally, current projects are simply unaffordable for those who need it most. With the number of climate refugees expected to increase mostly due to flooding, there is a pressing need to proactively respond to this challenge. Many major cities in the developing world are already struggling to properly house their rapidly-growing population – a trend that is only expected to grow. For example, in Nigeria, the scarcity of land and affordable housing has pushed people out onto the waters, resulting in the Makoko floating slum community (home to nearly 250,000 residents). LifeArk can rapidly provide resilient homes, master planning communities onto the water, addressing the land scarcity many cities are facing.”



Interior of LifeArk modular housing

PHOTO COURTESY OF GDS INNOVATION LAB

Roto-molded with environmentally-stable, recyclable and zero-maintenance high-density polyethylene (HDPE) and injected with polyurethane foam with inherent additives to form a composite material to provide fire resistance, buoyancy, thermal performance and structural values, LifeArk units are prefabricated via a module-based construction system ensuring efficiency in manufacture, assembly, relocation and reassembly, with a lifespan of 20 to 30 years. Interior walls, flooring and finishes may be customized. Arriving onsite, each module can be quickly assembled by unskilled workers using standard tools in just two hours. The only skilled labor required onsite is connections to sewers. LifeArk cuts the total design and construction time for prefabricated architecture in half, while its per square foot cost is expected to be approximately one-third of the price of conventional ground-up housing. LifeArk will apply a manufacturing protocol using US life safety standards to all parts of the world using locally-sourced HDPE and set up factories for manufacture, final assembly and site adaptation as

required in future. The first floating prototype and pilot project will be prefabricated in California and deployed on a lake in Texas and a land-based one near downtown Los Angeles for the homeless, then marketed to cities, NGOs and faith-based communities.



LifeArk slum upgrading

PHOTO COURTESY OF GDS INNOVATION LAB