2F WATER SUPPLY, STORAGE AND TREATMENT SYSTEMS

Photography:
NLÉ

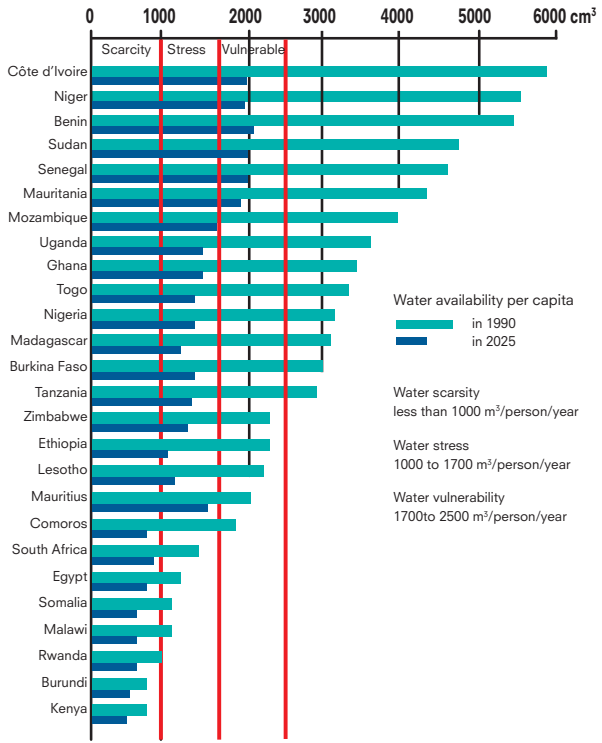
WATER AVAILABILITY

The Lagos water supply draws mainly from two rivers: the Iju (170,000 m³/day) and the Owo (265,000 m³/day). However, the availability of water is steadily diminishing.

In his 2006 Human Development Report, Matthew Gandy stated that only about 10% of households have an in-plot connection, while other households are depended on communal standpipes, wells or surface water sources.

Also, the author reported that when municipal authorities do attempt to extend water supply to poorer neighbourhoods, they are often met with violence and intimidation from water tanker lobbies, 'area 13 boys' and other groups who benefit from the unequal distribution of water.

Source:
Gandy, Mathew. "Water, Sanitation and the Modern City Colonial and Post-colonial Experiences in Lagos and Mumbai". Human Development Report 2006. PDF file.



Graph:
United Nations Economic Commission for Africa (UNECA), Addis Abeba ; Global Environment Outlook 2000 (GEO), UNEP, Earthscan, London, 1999.

MAKOKO WATER SUPPLY

Despite Lagos being built around and in water, and the ongoing flood risk, Lagosians cannot get enough drinking water.

According to the United Nations Children Education Fund (UNICEF) and the Department for International Development (DFID), 20 to 40 litres of water per person per day is considered to be the necessary minimum to meet the needs for drinking and sanitation alone.

However, the standard set by both of these bodies is a mirage in some parts of Lagos due to the increasing rates of population growth and urban expansion. Makoko and many other slums in Lagos are in short supply of water.

Investigations reveal that the majority of residents depend solely on water from hawkers who sell a jerry-can of water for N20, while many others buy direct from operators of boreholes in their area.

According to the Baale of the community, Chief Shomede Ajakaye, when the people of Makoko cannot afford to buy water, they use the water in which they live for washing and bathing; but even then, the water is far too polluted for drinking.

Given the unreliability of the Lagos water system, much more localised solutions need to be

Photography: NLÉ

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developed. Noah Shemede, a community figure, points out that there are no government agencies involved in water distribution in Makoko, forcing residents to solve the problems themselves. Many inhabitants already begin to collect rain water shortly after the rains start.

He also suggests that boreholes, which pump clean, fresh groundwater from 40 – 50 meters below ground level to the surface, should be installed throughout Makoko.

Sources:
Femi, Akinola "Lagos: Water everywhere, none to drink". Weekly Trust. 10 Sep. 2011, Lagos.
Ebenezer,Adurokiya. "Aphibious Residents of Makoko". Saturday Tribune. 05 Jun 2010,Lagos.


Photography: NLÉ


Photography: NLÉ

MAKOKO WATER USE

Domestic chores performed every day in Makoko involving water use include :

- Housecleaning
- Washing clothes
- Watering fruit gardens
- Sanitation Water
- Bathing

For some chores the people of Makoko recycle already-used water.

Photography:
Akintunde Akinleye

Photography:
NLÉ

MAKOKO WATER DEMAND AND SUPPLY

MAKOKO WATER DEMAND

180 LITERS OF WATER

PER HOUSEHOLD PER DAY

20 – 40 LITERS OF WATER

PER PERSON PER DAY

MAKOKO WATER SUPPLY

BOREHOLE OWNERS

FROM ₦10 TO ₦30 PER VESSEL

CANOE HAWKERS

₦20 PER VESSEL

OPTION A: RAINWATER HARVESTING

Rainwater Harvesting is by far the easiest and most cost effective way of collecting water. Once the water catchment system is installed it practically runs by itself. In addition, a rainwater harvesting system is a perfect application for off-grid housing settlements. The concept is simple: Collect, Store, Use.

In order to calculate the amount of water that we are likely to harvest we use the following formula:

catchment area (m^2) x RF (mm) x runoff coefficient = net runoff (liters)

whereas:

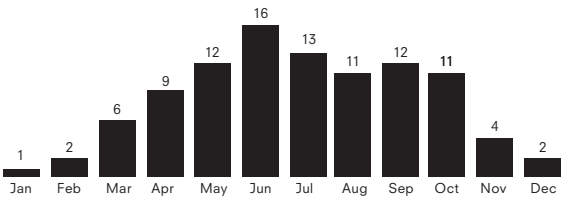
footprint of the roof's drip line = catchment area

Rainfall in mm = RF and

0.9 = Proportion of total rainfall harvested

Source:
Lancaster, Brad, 2006. Rainwater Harvesting for Drylands, Volume 1, Appendix 3: Water Harvesting Calculation.

LAGOS AVERAGE DAYS WITH PRECIPITATION PER MONTH



Note: The graph shows average amount of days (24h) with precipitation during a month. When precipitation has surpassed 1mm per day (24h) it is defined as a day with precipitation. The mean period is 1961–1990.

Source:
World Meteorological Organisation

OPTION A: RAINWATER HARVESTING

WHAT DO WE NEED?

CATCHMENT
Aluminium roofing sheet

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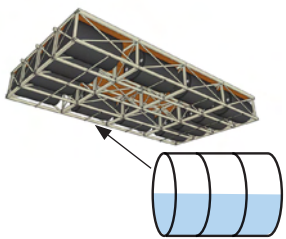

STORAGE
Floatation device with barrels

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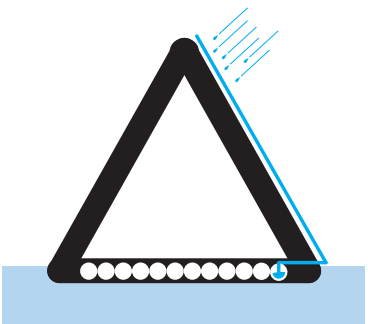
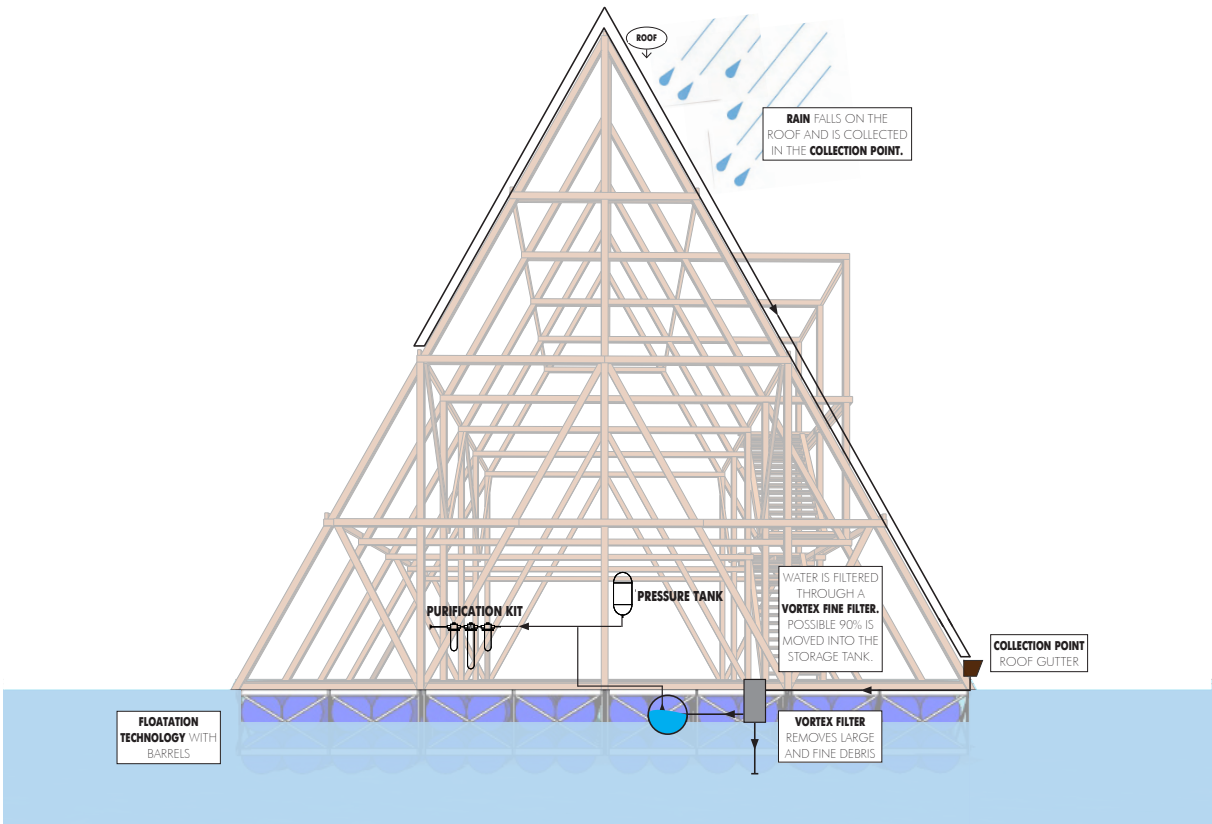


USAGE
Rain harvesting system

OPTION A: RAINWATER HARVESTING



OPTION A: RAINWATER HARVESTING CONCLUSIONS

SCHOOL DEMAND

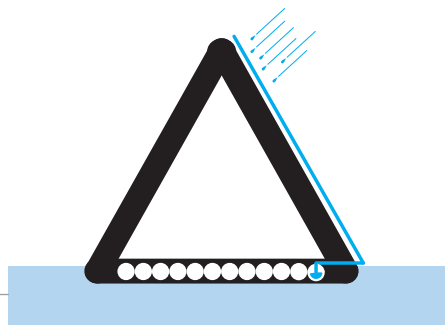
1.5 litres per student per day
x 100 students
54,750 litres of water per year
4,500 litres of water per month

150 LITRES OF WATER PER DAY

HOUSEHOLD DEMAND

30 litres of water per family member per day x 6 family members
65,700 litres of water per year
5 ,400 litres of water per month

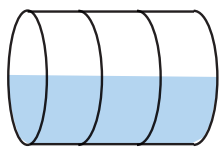
180 LITRES OF WATER PER DAY



COLLECTION

60m^2 catchment area
85,560 litres of water caught per annum
7,130 liters of water caught per month

237 LITRES OF WATER CAUGHT PER DAY

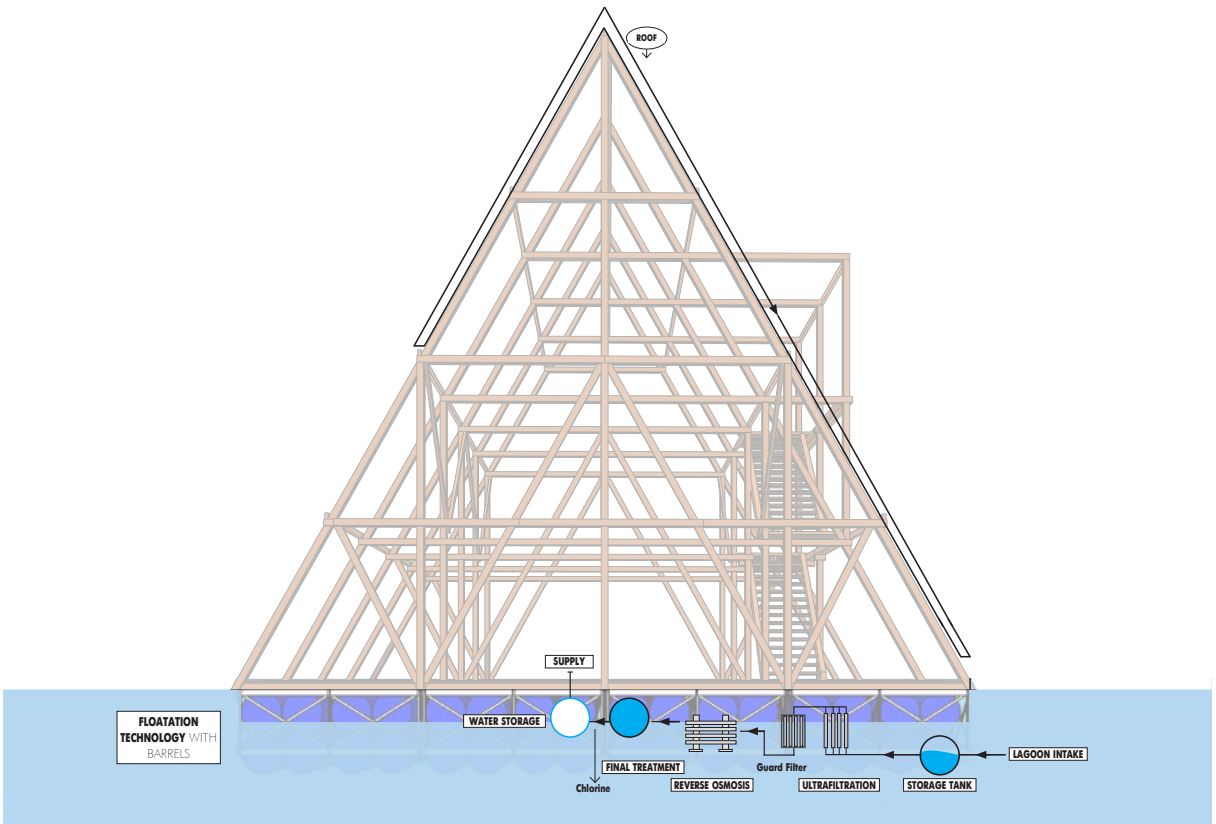


STORAGE

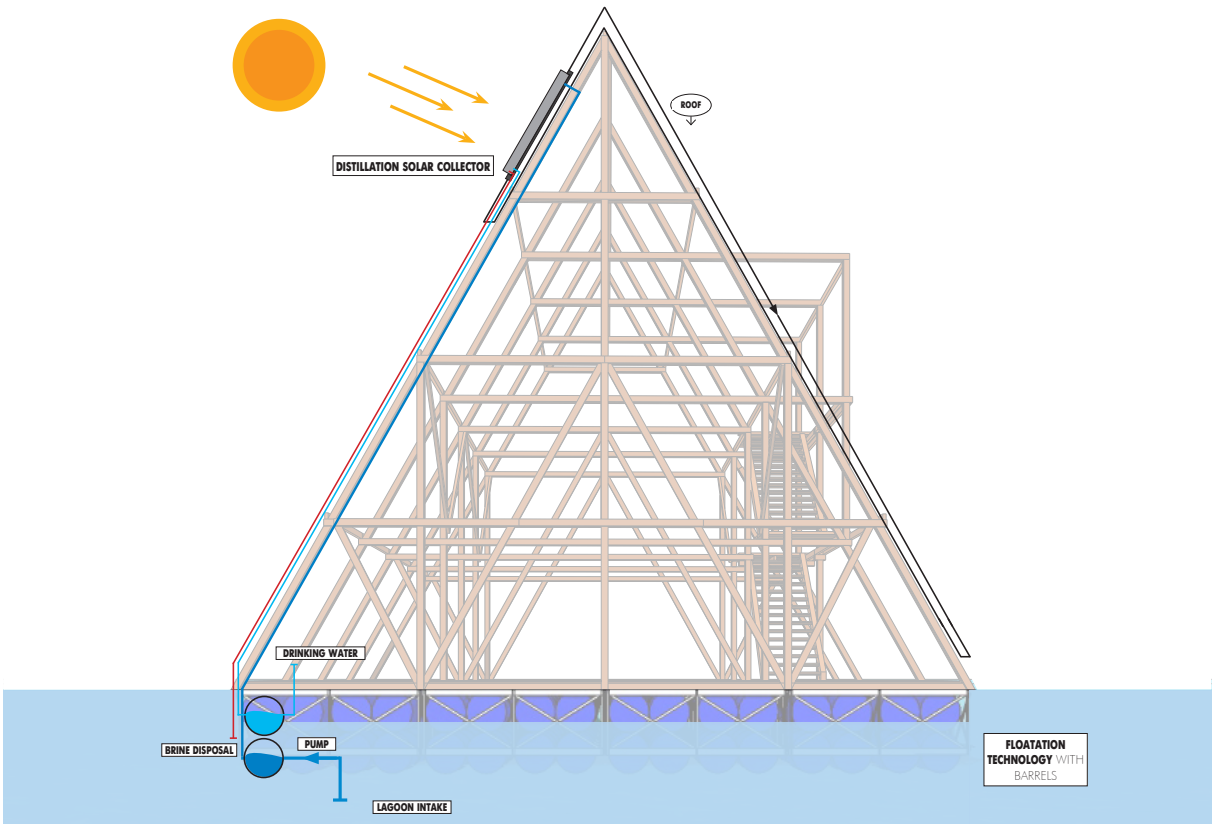
Storage for two weeks' supply
587 litres of water capacity per barrel
3,000 litres of water storage required

FIVE BARRELS REQUIRED FOR WATER STORAGE

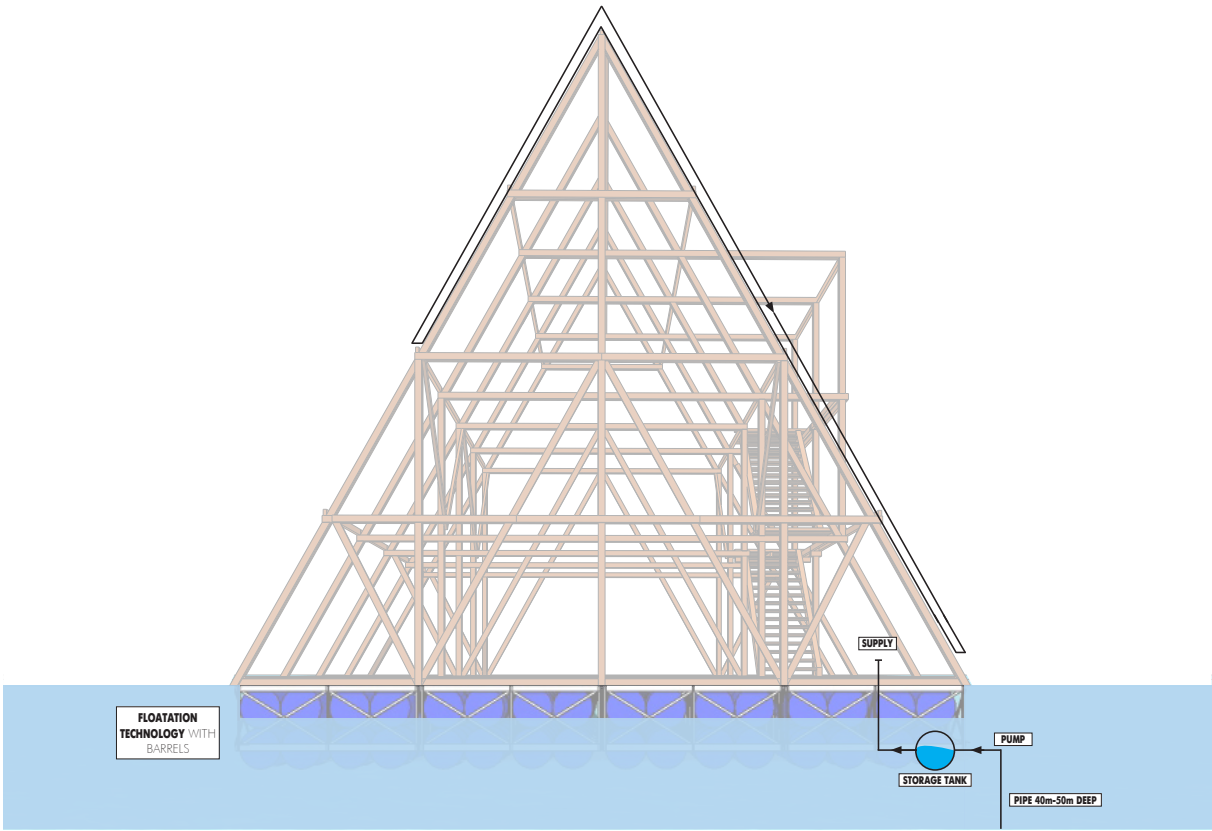
OPTION B-1: DESALINATION WITH REVERSE OSMOSIS



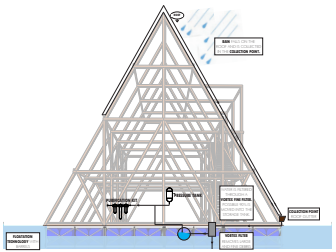
OPTION B-2: DESALINATION WITH SOLAR DISTILLATION

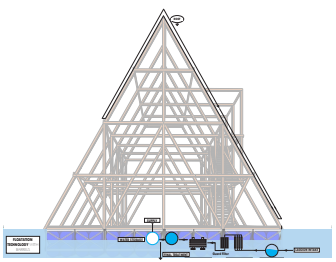


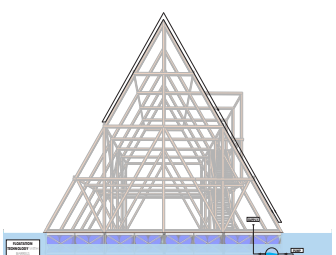
OPTION C: BOREHOLE SYSTEM



WATER SUPPLY ALTERNATIVES OVERVIEW







	PROS	CONS
RAIN HARVESTING	– Rainfall all year round – Back up water supply – The physical and chemical properties of rainwater are often superior to those of groundwater or surface water	– Relies on frequency and amount of rainfall – Impact on overall construction cost – Stored rainwater can foster bacterial growth
DESALINATION	– North-east and South-west winds – Secure source of water – Safe and purified water	– Removal of healthy, naturally occuring minerals from water – More water wasted – Brine water is a waste byproduct
BOREHOLE	– In most cases borehole water does not require treatment – The only operating cost is the electrical supply for the pump	– Systematic water purity checks required – Filters and other treatment may be necessarry – Installation can be expensive