

Thailand tests floating homes in region grappling with floods

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Author: Alisa Tang



AYUTTHAYA, Thailand, March 5 (Thomson Reuters Foundation) - Nestled among hundreds of identical white and brown two-storey homes crammed in this neighbourhood for factory workers is a house with a trick - one not immediately apparent from its green-painted drywall and grey shade panels.

Hidden under the house and its wraparound porch are steel pontoons filled with Styrofoam. These can lift the structure three metres off the ground if this area, two hours north of Bangkok, floods as it did in [2011](#) when two-thirds of the country was inundated, affecting a fifth of its 67 million people.

The 2.8 million baht (\$86,000) amphibious house in Ban Sang village is one way architects, developers and governments around the world are brainstorming solutions as climate change brews storms, floods and rising sea levels that threaten communities in low-lying coastal cities.

"We can try to build walls to keep the water out, but that might not be a sustainable permanent solution," said architect Chuta Sinthuphan of [Site-Specific Co. Ltd](#), the firm that designed and built the house for Thailand's National Housing Authority.

"It's better not to fight nature, but to work with nature, and amphibious architecture is one answer," said Chuta, who is organising the first international conference on amphibious architecture in Bangkok in late August.

Asia is the region **most affected by disasters**, with 714,000 deaths from natural disasters between 2004 and 2013 - more than triple the previous decade - and economic losses topping \$560 billion, according to the United Nations.

Some 2.1 billion people live in the region's fast-growing cities and towns, and many of these urban areas are located in vulnerable low-lying coastal areas and river deltas, with the poorest and most marginalised communities often waterlogged year-round.

For Thailand, which endures annual floods during its monsoon season, the worsening flood risks became clear in 2011 as panicked Bangkok residents rushed to sandbag and build retaining walls to keep their homes from flooding.

Vast parts of the capital - which is normally protected from the seasonal floods - were hit, as were factories at enormous industrial estates in nearby provinces such as Ayutthaya. Damage and losses reached \$50 billion, according to the **World Bank**.

And the situation is worsening. A 2013 **World Bank-OECD study** forecast average global flood losses multiplying from \$6 billion per year in 2005 to \$52 billion a year by 2050.

FLOATING HOUSE

In Thailand, as across the region, more and more construction projects are returning to using traditional structures to deal with floods, such as stilts and buildings on barges or rafts.

Bangkok is now taking bids for the construction of a 300-bed hospital for the elderly that will be built four metres above the ground, supported by a structure set on flood-prone land near shrimp and sea-salt farms in the city's southernmost district on the Gulf of Thailand, said Supachai Tantikom, an advisor to the governor.

For Thailand's National Housing Authority (**NHA**) - a state enterprise that focuses on low-income housing - the 2011 floods reshaped the agency's goals, and led to experiments in coping with more extreme weather.

The amphibious house, built over a manmade hole that can be flooded, was completed and tested in September 2013. The home rose 85 cm (2.8 feet) as the large dugout space under the house was filled with water.

In August, construction is set to begin on another flood-resistant project - a 3 million baht (\$93,000) floating one-storey house on a lake near Bangkok's main international airport.

"Right now we're testing this in order to understand the parameters. Who knows? Maybe in the future there might be even more flooding... and we would need to have permanent housing like this," said Thepa Chansiri, director of the NHA's department of research and development.

The 100 square metre (1,000 square foot) floating house will be anchored to the lakeshore, complete with electricity and flexible-pipe plumbing.

Like the amphibious house, the floating house is an experiment for the NHA to understand what construction materials work best and how fast such housing could be built in the event of floods and displacement.

FLOATING CITIES?

The projects in Thailand are a throwback to an era when Bangkok was known as the Venice of the East, with canals that crisscrossed the city serving as key transportation routes. At that time, most residents lived on water or land that was regularly inundated.

"One of the best projects I've seen to cope with climate-related disasters is Bangkok in 1850. The city was 90 percent on water - living on barges on water," said Koen Olthuis, founder of [Waterstudio](#), a Dutch architecture and urban planning firm.

"There was no flood risk, there was no damage. The water came, the houses moved up and down," he said by telephone from the Netherlands.

Olthuis started Waterstudio in 2003 because he was frustrated that the Dutch were building on land in a flood-prone country surrounded by water, while people who lived in houseboats on the water in Amsterdam "never had to worry about flooding".

His firm now trains people from around the world in techniques they can adapt for their countries. It balances high-end projects in Dubai and the Maldives with work in slums in countries such as Bangladesh, Uganda and Indonesia.

One common solution for vulnerable communities has been to relocate them to higher ground outside urban areas - but many people work in the city and do not want to move.

Olthuis says the solution is to expand cities onto the water.

Waterstudio has designed a [shipping container that floats](#) on a simple frame containing 15,000 plastic bottles. The structure can be used as a school, bakery or Internet cafe.

Waterstudio's aim is to test these containers in Bangladesh slums, giving communities flood-safe floating public structures that would not take up land, interfere with municipal rules or threaten landowners who don't want permanent new slums.

"Many cities worldwide have sold their land to developers... and now when we go to them, we say, 'You don't have land anymore, but you have water,'" Olthuis said. "If your community is affected by water, the safest place to be is on the water."

(Reporting by Alisa Tang, editing by Laurie Goering)

This article is part of a [Thomson Reuters Foundation series](#) on preventing disasters, ahead of a conference to adopt a new global action plan to reduce the risks of disasters, in Sendai, Japan, in mid-March.

[**http://www.trust.org/item/20150305000156-r6las/**](http://www.trust.org/item/20150305000156-r6las/)

Are watermills in Kashmir a solution to Pakistan's energy crisis?

Source: Thomson Reuters Foundation - Mon, 1 Jun 2015 06:31 AM
Author: Roshan Din Shad



MUZAFFARABAD, Pakistan, June 1 (Thomson Reuters Foundation) - Arshad Rashid thinks he has an answer to his country's energy shortages.

For a few hours a day, a few days a month, the villager in Katahi, about 50 kilometres outside of Muzaffarabad, the capital of Pakistan-administrated Kashmir, grinds maize and wheat with a watermill.

But he sees untapped potential in his century-old mud-and-stone mill, which sits idle most of the time. He wants to use it to generate free, clean electricity.

Arshad, 38, is one of hundreds of millers in Pakistan who make a living using watermills, or "jandar", built along brooks and streams.

If each of these mills were connected to a small-scale turbine, Arshad believes, villages could become energy self-reliant, helping bring an end to the long power outages that have sparked violent protests across Pakistan and his region of Azad Jammu and Kashmir (AJK) over the past few summers.

"Water channeled for watermills can be used to produce electricity for a whole village," said Arshad, who got the idea after seeing a nearby hydroelectric power station that runs on massive turbines. Any surplus energy generated could be sold to the government to feed into the national grid, he added.

By May, with the hot weather starting to bake Pakistan's plains, the country was already facing an energy shortfall of 5,000 megawatts (MW).

AJK also regularly suffers from crippling power shortages, despite producing more energy than it consumes, as energy generated in AJK goes into Pakistan's national grid, making AJK vulnerable to national load shedding plans.

"Our requirement is 300 megawatts of electricity for the whole of AJK, while production is 1,133 megawatts," Fayyaz Ali Abbasi, AJK Energy Secretary, told the Thomson Reuters Foundation.

The government of Pakistani Prime Minister Nawaz Sharif has assured the country that the electricity crisis will be resolved by 2018, when it hopes to have completed a series of energy mega-projects that could add several thousand megawatts to the national grid.

But instead of focusing on large power projects, said Arshad, governments and NGOs should be helping millers install small energy production alongside their jandars. "It would require a maximum investment of half a million Pakistani Rupees (\$5,000) on the turbine, the motor and the pipe," he said. So far, however, no help has come, he said.

SMALL PROJECTS, BIG BENEFITS?

Some millers have taken it upon themselves to harness the potential of their watermills. Two years ago, Maskeen Qureshi, who lives in the Kohori Tarari hamlet near Muzaffarabad, installed a homemade turbine and a small transferring motor alongside his jandar.

Maskeen's son helped him make and install the turbine, while a neighboring village leader gave him a small-capacity motor. The generator is connected to lights by copper wiring recycled from telephone cables. The whole project cost Maskeen 50,000 rupees (\$500), he said.

The energy his turbine produces lights the mill and a half-dozen houses, all for free. "The turbine uses one-fourth of the water required to run the watermill, and generates enough to light our homes and charge our cellphones," said Maskeen, 75.

He estimates that with another 100,000 rupees (\$1,000) he could fix the turbine to a concrete base and install a higher capacity motor to create a permanent installation that would provide electricity to all 18 houses in the village, day and night.

"If anyone [in government] can help us with this, we would be thankful," he said.

According to Sardar Muhammad Rafique, assistant director at the State Earthquake Rehabilitation and Reconstruction Agency, installing small waterpower projects on streams and tributaries in AJK could ease both the country's energy troubles and one of its biggest environmental issues.

As well as lightening the load on the national grid, the move would help slow the destruction of regional forests, he said.

"Electricity generation through watermills and small projects will ultimately reduce pressure on the forests which are being cut down for wood fuel," Rafique said.

When pressed about the energy potential of watermills, AJK Minister for Finance Chaudhry Latif Akbar said the government is ready to finance any initiatives involving local communities as stakeholders and said he would ask the Planning and Development Department to look into the best way of doing that.

But for now, millers like Arshad who want to turn water into power are on their own. They are frustrated with the lack of progress.

"Thousands of megawatts of electricity could be produced through the vast spread of watermills along with technical and financial assistance to villagers," Arshad said. "But neither the government nor the private sector are taking any steps to promote this environmentally friendly traditional industry." (Reporting by Roshan din Shad; editing by Jumana Farouky and Laurie Goering) ;))

<http://www.trust.org/item/20150601063230-p60do/>

Boat schools bring classroom to Bangladesh's flood-hit children

Source: Thomson Reuters Foundation - Mon, 9 Mar 2015 10:12 AM
Author: Syful Islam



By Syful Islam

DHAKA, March 9 (Thomson Reuters Foundation) - Anna Akter, a nine-year-old student at a floating school in Bangladesh's remote Natore district, says she might have missed out on her education during annual monsoon floods without her boat-based classroom.

The same goes for Khushi Khatun, who also studies at the boat school where she gets free tuition and materials.

"Had there been no such school, she would have had to walk two kilometres along a muddy path or take a boat journey during monsoon which may have discouraged her to study," said her father Nazir Uddin, a farmer in Pangasia village.

Hundreds of students in the northern Bangladesh district are taught in floating schools, an initiative to make education available to children whose lives are complicated by regular flooding.

"Instead of the students going to school, the school reaches them," said Mohammed Rezwan, founder of [Shidhulai Swanirvar Sangstha](#), the non-profit organisation that introduced the country's first floating school system.

It also trains farmers to grow vegetables in floating gardens and raise ducks and fish, as well as offering free farm inputs.

The boat schools are the kind of measure that can help education in developing nations like Bangladesh become more resilient to extreme weather and worsening climate impacts.

Governments meeting in Japan from March 14-18 to adopt a [new action plan to reduce the risk of disasters](#) are expected to call for better ways to protect education before, during and after crises.

FROM BUS TO CLASS

Rezwan, an architect, was born and brought up in Natore district. He was lucky as he didn't miss school in the rainy season thanks to his family's boat, unlike many of his friends.

"From school age, I thought there must be a solution to this problem," Rezwan told the Thomson Reuters Foundation by telephone from his office in Natore.

While at university, it occurred to him that if children couldn't make it to school, their classroom should go to them.

Rezwan established Shidhulai Swanirvar Sangstha in 1998 with \$500 from his savings and scholarship money, and the floating school concept was launched in 2002.

The boats first serve as school bus, collecting children from different riverside stops. Once they have docked, class begins.

Rezwan's organisation now has 22 wooden boats, each able to accommodate 30 students. The boats have a classroom, a library and internet-connected computers powered by onboard solar panels.

Each year, much of the Bangladesh countryside is hit by flooding, forcing schools to close, Rezwan said. In 2007, for example, some 1.5 million students were estimated to have been affected by floods, he noted.

Around two thirds of the country's 160 million people live in rural areas. During a normal rainy season, over a fifth of the country's land is submerged, while in extreme years, up to two thirds can be inundated.

As climate change impacts become visible, disasters caused by extreme weather, including floods and storms, are increasingly hitting the low-lying nation, Rezwan said. Sea-level rise could exacerbate the situation in coastal areas in the coming years, the Intergovernmental Panel on Climate Change has predicted.

IDEA SPREADS

The floating schools cover an area of 2 square km, offering primary level education to local children who might otherwise have stayed away from school.

Shidhulai Swanirvar Sangstha now also trains adult villagers on children's and women's rights, nutrition, health and hygiene, and how to farm ducks and fish alongside vegetables in "floating gardens", helping them adapt to the impacts of climate change.

Some other flood-prone countries, including Cambodia, Nigeria, the Philippines, Vietnam and Zambia, have introduced floating schools, following Rezwana's model.

Nazma Khatun, a teacher at the Natore boat school, said the nearest government primary school, located some 2 km away, could not be reached by students from her area during seasonal flooding.

"The floating school has brought many benefits," she said. "The students can easily go to school and stay close to their parents. The literacy rate is growing here," she added.

Her daughter also attended the floating school and is now studying at secondary level nearby. It has changed Khatun's life for the better, too.

"After I got married, I stayed at home as a housewife," she said. "Now I am teaching in this school alongside pursuing my graduate studies."

(Reporting by Syful Islam; editing by Megan Rowling)

*This article is part of a [**Thomson Reuters Foundation series**](#) on preventing disasters, ahead of a conference to adopt a new global action plan to reduce the risks of disasters in Sendai, Japan, in mid-March.*

<http://www.trust.org/item/20150309101250-4lmwe/>

From open sewage to high-tech hydrohub, Singapore leads water revolution

Source: Thomson Reuters Foundation - Mon, 3 Aug 2015 01:00 AM

Author: Alisa Tang



SINGAPORE, August 3 (Thomson Reuters Foundation) - Fifty years ago Singapore had to ration water, and its smelly rivers were devoid of fish and choked with waste from shipbuilding, pig farms and toilets that emptied directly into streams.

But it's a very different story today. The world's most densely populated country now collects rainwater from two-thirds of its land, recycles wastewater and is even developing technology that mimics human kidneys to desalinate seawater.

"In about a lifetime, we have transformed Singapore," said George Madhavan, an engineer who has worked for the national [PUB water agency](#) for 30 years and is now communications director.

"It's not rocket science - it is more political will ... The key success factor is really government - the leadership to pull different agencies together to come up with a plan."

As governments around the world wrestle with water crises from droughts to floods, many are looking to the tiny Asian city-state of Singapore for solutions.

In many countries, a flood prevention agency focuses on quickly draining away storm water, while another manages drinking water.

In Singapore, PUB "manages the entire water loop", Madhavan told the Thomson Reuters Foundation.

Its aim is to capture every drop of rain it can and recycle as much used water as possible.

"That means that ideally, we don't sell you water. We rent you water. We take it back, we clean it. We're like a laundry service. Then you can multiply your supply of water many, many times," Madhavan said.

"The water that you drink today is the same water that dinosaurs drank. We don't create or destroy water. It just goes around. So we are using engineering to shorten the loop."

BEWARE OF CROCODILES

Following independence on August 9, 1965, the new 700 sq km country relied on three reservoirs and water imported from neighbouring Malaysia.

Today, it collects rainwater through an 8,000-km drain network that empties into 17 reservoirs, and reclaims used water from a deep tunnel sewerage system up to 60 metres below ground.

Singapore, which is recognised as a global leader in water technology, set up a water planning unit in 1972. Unlike Bangkok, Kuala Lumpur and Tokyo, it does not have land outside the city to act as huge catchment areas.

Eleven government agencies joined up from 1977 to 1987 to clean the heavily polluted Singapore River and Kallang Basin in the main commercial area.

The city relocated 610 pig farms and 500 duck farms (later barring such farms), transferred 5,000 street hawkers to food centres, and moved boats east to the Pasir Panjang area.

Madhavan said the biggest challenge was relocating 46,000 squatters living in squalid conditions without sewers into housing blocks.

More than 260 tonnes of rubbish were removed, the area was landscaped, and in 1987, fish returned to the waters.

Worried about pollution, authorities initially kept people away from the waterways.

"We even had warning signs about crocodiles (which had been spotted in the reservoirs) to keep people away," Madhavan said.

Singapore has since shifted its stance, opening waterfront areas such as Marina Reservoir, where people kayak, bike and fly kites against a backdrop of the city's highrise skyline.

HOLY GRAIL OF DESALINATION

Singapore's "four national taps" supply 400 million gallons each day for 5.4 million people.

The island's two natural sources are rain and, through an agreement that expires in 2061, up to 250 million gallons per day from Malaysia's Johor River.

As climate change makes nature's sources less reliable, Singapore is focusing on its reclaimed and desalinated water taps.

NEWater, introduced in 2003, is the name for used water from the sewerage system, treated and further purified through microfiltration, reverse osmosis and ultraviolet disinfection.

Meeting 30 percent of demand, NEWater is potable but mainly used by industries and during the dry season to top up reservoirs. Singapore aims for NEWater to meet 55 percent of demand by 2060.

The island's first desalination plant opened in 2005, and desalinated water meets a quarter of demand.

Desalinated water and NEWater are fairly independent of the weather but on the downside, require more energy to produce, Madhavan said.

Conventional reverse osmosis requires 3.5 to 4 kilowatt-hours (kWh) to squeeze seawater through a membrane to make 1,000 litres of freshwater.

Singapore is now building a demonstration plant to scale up tests on electrochemical desalting, which uses an electric field to pull salt out of seawater. Madhavan said PUB hopes to halve energy use.

University researchers are also developing "the holy grail of desalination" - technology that imitates the kidneys, he said.

"This will take some years ... They more or less understand how the kidney works to do desalting. But it's now how to engineer it, how to build it, the enzymes that are key to this process."

(Reporting by Alisa Tang, Editing by Emma Batha.; Please credit the Thomson Reuters Foundation, the charitable arm of Thomson Reuters, that covers humanitarian news, women's rights, corruption and climate change. Visit www.trust.org)

<http://www.trust.org/item/20150803010128-04x94/>

Cheap, off-the-shelf technology cuts costly climate losses in Bangladesh

Source: Thomson Reuters Foundation - Thu, 24 Sep 2015 11:42 AM
Author: Amantha Perera



CHENCHURI, Bangladesh, Sept 24 (Thomson Reuters Foundation) - Every day without fail Munsheer Sulaiman, 69, follows the same ritual. He dips a small cup into the stream that flows through his village of Chenchuri, about 300 kilometres southwest of Dhaka, and uses a light blue salinity monitor to measure the salt level in the water.

If Sulaiman, who heads the village water operating committee, is unable to take the measurements, he makes sure someone does it on his behalf. The reading is essential to the health of Chenchuri's crops, telling the community if the water is safe to use that day.

"Depending on the salinity level we decide whether to open the gates of the small dam that distributes water to the village," Sulaiman said.

In 2009, deadly Cyclone Aila swept seawater into southwest Bangladesh's fields and freshwater, leaving salinity levels so high that farmers found themselves struggling to grow crops.

Three years later, the Bangladesh government, the Netherlands, and the Asian Development Bank (ADB) together launched a \$43 million programme to rehabilitate the waterways in Chenchuri and nearby Narail district.

The project included rebuilding 22 kilometres (14 miles) of riverbank, rehabilitating 257 kilometres (160 miles) of canals, building and repairing bridges, and improving irrigation systems.

Chenchuri's small dam was repaired to allow control of the water flowing from the much larger Chitra River. And the village committee was given the responsibility of opening and closing the dam gates, based on the daily readout from a simple salinity monitor.

Experts in Bangladesh say that, as cases like Chenchuri's show, big climate resilience projects can save communities from the effects of weather disasters - but only if the projects are run hand-in-hand with local know-how and make use of cheap, off-the-shelf technology.

BIGGER HARVESTS

Nazma Begam, whose family's paddy rice fields rely on the water flowing through Chenchuri dam, said her crop output has increased four-fold since the village starting using the dam and the salinity monitor two and half years ago.

The multi-million dollar investment improved Chenchuri's dam system, but it only works because a \$50 salinity monitor allows the villagers to make good day-to-day decisions, said regional water engineer Masud Karim.

"Salinity can really harm the crops, so when the villagers know the levels are high, they keep the gates shut and their crops safe," Karim said.

Chenchuri residents use their mobile phones to communicate with the water committee about their water needs. "When we need water we phone the water committee and, if there is agreement, we get water within hours," said farmer Begam.

According to Karim, before the dam's rehabilitation, villagers had to send requests for water to government officials about 100 kilometres away, and the opening or closing of the dam would take 48 hours to come into effect.

Water users also use their phones "to keep in touch with others upstream to get an idea of water levels, especially during the monsoon or heavy storms", Sulaiman said.

A COMPUTER - AND A MESSAGE BOARD

In the village of Boyarshing, about 100 kilometres (62 miles) south of Chenchuri in Satkhira District, another merging of technologies is helping keep residents safe from extreme weather.

Villagers use a combination of an internet-connected computer, a manually operated weatherboard, and mobile phones to stay up to date on the area's increasingly erratic weather.

A computer at the village's main government office feeds weather bulletins to officials who use it to update the weatherboard with colour-coded warning levels that are easily understood by villagers.

They then spread the information around their communities. "If we had something like this when Typhoon Aila came, if we had this kind of a warning system, it could have saved many more lives," said villager Anzar Ali.

Afrif Mohammad Faisal, ADB's environmental specialist in Bangladesh, said as rural communities come to recognise the severity of changing climate patterns, inexpensive technology has helped them become better prepared.

"It is about people understanding the threat levels, gaining up-to-date information and using it within their communities," he said. "The hardest job is to initially convince them that all of us need to change the way we react to weather."

Water engineer Karim says that villagers in Chenchuri were at first sceptical about the usefulness of the salinity monitor. Government officials spent several days with village communities building awareness of the benefits of using the monitor alongside the rehabilitated dam.

"Initially we were the ones doing the salinity monitoring. But after the harvest went up when we moderated water flow, depending on the salt levels, villagers figured out the importance," he said. "Now they even have a backup monitor, in case the one in use fails."

(Reporting by Amantha Perera; editing by Jumana Farouky and Laurie Goering ;; Please credit the Thomson Reuters Foundation, the charitable arm of Thomson Reuters, that covers humanitarian news, climate change, women's rights, trafficking and corruption. Visit www.trust.org/climate)

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