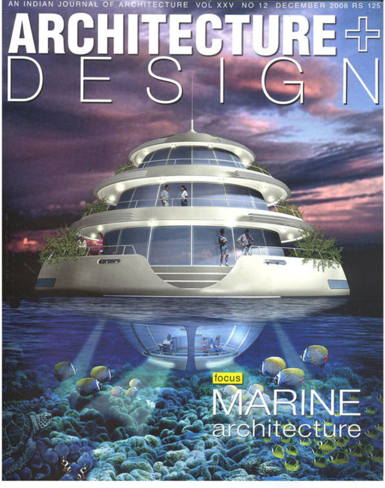


building floating constructions

Koen Olthuis

(Photo credit: Waterstudio.NL and BAM)

>> Koen Olthuis

Living on water has attracted a lot of attention in the last few years. Coping with fluctuations in water level has become a central theme in spatial developments. This challenge has proven to be a driving force behind the development of water-based architecture.

Living on water

In Holland, people have lived on the water for over hundred years. The first types of water-homes were ships that were transformed into houses. After that, people started building houses on concrete boxes- these were the first houseboats. In the last five years, the modern water villa has become more popular; this is a type of house equal to the houses you can find on land, but with a full-fledged stable floating foundation. This foundation has been the base for a completely new spectrum of floating housing typologies with high densities, such as semi-detached houses, urban villas and terrace houses complete with a garden and road. Technically, it is now even possible to make very large floating foundations on which virtually any large-scale developments can take place. Developers in the Netherlands are already including floating apartment complexes or floating high-rise buildings in their developments.

Water as building plot

In newly built living areas in the Netherlands, there is hardly enough room to realise the required amount of houses according to the regulations and criteria for water storage. The new floating foundations and floating parcels give designers the opportunity to also use water as a building plot. This allows for a higher density and more space per house, because the building plot is much bigger by also using the water storage areas. The new floating neighbourhoods will be dynamic neighbourhoods, in both horizontal as well as vertical sense.

Dynamics in the vertical plane

Water storage is not static. Depending on weather, season, or extreme water fluctuations, the water storage system will have to accommodate smaller or larger amounts of water. In the vertical plane, the dynamic neighbourhood is designed to cope with

(Photo credit: Waterstudio.NL and Dutch Docklands)

Facing page: Drijvend Appartementencomplex, Westland

Above: Floating and rotating tower, Dubai, UAE

fluctuations of the water level. These fluctuations are caused by either natural circumstances or by deliberately pumping water into the water cell. This may include excess rainfall, but also water storage from other districts during high water levels. The different fluctuations obviously result in their own fluctuation domains. This means that during a rise of 5cm, a smaller area will be flooded than during a 50cm rise of water level. The frequency of the fluctuation influences the choice of the dwelling. A floating dwelling constantly needs water, whereas a terp-dwelling for instance, is suitable for a fluctuation of 50cm, occurring once every ten years.

Dynamics in the horizontal plane

Floating constructions also allow functions to be moved. In Delft, this already happens in the form of floating terraces, providing additional space for restaurants near the canal side. In the summertime, these terraces are towed into the city, and are removed after the summer season. Besides catering or recreational functions, other common public or temporary functions such as schools, parking facilities, leisure, building utilities, sales offices and shops, and floating infrastructure can just as well be made mobile in the horizontal plane.

The use of these functions is dependent on demographical make-up and culturally determined demands and wishes of the users. Experience teaches us that both the cultural as well as the demographical make-up of neighbourhoods change during decennia. A traditionally built neighbourhood on land responds to this by demolition, renovation and restructuring. As a result of the relatively easy possibilities of disconnecting floating constructions from their locations, extra possibilities emerge to cope with both these

(Photo credit: Waterstudio.NL)

Above: Watervilla Aalsmeer, The Netherlands

predictable as well as unpredictable changes in the neighbourhood by building on water.

Advantages

During construction, the building location can float along with the growing water-district. A primary school can be replaced by a high school in case pupil numbers are insufficient, relocating the primary school within the urban configuration. Floating roads can provide for temporary access over the water during construction or maintenance in a neighbourhood. Shopping malls can either grow and regroup or be moved to new locations. This means an unheard-of flexibility, that would be much more difficult to achieve on land.

Conclusion

Space for water and space for living can be perfectly combined. Because of vertical and horizontal freedom, the spatial experience in the water-neighbourhoods will stay dynamic. Terms such as real estate and movable property, however, will acquire a completely new meaning.

Koen Olthuis is the founder of the Dutch architectural firm Waterstudio.NL that specialises in floating structures.

sculpture at SEA

Project: Floating Cruise Ship Terminal

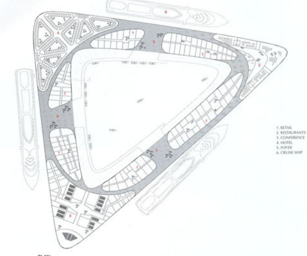
Architect: Waterstudio.NL, Rijswijk

This revolutionary concept for a cruise ship terminal consists of a floating construction in a triangular shape measuring 700 by 700 meters- enough to simultaneously host three of the world's largest cruise ships. The floating terminal is situated outside the mainland shore to allow enough draught for even the largest cruise ships to moor. Its simple iconic shape is like an elegant and natural sculpture outside the shore.

The basic triangular ring is lifted up at one point creating a smaller inner harbour with a spectacular entrance arch. The lifted point acts as a landmark- a beacon marking the terminal. The inner harbour allows smaller vessels to moor in enclosed water. From here, water-taxis and ferries connect the cruise ship-terminal to the mainland.

Construction and exterior: The terminal consists of three floating legs to which the lightweight construction of the raised point is attached as a cantilever. The shape, length and surface of the main floating structure ensure complete stability, even with the expected wave height and length of (semi) open water. The whole structure is rigged to a foundation in the seabed by means of anchoring cables with dampers, allowing flexibility in vertical sense while ensuring stability in the horizontal plane.

The exterior surface is cladded with aluminium panels. Both the fluid shapes of the structure as well as its construction are reminiscent of ship exteriors.



PLAN

Ten per cent of the considerable roof surface is covered with Photovoltaic cells, a sustainable energy source decreasing the demand of external energy. At night-time, the cruise ship terminal is lit in a subtle blue light, so as to bring out the bluish tint of the aluminium surface.

The outside of the sculptural shape is accessible to pedestrians offering a surprising landscape amidst the open waters- a sparkling island of sculptural quality.

Functions: Inside the terminal, a number of functions are situated to facilitate and enhance the travelling and recreational experience. Around the inner harbour, the central circulation area leads around a modern retail space. The entire circulation area features a circular people mover that allows one to easily reach all areas of the terminal. Three large foyers provide entrance to the inner harbour from which ferries leave for the mainland. There are over 50,000sq m of retail space, directly accessible from the central circulation area, creating an open and light ambience for shopping.

The corners of the triangular shape house three larger functions. The 180-room hotel features rooms at both the waterside as well as rooms at the inner courtyard and harbour. The inner rooms are situated alongside wide patios. The transparent patio roofs allow light from above to reach the hotel area and guest rooms.

The conference center measures a total of over 24,000sq m, offering around 30 meeting, conference and lecture halls of various sizes from small personal meeting rooms to a 950 seat auditorium. The 12,000sq m restaurant is situated on the raised point, looking out over the open water as well as the cruise terminal itself and the inner harbour, providing a spectacular dining experience. In total, the cruise ship terminal features over 160,000sq m featuring conference, cinema, retail, spa, hotel and restaurant, etc.

The floating cruise ship terminal is a complete world in itself- the ideal starting place of any luxury cruise travel.

Photo credits: Waterstudio.NL and Dutch Docklands

Design team	Waterstudio.NL
Co-developer	Dutch Docklands
Project status	Feasibility phase

integrating interface

Project: Residence, The Hoef, The Netherlands

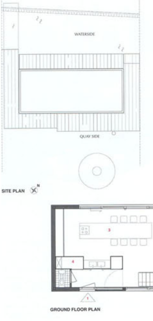
Architect: Waterstudio.NL, Rijswijk

This spacious villa demonstrates that floating architecture has become completely equivalent to land-based dwellings- modern, light and transparent. This dwelling is an amphibious structure, floating on water, yet surrounded by land on three sides. There are three types of amphibious houses: the 'full-wet' type which normally floats, but can, in case of extreme low water level, fall dry on a foundation in the waterbed. The 'full-dry' is exact opposite- the house is usually supported by a foundation, but can rise with the water level and become floating when floods occur. The third type is a villa, which is basically a floating dwelling that is surrounded by land so that it looks as though it is land-based. Surrounded by land on three sides, this floating villa looks as a normal house at the waterside, but is capable of dealing with fluctuations in water levels of up to 30cm.

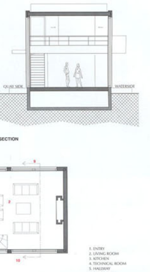
The choice for a floating structure in this case stems from a legal point of view: normal, land-based houses were not allowed in this rural peat landscape with its characteristic meadows and ditches. Someone however, discovered that legally floating dwellings were not prohibited, opening possibilities for inhabiting this beautiful area, which now still shows a rather haphazard but cosy mix of privately designed and built dwellings resembling large mobile homes, and some 'architectural' designs.

The clients asked for a simple, modern and open dwelling. In order to fully experience the border between land and water, transparency through the whole dwelling was taken as the design aim. In addition, the floor level of the living room was kept as close to the garden and water as possible. And together with the large windows on either side of the living room, these allow a direct view from the central area of the house to both the garden on one side, as well as the water on the other side. The situation on the border between water and land is made explicit in the dwelling- you literally live in between water and land. Viewed from the garden, the transparent living room allows a clear view right through the dwelling to the water.

The concept of transparency was maintained throughout the house by creating an open layout where, except for the toilets, not a single door is used. The mezzanine floor seems to float in the open space of the living room, and protrudes through the façade to form a balcony. The lower floor contains the living room with an open kitchen, and some storage space. The upper floor contains two bedrooms and a bathroom. Circulation space is reduced to a minimum. All spaces are fluently connected, separated only by storey-high cupboards that form the only fixed interior elements.



SITE PLAN



SECTION

GROUND FLOOR PLAN

FIRST FLOOR PLAN

1. ENTRY
2. LIVING ROOM
3. KITCHEN
4. TECHNICAL ROOM
5. HALLWAY
6. BEDROOM
7. BATHROOM
8. BALCONY
9. WATER SIDE
10. QUAY SIDE

Typical eye catchers in the interior are the elegant steel stairs and the mezzanine floor that curves up to form the parapet. The airy and spacious feel of the dwelling can even be seen in the detailing of the bathroom, where the suspended bathtub hovers above the floor. Because of the large transparent façades, sliding screens with wooden lamellas are used that allow the owners to control the sunlight entering the dwelling. Fixed wooden lamellas form the front door, incorporating it in the simple façade layout.

The clients wanted to minimise construction time, which led to the choice to both re-use the existing hollow concrete base, and to use a steel frame construction. Using steel doesn't only allow the large windows to be made without obtrusive visible construction elements, but because of the accuracy, it also allows the rest of the timber-frame elements to be prefabricated.

Photo credit: Waterstudio.NL (Photo: Pieter Kers)

Design team	Waterstudio.NL
Contractors	EMK
Cost of project	250,000 Euros
Year of completion	2006