STRATEGIC DESIGN RESEARCH JOURNAL

Floating: design for living on water

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ABSTRACT

The paper speculates on floating solutions for a world where flooded cities are proliferating because of climate change. It highlights a specific aspect present in the author's post-doctoral thesis on the chaos that fosters creation, manifested through design and architecture for disaster relief, particularly those related to rain. Intending to understand technologies for floating, it presents four different projects that could serve the same scenario of populations threatened by rising sea levels: the restoration of a water vehicle, mobile platforms adapted from containers, a prefabricated self-built floating system and a plan for a modular maritime metropolis. The results provide a comparison between the advantages and disadvantages of this way of life of floating communities. In conclusion, it presents ontological design as a guiding principle to be adopted by designers for a transition to a future on water.

Keywords: sea level rise, floating communities, sustainable constructions, floating systems.

FLOATING INTO A FUTURE IN WHICH MANY CITIES WILL BE AFFECTED BY SEA-LEVEL RISE

Among the Global Sustainable Development Goals (SDGs) that explicitly incorporate the concept of resilience, Goal 13 calls for strengthening resilience and adaptive capacity to climate-related hazards and natural disasters in all countries: “Take urgent action to combat climate change and its impacts. Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries” (United Nations, 2015).

According to Escobar (2018), the current crisis is fundamentally an ontological crisis, and the transition toward a scenario more deeply connected with nature requires a radical transformation in how we conceive and practice design. Such a transformation would entail shifting design from a tool serving colonial modernity to a decolonial practice oriented toward the creation of pluriversal and sustainable realities.

Possible strategies seek to approximate a holistic worldview in which the relationships between the environment and human beings are harmonious and complementary, inspired by eco-spiritual thought. The Constitutions of Ecuador (2008) and Bolivia (2009) provide examples of the application of principles derived from Andean cosmogony, in which Pacha Mama, Mother Earth, or nature is recognized as a rights-bearing entity of which human beings are an integral component, maintaining interrelation and functionality (Silva; Rangel, 2016). As illustrated in Figure 1, Chaac is a deity who manifested through the natural cycles of life, ensuring harvests but also expressing power through hurricanes and hailstorms. For this reason, he was represented in many temples as the provider of rain, upon which agriculture depended.

Barbosa, L. L. (2025). Floating: design for living on water. *Strategic Design Research Journal. Volume 18*, number 02, July - December 2025. 172-187. DOI: 10.4013/sdrj.2025.182.05.

Figure 1. Chaac, the Maya deity of rain and storms (Source: Available at: https://commons.wikimedia.org/wiki/File:Chac_Xib_Chac.jpg)

The role of Chaac in this article is to reclaim its symbolic expression within a historical and environmental context. In a region marked by strong seasonal variations in rainfall and the periodic occurrence of intense climatic events, the deity embodied both the abundance provided by water and its capacity to alter landscapes, harvests, and ways of life. More than controlling nature, Chaac personified the need to coexist with its dynamics, recognizing that prosperity depended on continuous adaptation to natural cycles. This relational understanding of ecological cycles reappears in recent debates on regeneration. This approach, in the design principle, proposes changes from flood control to its incorporation into urban cycles. This logic aims to design for continuous transformation, not for stability.

Some political initiatives aimed at fostering change were promoted by the United Nations, such as the Scientific Conference on the Conservation and Utilization of Resources, held in Lake Success, New York, in 1949. The issue was revisited only in 1968 at UNESCO headquarters in Paris, where the Intergovernmental Conference of Experts on the Scientific Basis for Rational Use and Conservation of the Resources of the Biosphere was convened. These discussions gained greater prominence after 1972, when the Stockholm Declaration—formally known as the outcome of the United Nations Conference on the Human Environment—marked a significant shift in the approach to the human–environment relationship, initiating a transition from an anthropocentric-utilitarian perspective toward a biocentric/ecocentric one.

> "In our contemplation of how tragic moments of disintegration over the centuries were followed by immensely creative moments of renewal, we received our great hope for the future. Starting and guiding this next creative moment in Earth's history is the Great Work of the world's religions, as we move forward" (BERRY, 2009, p. 87).

Nearly fifty years after the historic Stockholm Declaration, the premises established by the concept of sustainability have fostered certain changes; however, little has been effectively implemented in relation to the aspirations originally envisioned. The mere maintenance and preservation of resources in order to sustain human needs may be replaced by the value of

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regeneration, whereby human beings seek to restore what has been damaged, recognizing their integration with and interdependence upon nature.

Regeneration represents a possible pathway: following the losses already incurred, prosperity may be achieved by replenishing and restoring resources in order to rebuild economies and communities. A crucial point lies in the concept of restructuring as something new—distinct from what previously existed—in a manner analogous to resilience. If emphasizing the capacity of future generations to meet their own needs has proven insufficient to promote sustainable development, might the urgency of the present moment serve as a catalyst for transformative and immediate change?

The countdown to resource depletion has already begun, prompting efforts to achieve more with fewer resources. Nevertheless, prevailing economic conceptions remain grounded in an anthropocentric perspective, treating the economy as a system isolated from nature.

> "Il binomio vita/morte cerca di cogliere gli aspetti positivo e negativo dell´acqua: essenzialmente come sorgente della vita e simbolo della prosperità che nelle conture contadine significa per i raccolti, mas anche per la sua trasparenza che si associa a purezza, frechezza, igiene e, infine, per le proprietà terapeutiche riconosciute sin dall´antichità per l´efficacia sia sul corpo che sullo spirito" (DAGLIO, 2014, p. 16).

In the period following the Second World War, Joseph Cornelius Kumarappa proposed the concept of an "economy of permanence" and of appropriate technology, in which harmony and cooperation prevail between individual units and the whole, and nature is united in a common cause. This perspective articulated an alternative that disrupted the prevailing paradigm. Regenerative development may foster both an honest exchange between human beings and nature and the revitalization of human communities at the local level. The economy of permanence represents an interpretation of union with the divine as expressed in everyday human life (Kumarappa, 1958). When reflecting on what may be considered permanent or transient, Kumarappa argues that there is nothing that can truly be said to be permanent.

1. MOBILE FLOTATION ACCORDING TO WATER-LEVEL OSCILLATION

If adaptation to inevitable climate change is required—particularly given that many cities will be affected by sea-level rise—design projects that consider interaction with water become critically important. The solution of floating is advantageous because it enables the entire structure of a building to follow water-level oscillations, even without precise knowledge of the extent of such variation. "When flooding occurs the water dwelling vertically rises with the water levels to remain safely above water then settles back into places as the water recedes" (URKUDE et al 2019, p. 1561).

The concept of floating is not merely a technical solution for adapting to floods, but rather a design approach to the uncertainty imposed by climate change and the increasing variability of water regimes. This represents a way of designing in the context of environmental instability, incorporating principles of adaptation, coexistence with water, and the capacity for transformation over time.

Adaptive strategies that move with water include flotation (which oscillates and shifts according to variations) and permeability (through amphibious solutions and vernacular techniques that adjust to water dynamics).

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Buoyancy is explained by Archimedes' Principle and constitutes the theoretical foundation of hydrostatics. Any body totally or partially immersed in a fluid is subject to an upward vertical force equal to the weight of the volume of fluid displaced by the body. This force is known as buoyant force, expressed as E = P = m × g. An object submerged in water weighs less than in air; this relationship is said to have been perceived by Archimedes while bathing, upon observing the displacement of water.

To enable a building to float, it must rest on a rectangular platform between two and fifteen feet in depth (approximately 0.61 to 4.57 meters). Materials used for this base may include logs, concrete, expanded polystyrene (Styrofoam), plastic barrels, steel, or combined fiberglass systems. A floating structure may take the form of a barge, raft, platform, or hull and differs from a houseboat in that it does not possess a motor for propulsion. Nevertheless, such structures are mobile and must be towed over long distances or manually maneuvered over short ones. In some cases, this solution is stabilized by fixed piles, rendering it flood-resistant.

Both floating and amphibious constructions allow a building to rise with floodwaters; however, in amphibious systems, the foundation that levels the structure maintains its connection to the ground, supporting it firmly on land during dry conditions.

Although it may seem self-evident, the principal advantage of these buildings is that residents can remain in their homes during flooding events (Urkude et al., 2019).

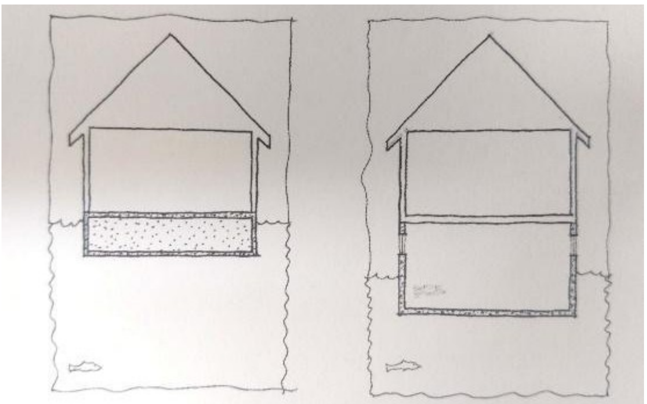

Figure 2. Concrete platform filled with expanded polystyrene or reinforced concrete hull (Flanagan, 2003, p. 60).

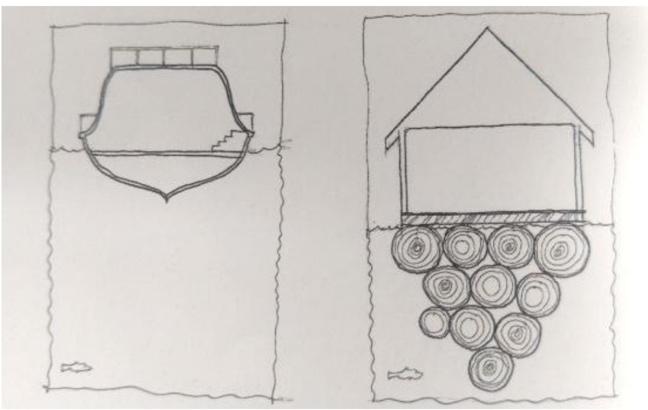

Figure 3. Shallow metal or fiberglass hull for factory-built motorized boats, or traditional inverted-pyramid foundation made of cedar logs (Flanagan, 2003, p. 62).

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2. PRECEDENTS AROUND THE WORLD

Human societies have experimented with floating typologies for more than 5,000 years. Among the oldest examples are those found in the marshlands of southern Iraq, documented by the Sumerians. The Madan people (or Marsh Arabs) constructed houses from reeds harvested in the complex system of lakes, marshes, and floodplains near the Tigris and Euphrates rivers in Mesopotamia (Flanagan, 2003). Floating architecture may also be associated, in symbolic and historical terms, with the biblical heritage of Noah's Ark.

Examples of diverse floating housing typologies can be found throughout the world:

Table 1: Diversity of Floating Houses

Types of Floating Structures	Location
Vernacular adaptations built on wooden and thatched rafts	Pacific Islands (New Zealand, Palau, Solomon Islands, Fiji) and along the Amazon River (Peru and Brazil)
Traditional floating houses	China, India, Thailand, Cambodia, Vietnam
European canal boats	Netherlands, Great Britain, France, Belgium, Sweden
Floating residential communities	North America (United States and Canada)

2.1. The Historical Experience of Le Corbusier: Asile Flottant

A particularly compelling historical example was developed by the visionary architect Le Corbusier, who repurposed a decommissioned vessel as a resource capable of addressing a social need.

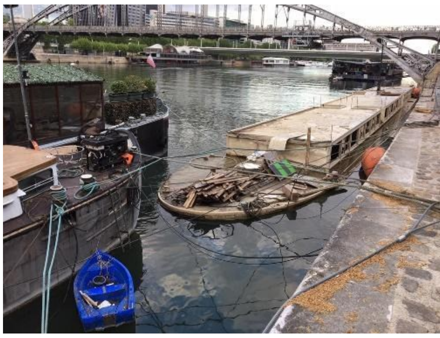
In 1929, the The Salvation Army acquired the barge "Liège," built in 1919 by the National Navigation Office for coal transport. Le Corbusier was commissioned to redesign and convert the vessel, a project sponsored by the Countess Cantora de Polignac and Madeleine Zillhardt. This floating architecture was intended to accommodate refugee women who had arrived in the city of Paris following the First World War.

Originally, the barge was conceived as mobile and adaptable to seasonal uses. During the winter, it would be moored near the Louvre Palace to shelter homeless individuals from the cold, removing them from the arches of bridges. In the summer, it could transport children to holiday camps near Paris. Measuring 80 meters in length, the elongated structure featured a large hall divided into three compartments. Corbusier introduced modernist elements such as pilotis, a roof terrace, and horizontal windows. The program included 160 beds, a dining hall, kitchens, bathrooms, washbasins, showers, the sailor's quarters, the director's apartment, and a suspended garden above the barge. At the time, the project received authorization from the river navigation authorities.

Unfortunately, due to rising water levels in the Seine River, the barge was submerged in February 2018. As it had aged and fallen into disuse, restoration works had already begun in 2005. Following the accident, a Japanese group resumed restoration efforts, as exhibitions dedicated to the project had been planned. The "Asile Flottant JAPAN ARCHITECT" exhibition was scheduled to take place inside the barge, continuing a prior exhibition that had presented the restoration project in four locations, including Tokyo in August 2017.

The adaptive reuse of a vessel—an underutilized structure—represented an efficient measure of urban "sanitation" by reallocating displaced populations away from public view. The accommodation of war-affected individuals along the riverbanks may be interpreted ambiguously: from a humanitarian perspective, it provided shelter for those living on the streets; yet it also required submission to confinement within a restricted and controlled space.

Figures 4 and 5. Le Corbusier: Asile Flottant, 1929 (Source: Images from the Fondation Le Corbusier Archive).




Figures 6 and 7. Divers begin investigating damage after the sinking in May 2018; interior view, June 2017 (Source: Asile Flottant website. Photograph by Stirling Elmendorf).

2.2. An Experienced Dutch Architect: Koen Olthuis and the Floating City Apps

Currently, one of the most experienced figures in floating architecture is Koen Olthuis. Also known as the "floating Dutchman," he has constructed more than 200 floating residences and office buildings through Waterstudio, founded in 2003. A graduate of Delft University of Technology, he is also a member of the Flood Resilience coordination group at UNESCO-IHE. In an interview with The New York Times, he presented his vision for the future of housing, arguing that within twenty years cities will differ substantially from those of today (Schuetze, 2016). He observes that cities continually seek additional space for densification. Unlike land reclamation—which is costly and negatively impacts aquatic ecosystems—floating structures are comparatively simpler to construct.

Focusing on vulnerable populations living in flood-prone areas, Olthuis proposed the *Floating City Apps*: floating container-based installations conceived as urban components with flexible and reusable functions.

This concept of an "app city" is based on the volatile demand for certain services (analogous to software), which can be replaced once needs are met. It reproduces the complexity of a city in floating form: social housing (shelters), floating schools, and other facilities. For sanitation, floating sewage filtration systems are implemented; for energy, solar collectors and floating

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agricultural platforms provide food production. The first prototype was developed as a communication app, equipped with twenty tablets and two television screens, functioning as a social and educational platform connecting informal-settlement residents to the internet. The app is designed as a multifaceted platform supporting business and entrepreneurship, communication centers, children's education, digital handicraft markets, women's empowerment and training, and health education. Its interior incorporates a built-in wall unit that houses digital equipment, maximizing usable space.

To implement the project, once a local diagnosis of needs in informal settlements is established, a network of local consultants (including hydraulic engineers) facilitates partnerships with NGOs, university representatives, embassies, and local political actors. A pilot app in Bangladesh was scheduled for 2017 at Lake Banani, adjacent to the Korail informal settlement of approximately 40,000 inhabitants in Dhaka. With support from Bangladesh Telecommunications Company Limited, the initiative sought sponsors to provide internet access and to join existing partnerships with Bitmymoney, Dupont Corian, Fox IT, and the foundation established by Olthuis, Dutch Docklands, which receives funding from Dutch partners.

Olthuis identifies the most pressing issues in informal settlements—particularly those located in flood-risk areas or threatened by sea-level rise—as the lack of sanitation and reliable energy sources. These floating modules can accommodate amenities such as internet terminals, toilets and showers, large-scale water filtration systems, medical clinics, community kitchens, and workshops, and can be easily relocated to areas where they are most needed.


Figures 8 and 9. Floating City Apps (Drawing by Waterstudio). Floating communication app for Dhaka, Bangladesh (Waterstudio project website).

2.3 Prefabrication and Self-Building: NLÉ Architects and the Design of the Makoko Floating System

Based on a community that has lived on water for more than a century, sustained by fishing and sawmill industries, the Makoko Floating System represents an innovative coastal model. Lacking technological infrastructure, roads, or formal land tenure, Makoko demonstrates how low-resource alternatives can be created for informal settlements accommodating approximately 300,000 inhabitants.

The proposal developed by NLÉ Architects originated from the conception of a school as a collaborative knowledge platform for aquatic communities such as Makoko, in Lagos. The first prototype was completed in 2012. As floating architecture, it responded to the need for continuity in education during periods when populations become isolated due to river flooding or temporary inundations. Produced through prefabrication and rapid assembly, the structure featured a floating base composed of 256 plastic barrels, with an estimated capacity of one hundred people. The subsequent versions explored diverse scenarios for floating

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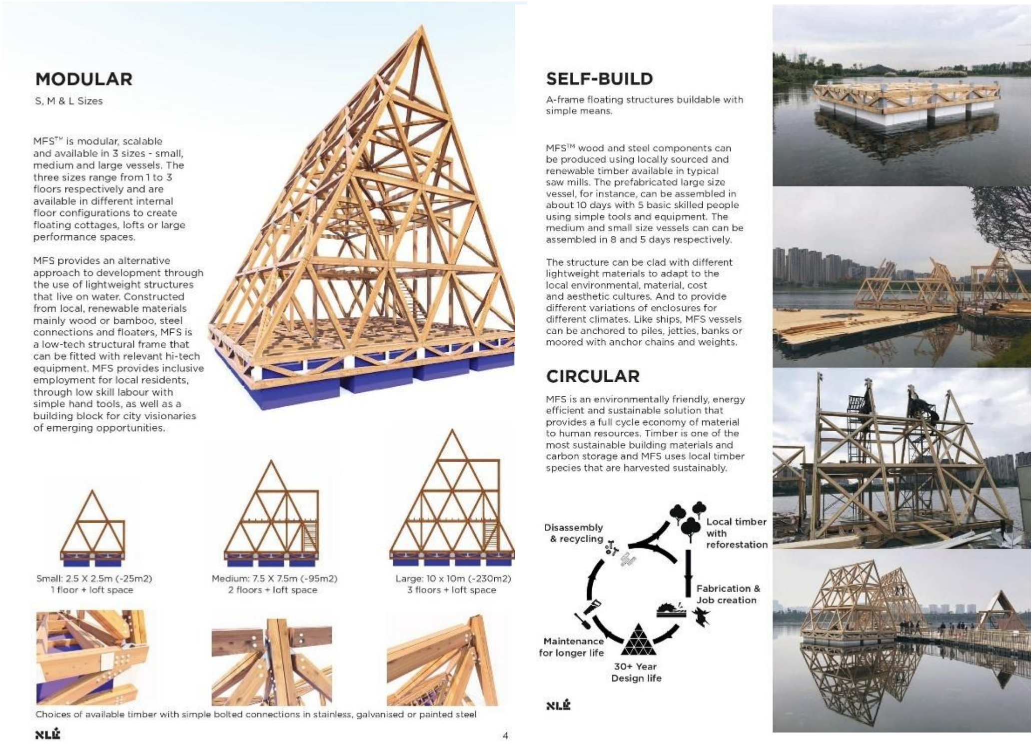
villages in cold and warm climates, across different religions and cultures, using locally available materials ranging from timber to bamboo and other adaptable solutions.



Figures 10 and 11. Construction and variations of the building system. From left to right: The schematic sectional representations illustrate: small, medium, and large modular combinations; (left) the integration of local Makoko housing technology with global floating technology. Source: NLÉ project documentation (Bouillon, 2018; NLÉ, 2018; Ebhomele, 2016).

The model has been implemented in five countries across three continents, adapting to uses such as housing, hospitality, healthcare, education, culture, agriculture, freshwater osystems, forestry, and environmental protection through water-based strategies.

However, the first constructed prototype did not withstand three consecutive days of heavy rainfall and collapsed on June 7, 2016. According to a statement by the NLÉ team, the Makoko Floating School had been out of use since March of that year, and no injuries were reported (Ebhomele, 2016). The architects subsequently developed improved iterations, reinforcing the structural system for reconstruction (AD Editorial Team, 2016). An extensive research document supported the project, incorporating data such as those derived from the 2005 Status of Coastal Zones in Nigeria, and reflecting a thorough engagement with local challenges.

There is profound symbolism in the fact that the structure collapsed one week after the Nigerian architect Kunlé Adeyemi, of NLÉ Architects, received the Silver Lion award in May 2016, granted to a "promising young participant" for the exhibition *Atlas of the WATERFRONT* at the Venice Architecture Biennale. The complexities and contradictions inherent in such processes range from opportunistic fundraising under humanitarian premises to the practical difficulties of implementation, particularly considering that the school was effectively used for only four months over its three-year existence (AD Editorial Team, 2016).

2.4 Without an Address: Bjarke Ingels Group and Oceanix City

What is the feasibility of floating entire cities in order to accommodate fluctuations in water levels? Europe has become a laboratory for floating solutions; however, at what scale have such experiments truly been implemented? The project discussed here simulates diverse scenarios for floating settlements in cold and warm climates, across different religions and cultures, employing locally available materials—from timber to bamboo and other alternatives.

> "Can we do something at that scale? Or maybe scale up by two, and coupled with maybe new material technologies and new construction methods, can we synthesize or hybridize a bit of hi-tech and a bit of lo-TEK and come up with something that is going to be symbiotic and not have a detrimental impact on every other species in that environment?" (Zuckerman, 2020).

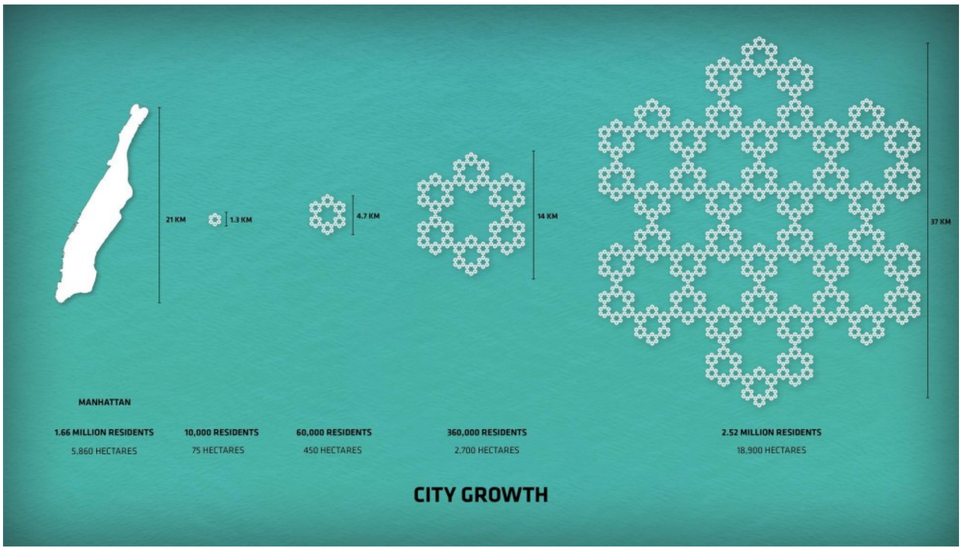
Shortly after Kiyonori Kikutake demonstrated the potential of floating construction with his 1963 Marine City proposal, the British collective Archigram drew inspiration for a series of "Plug-In" projects. The image of capsules stacked within superstructures became a conceptual response for the group. Warren Chalk wrote in *Archigram 4* that "the house, the whole city and the frozen pea packet are all the same," a manifesto for the Plug-In concept (Archigram, 1999). In *Plug-In City* (1964), developed by Warren Chalk, Peter Cook, and Dennis Crompton, transportation played a central role: levels could be moved up or down, automobiles were eliminated, and monorails replaced conventional traffic systems. A 1968 version featured cranes installed atop towers, conveying the notion of a structure perpetually "under construction." Similar imagery reappeared in Archigram's representations, incorporating balloons, helicopters, and even zeppelins as integral components of the urban system.

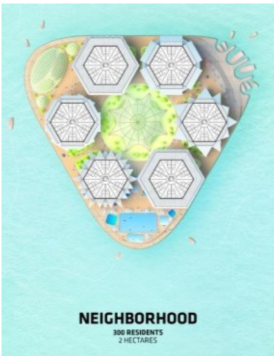
As noted by Leslie (2006, p. 186), while Archigram viewed the capsule as a liberating mechanism from societal norms and political organization, the Japanese Metabolists understood it as an instrument of regimentation—fixing one's social position within an overarching framework.

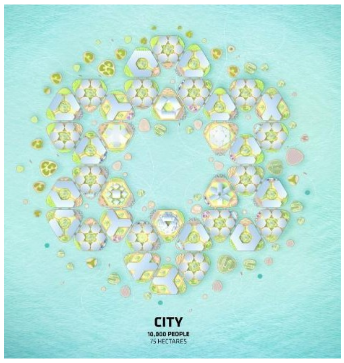
More recently, the renowned Danish studio Bjarke Ingels Group (BIG) developed a proposal—without a predefined location—for a modular and ecological floating city designed to accommodate up to 10,000 inhabitants across 75 hectares. The project appears to translate into contemporary terms the visionary ambitions of the Japanese Metabolists and Archigram.

Presented to UN-Habitat and aligned with the Sustainable Development Goals of the New Urban Agenda, *Oceanix City* channels flows of energy, water, food, and waste into a comprehensive plan for a modular maritime metropolis. Conceived without a fixed address, the city could be deployed in tropical or subtropical regions facing high risk due to rising sea levels.

Bjarke Ingels proposes clusters of floating islands organized in groups of six hexagonal modules: "It has the omnidirectionality of a circle, but the modularity and rationality of something man-made" (Gibson, 2019). Constructed on land and subsequently towed to sea, the modules would be anchored on site and, ideally, built with locally sourced and renewable materials.







Figures 12 – 18. BIG: Oceanix City, 2019. The map illustrates vulnerable tropical and subtropical regions worldwide where the first Oceanix cities could emerge. The modular concept proposes hurricane-resistant floating settlements at three scales: neighborhood (300 residents / 2 hectares); village (1,650 residents / 12.2 hectares); city (10,000 residents / 75 hectares). Source: Images and drawings by BIG – Bjarke Ingels Group.

The project presents itself as the world's first resilient and sustainable floating community—perhaps so if low-technology initiatives, which neither seek titles nor aspire to monumental scale, are excluded. Researcher Julia Watson has mapped approximately sixty to seventy island-based floating communities that often remain overlooked, including the Uros and the Marsh Arabs, among others, whose ways of life are deeply rooted in mythological and ecological relationships with place.

The Uros, for example, construct islands by cutting massive blocks of mud, peat, and intertwined reed root systems from wetland zones. These blocks are bound together and anchored to the lakebed. Layer upon layer of dried totora reeds is added until a thickness of one to two meters is achieved; through successive processes of decomposition and renewal, the island remains buoyant.

Figure 19. Totora reed islands and structures built by the Uros people (Photograph by Enrique Castro-Mendivil. Courtesy of Julia Watson).

Based on this knowledge derived from close observation, Watson questions the most appropriate scale for replication. A community of one thousand inhabitants may not be sustainable; however, an island supporting thirty to forty families might achieve a more balanced and resilient form of coexistence.

3. WEIGHING ADVANTAGES AND DISADVANTAGES

Laws and regulations necessary for this type of construction are still under development. However, as a cost-reducing alternative to land use, floating architecture represents a sustainable strategy that can be accessible if properly managed. Floating communities anchored along the edges of densely populated, flood-prone cities have attracted investor interest (Ross, 2010).

> "Properly designed and monitored projects for repairing and retrofitting houses can drastically improve the reconstruction process in terms of cost, environmental impact, speed, supply of resources, community participation and satisfaction, recovery of psychological wellbeing, and heritage conservation" (Jha et al., 2010, p. 166).

In the Netherlands, the Ministry of Housing, Spatial Planning, and the Environment implemented a fifteen-year program (2005–2020) to purchase and reserve land as floodplains, particularly along riverbanks. With nearly one-quarter of the country reclaimed from the sea, and half at or below sea level, numerous ideas exist for utilizing water, not merely defending against it, including floating architecture. The Netherlands has been applying these solutions since at least the 1990s.

Countries like Thailand have extensive experience with annual monsoon flooding. In response, the government has promoted policies such as the *Thailand Water Resources Management Strategy*, encouraging the construction of cost-effective amphibious houses for future urban developments (Saengpanya & Kintarak, 2019).

Several floating residential communities exist in the Pacific Northwest of North America, each managing an average of 300–400 homes.

Figures 20 – 24. Logos of floating home associations where such housing is already a reality: Floating Homes Sausalito; Floating Home Association of BC; Seattle Floating Homes Association; Floating Habitats; Portland Floating Homes. Source: Available at: http://floatinghomes.org/; http://www.floatinghomesbc.ca/; http://seattlefloatinghomes.org/; https://www.floatinghabitats.com/; https://www.portlandfloatinghomes.com/ (Accessed 14/07/2020).

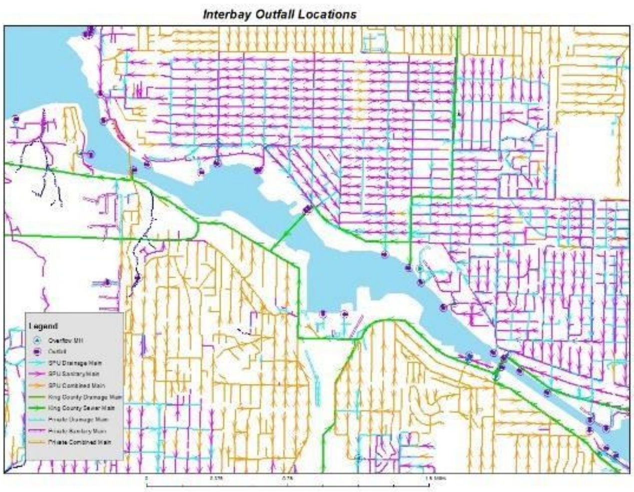


Figure 25. Map of outfall locations for the Seattle Floating Homes community. Source: Available at: http://seattlefloatinghomes.org/outfall-locations/ (Accessed 14/07/2020).

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> "Although live-aboard boats and then houseboats have existed for centuries, the modern floating house is a relatively recent invention, with new materials and methods allowing for full-height construction without the loss of stability or the risk of intruding moisture. The buildings are constructed on a floating foundation (sometimes stabilized by fixed stilts), which makes them flood-proof, affordable and independent of expensive real estate, although obtaining building permits can be tricky" (Schuetze, 2016).

Table 2: Weighing the pros and cons of a floating building can help identify opportunities for innovation in resilient architecture and flood-adaptive design.

Potential Critical Issues	
1. Permitting	Construction and planning permits must be obtained according to location.
2. Accident susceptibility	If mobile like a boat, the building is vulnerable to storms and accidental collisions; also subject to strong external loads from wind, rain, ice, and other environmental conditions.
3. Construction feasibility study	Viability depends on the type of material and the weight of the structure.
4. Maintenance challenges	Access to the underside of the building must be considered for hydraulic system upkeep.
5. Height limitation	The mooring post restricts vertical expansion; multi-story construction is limited.
Benefits of Floating Buildings	
1. Flood-proof	Buildings constructed on a floating foundation (sometimes stabilized with fixed stilts) are flood-resistant, affordable, and independent of costly real estate.
2. Adaptable to vernacular architecture	Submerged foundation engineering can be combined with vernacular floating homes using regional materials and methods.
3. Low cost	Cost-effective amphibious housing offers an alternative to conventional raised structures.
4. Reusability	Boats and containers can be refurbished and adapted to local housing conditions in flood-prone areas. Reusing buildings not only reduces construction costs but also minimizes environmental waste impacts.

Source: Adapted from the author's original thesis.

4. A TRANSITION TOWARD ONTOLOGICAL DESIGN

Arturo Escobar's (2018) reflection on a transition toward a built environment more deeply connected with nature points directly to the concept of ontological design. Floating typologies exist worldwide, ranging from historically adopted solutions in remote communities—where human construction is closely integrated with nature using local materials—to industrially produced structures in flood-prone urban areas.

The cases analyzed demonstrate different ways of operationalizing adaptation processes to futures marked by water uncertainty and represent proposals for the design of sustainable transitions (Irwin, Tonkinwise, and Kossoff, 2020). The authors argued that local and situated interventions should be understood as concrete manifestations of broader systemic dynamics: "wicked problem resolution requires myriad interventions at multiple levels within extremely large spatio-temporal contexts" (Irwin, 2020, p. 42).

The floating structures illustrated here present different material mediations and different leverage points within an ecology of disciplines, revealing diverse ways of designing for coexistence with water variability and climate uncertainties. The examples highlight more radical forms of coexistence with aquatic environments and should not be understood as

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something to be replicated, even because their contexts are not the same, but they contribute to the way of seeing new possibilities. Taken together, these examples suggest that "floating" can be understood as a transitional strategy that shifts the paradigm of resistance to water to a paradigm of adaptation and coexistence, contributing to the construction of more resilient housing systems in the face of climate change.

Solutions such as those illustrated in this article, where structures are adapted or repurposed, can be understood as transitional steps toward an idealized future characterized by enriched lives, human solidarity, and a healthy planet.

One pathway is the promotion of retrofitting, extending the lifecycle of equipment that would otherwise become waste, transforming it into resources that enable life on water. Examples include the reuse of underutilized boats through restoration projects, and floating container installations serving as urban components with flexible and reusable functions.

From an implementation perspective, the Makoko Project demonstrates aspects of social inclusion by training economically disadvantaged individuals in the assembly of wooden structures. This approach may represent a step toward improving the traditional responses commonly observed in similar environments. Planning potential floating cities for populations threatened by extreme climate events offers a way to optimize behaviors and, to some degree, control resources at a larger scale.

The apparent contradiction of high-tech solutions, monumental scale, or even commercial bias, is not the focus of the selection criteria for composing the demonstrated solutions. We understand that the focus should be on resources available in the urban environment (such as containers or abandoned boats), modulated (in the Makoko System style) and measured on a large scale (with a BIG bias). In Chaac's time, it was a highly sophisticated agricultural society, but deeply dependent on the natural dynamics of water and climatic phenomena. This Mayan socio-ecological context would have its contemporary equivalent in the components of current cities: a society full of waste and discards amplified on a large scale, with the same challenges of climate adaptation and coexistence with environmental instability.

Recommended habits and paradigmatic revisions for designers, which can guide this transition, are summarized in the following principles:

1. Uses living system theory as an approach to understanding/addressing wicked problems;
2. Designs solutions that protect and restore both social and natural ecosystems;
3. Sees everyday life/styles as the most fundamental context for design;
4. Advocates place-based, globally networked solutions;
5. Designs solutions for varying horizons of time and multiple levels of scale;
6. Links existing solutions so that they become steps in a larger transition vision;
7. Amplifies emergent, grassroots solutions;
8. Bases solutions on maximizing satisfiers for the widest range of needs;
9. Sees the designer’s own mindset/posture as an essential component of the design process;

Barbosa, L. L. (2025). Floating: design for living on water. *Strategic Design Research Journal. Volume 18*, number 02, July - December 2025. 172-187. DOI: 10.4013/sdrj.2025.182.05.

10. Calls for the reintegration and recontextualization of diverse transdisciplinary knowledge.

(Irwin, Kossoff, and Tonkinwise 2015, 3 apud Escobar, 2018, p. 158).

Ultimately, this speculative stance could serve as a guiding framework for regenerative futures, particularly in contexts where the greatest challenges involve interfaces with water.

ACKNOWLEDGMENTS

Financial support from PROAP-Capes-PPG-Design USP for the presentation of this article in Portuguese at the X SDS 2025 - Sustainable Design Symposium, in the city of São Luís-MA from December 3rd to 5th, 2025.

ENDNOTES

Author's version in English: "The life/death binomial seeks to grasp the positive and negative aspects of water: essentially as a source of life and a symbol of prosperity— which in rural cultures refers to agricultural harvests— but also for its transparency, associated with purity, freshness, and hygiene, and finally for its therapeutic properties, recognized since antiquity for their effectiveness on both body and spirit".

REFERENCES

AD Editorial Team. (2016, June 8). *A escola flutuante de Makoko desmorona após três chuvas intensas na Nigéria* [NLÉ's Makoko Floating School reportedly collapses due to heavy rain]. ArchDaily Brasil. https://www.archdaily.com.br/br/789086/a-escola-flutuante-de-makoko-desmorona-apos-tres-chuvas-intensas-na-nigeria

Archigram, & Cook, P. (Ed.). (1999). *Archigram* (with a new foreword by M. Webb). Princeton Architectural Press.

Berry, T. (2009). *The sacred universe: Earth, spirituality, and religion in the twenty-first century*. Columbia University Press.

Bouillon, S. (2018, May 17). In Lagos, the "Venice of Africa" fights for survival. Phys.org. https://phys.org/news/2018-05-lagos-venice-africa-survival.html

D'Aglio, L. (2014). *Abitare con l'acqua*. Maggioli Editore.

Ebhomele, E. (2016, June 7). Makoko floating school collapses. Legit.ng. https://www.legit.ng/852568-just-lagos-floating-school-collapses-photos.html

Escobar, A. (2018). *Designs for the pluriverse: Radical interdependence, autonomy, and the making of worlds*. Duke University Press.

Flanagan, B. (2003). *The houseboat book*. Universe.

Gibson, E. (2019, April 4). BIG unveils Oceanix City concept for floating villages that can withstand hurricanes. Dezeen. https://www.dezeen.com/2019/04/04/oceanix-city-floating-big-mit-united-nations/

Jha, A. K., Barenstein, J. D., Phelps, P. M., Pittet, D., & Sena, S. (2010). *Safer homes, stronger communities: A handbook for reconstructing after natural disasters*. World Bank.

Irwin, T. (2020). The Emerging Transition Design Approach. *Cuadernos Del Centro De Estudios De Diseño Y Comunicación*, (87). https://doi.org/10.18682/cdc.vi87.3762

Irwin, T., Tonkinwise, C., & Kossoff, G. (2020). Transition Design: An Educational Framework for Advancing the Study and Design of Sustainable Transitions. *Cuadernos Del Centro De Estudios De Diseño Y Comunicación*, (105). https://doi.org/10.18682/cdc.vi105.4188

Kumarappa, J. C. (1958). *Economy of permanence: A quest for a social order based on non-violence*. Akhil Bharat Sarva-Seva-Sangh.

Leslie, T. (2006). Just what is it that makes capsule homes so different, so appealing? Domesticity and the technological sublime, 1945 to 1975. *Space and Culture, 9*(2), 180–194.

NLÉ. (2012, April). *Makoko Floating School: Research report*.

NLÉ. (2018). *MFS IIIX3 – Sistema flutuante Minjiang, Chengdu, China*. http://www.nleworks.com/case/mfsiiix3-minjiang-floating-system/

Organização das Nações Unidas. (2015). *Transformando nosso mundo: A Agenda 2030 para o desenvolvimento sustentável*. http://www.agenda2030.org.br/

Ross, K. (2010, October 27). As seas rise, future floats. *The New York Times*. https://www.nytimes.com/2010/10/28/business/energy-environment/28iht-rbobfloat.html

Saengpanya, P., & Kintarak, A. (2019, October). Thailand's floating house project: Safe and sustainable living with flooding. *International Journal of Engineering and Technology, 11*(5). http://www.ijetch.org/vol11/1165-W5005.pdf

Schuetze, C. F. (2016, November 28). A Dutch architect offshores the future of housing. *The New York Times*. https://www.nytimes.com/2016/11/28/arts/design/offshoring-the-future-of-housing.html

Silva, D. M. da, & Rangel, T. L. V. (2016). Neoconstitucionalismo latino-americano e o fortalecimento do discurso ecocêntrico: A experiência equatoriana e boliviana de reconhecimento dos direitos da natureza (Pacha Mama e Madre Tierra). *Captura Críptica: Direito, Política, Atualidade, 5*(1).

Urkude, T., et al. (2019, January). Review on amphibious house. *International Research Journal of Engineering and Technology, 6*(1).

Zuckerman, A. (Anfitrião). (2020, 23 de janeiro). Julia Watson on the power of indigenous technologies to transform our planet (Nº. 21) [Episódio de podcast de áudio]. Em *Time Sensitive*. The Slowdown. timesensitive.fm https://www.timesensitive.fm/episode/anthropologist-landscape-designer-julia-watson-indigenous-technologies-transform-our-planet