askSTart

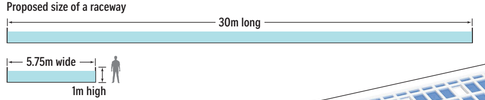
What is the future of fish farming?

Floating Ponds, a land-based urban farming concept by Surbana Jurong which comprises a multi-storey complex of fish ponds in a closed-loop ecosystem, promises to turn people's concept of fish farming on its head. Still in the conceptual stage, this bold plan, if approved by the authorities, will invariably boost fish, as well as – albeit to a lesser extent – leafy vegetable production, and help bolster food security in tiny Singapore.

TYPICAL LAYOUT OF A FLOATING PONDS FISH FARM

Food fish farm with vertically-stacked raceways
- Currents in the water mimic the fish's natural habitat
- Seafood such as pearl grouper, coral trout (below) and shrimps will be reared

Proposed size of a raceway



Constructed wetlands with elevated visitor walkway (left)
- The public can see for themselves how farming is done in a safe, smart and sustainable way in an urban setting
- Leafy greens such as lettuce, bak choi (right) and spinach can be grown in this aquaponic farm

A SYSTEMATIC APPROACH TO FARMING

The building is designed with closed-loop features that tap on available natural resources. Illustrated below is how the exchange and flow of water, nutrients and energy help reduce wastage and make the farm self-sustainable and self-contained.

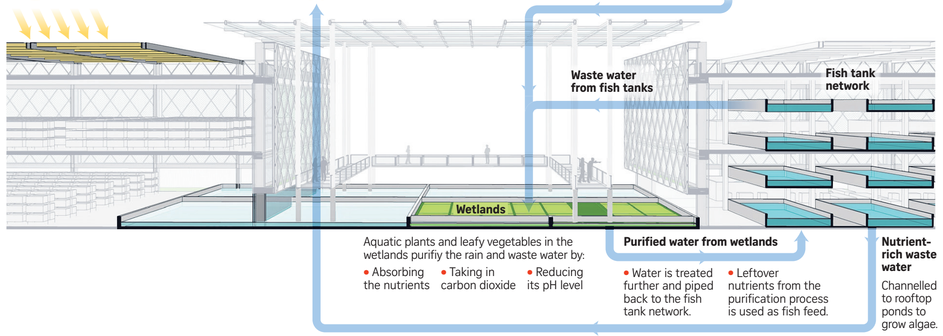
SUN'S RAYS

Solar energy
Electricity generated will power the lights, air-con and devices in the office block, offsetting grid power usage.

Algae production
- Micro-algae grown can be used as fish feed and organic fertilliser for vegetables.
- Specific strains of algae can be farmed and sold to biorefineries to be converted into biofuel.

RAINFALL

Rainwater collection
Roof and surface rainwater run-off is conveyed to the constructed wetlands system via the bioswale.



Aquatic plants and leafy vegetables in the wetlands purifiy the rain and waste water by:
- Absorbing the nutrients
- Taking in carbon dioxide
- Reducing its pH level

- Water is treated further and piped back to the fish tank network.
- Leftover nutrients from the purification process is used as fish feed.

PROS OF THE FLOATING PONDS DESIGN

CUSTOMISABLE FARM SIZE
Modular and scalable tiered design helps overcome land constraints.

WATER-SAVING
More than 90 per cent of the water in fish tanks is recycled, reducing fresh water usage.

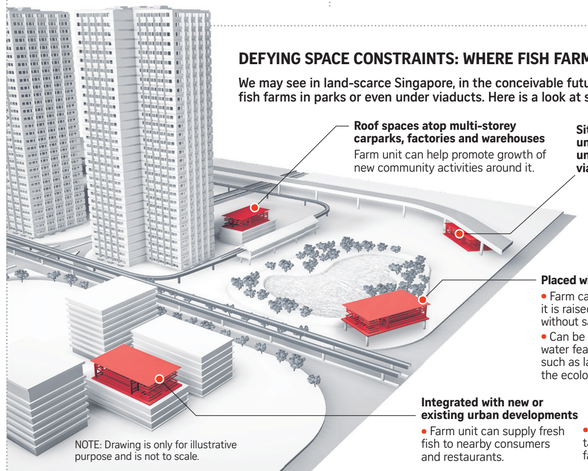
HIGH TECH
Sensors in ponds allow farmers to remotely monitor the water's salinity, acidity levels and temperature.

DRUG-FREE FOOD FISH
Largely contamination-free environment eliminates the need for antibiotics.

SAFETY
Safe from oil spills and weather-triggered upheavals such as plankton blooms.

DEFYING SPACE CONSTRAINTS: WHERE FISH FARMS CAN GO

We may see in land-scarce Singapore, in the conceivable future, multi-storey fish farms in parks or even under viaducts. Here is a look at some suggestions.



Roof spaces atop multi-storey carparks, factories and warehouses
Farm unit can help promote growth of new community activities around it.

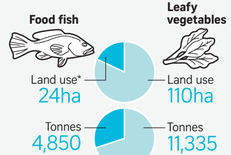
Situated in unutilised spaces under MRT rail lines, viaducts and the like

Placed within urban parks
- Farm can be built such that it is raised above the ground without sacrificing park space.
- Can be integrated with water features in the park – such as lakes – to enhance the ecological landscape.

Integrated with new or existing urban developments
- Farm unit can supply fresh fish to nearby consumers and restaurants.
- People can even take part in hands-on farming activities.

DID YOU KNOW

Singapore's production last year



*Pertains to land-based farms which contribute 10 per cent of fresh and chilled fish produced in Singapore. The other 90 per cent comes from sea-based fish farms.

Singapore's consumption last year

Last year in Singapore:

Imports
94,078 tonnes

Local fish farms
6,086 tonnes (6.1% of the total tonnage)

About 1% of Singapore's land area is used for agricultural purposes*.

*Includes production of eggs, fish and vegetables, as well as ornamental fish and plants for export.

A three-storey prototype at Apollo Aquaculture Group's farm in Lim Chu Kang is about **six times more productive** than a traditional fish farm on the same land space.

2014 The year farmed fish became the chief source of fish consumed – overtaking wild-caught fish.

Sources: SURBANA JURONG, AVA, UN FOOD AND AGRICULTURAL ORGANIZATION STRAITS TIMES GRAPHICS: LIM YONG