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WATER CONSERVATION

Architects can contribute in a big way through conservation-integrated design, say leading practitioners Ar. Manit and Sonali Rastogi

Words / Ar. Sonali & Manit Rastogi, Morphogenesis * Photographs / André J Fanthome

The Uttorayon Township, designed by Morphogenesis, in the outskirts of Siliguri city, West Bengal, utilises surface run-off and storm water efficiently.

A recent report by Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) reveals that the health of our ecosystems, on which mankind and all other species depend, is deteriorating more rapidly than ever. We are eroding the very foundations of our economies, livelihoods, food security, health and quality of life, worldwide. Ecosystems untouched by human interventions no longer exist. Human civilisation and technology have permanently altered our planet and some of the most tangible impacts include imploding population numbers, rampant deforestation, dangerous pollution levels (air, water, soil, industrial), immense ocean acidification and climate change, along with a plethora of other consequences.

As the world continues to urbanise, sustainable development depends increasingly on the successful management of urban growth and resources, especially in countries with developing and transition economies. Many countries will face challenges in meeting the needs of their growing urban population, including adequate water, housing, transportation, energy systems and other infrastructure, integrated with some basic services. A recent report by Niti Aayog has suggested that 21 Indian cities will

Sonali & Manit Rastogi, Morphogenesis

PHOTOGRAPH | Vidur Yadav

run out of groundwater by next year, including New Delhi and Bengaluru. What is crucial is that we need to realise that our urban systems must now become self-sustainable ecosystems that are net zero on energy, water and waste to landfill. Taking a case example of Chennai, the city came to a halt due to acute water crisis. The lakes had dried up containing only 1% of the volume they did last year. Existing companies had to additionally pay 30% more for private supply of water sourced from outside Chennai. On the other end, people in Mumbai, were reeling under a deluge. In the past, these extreme situations may have been solely due to the peculiarities of nature, but now science has established that human-caused global warming is driving climate change, impacting both human and natural systems. This is resulting in disrupting rainfall patterns and increasing the frequency of extreme weather events. No country is immune to these forces, but India is particularly vulnerable.

The threat it poses is existential and our buildings are complicit in making it so. And architects as authors of these buildings must take cognisance of the situation and lead by focusing on green architecture as a response to climate change.

We need to take measures to start reviving the traditional systems of water harvesting in the country. Given that these methods are simple and eco-friendly for the most part, they are not just highly effective for the people who rely on them, but they are also good for the environment and play a crucial role in water conservation.

However, at times, the 'one size fits all' approach doesn't work. For towns and communities localised solutions are required. An example of a contextual solution is how Uttorayon Township designed by Morphogenesis, in the outskirts of Siliguri city, utilises surface run-off and storm water. The region receives annual rainfall of about 3 metres in a year. In order to avoid building expensive piping networks, correct slopes of the road were calculated, and existing natural water streams were used. This also meant that surface storm water drains were never more than 12.5 cm deep and the system eliminated crossover of services. A network of green strips was used to connect communal greens with microgreens and aquifers. This ensured effective percolation of rainwater into the ground. Furthermore, a module sewage trunk flanking both sides of neighbourhood clusters was installed. They could be plugged into, as the development increases. The natural sewage system used reed-beds as an affordable alternative to a mechanised sewage treatment system. For communities, they need to view themselves as stakeholders and take the lead.

An example can be the residents of Delhi's Nizamuddin East who came together and took the initiative themselves to set-up water harvesting facilities, such as bore wells in the colony to address water-shortage problems.

Over the years, green buildings have proved to be effective in dealing with pollution problems, waste generation and environmental degradation. The green building market in India is expected to double

Need to know

THE BASIC RAINWATER HARVESTING PROCEDURE IN A BUILDING CONSISTS OF THREE STAGES:

COLLECTION OF RAINWATER
Rainwater is collected in areas such as rooftops and pavements. Channels around the edges of sloping roof collect and transport rainwater to a storage tank.

DISTRIBUTION STAGE Pipelines used are either semi-circular or rectangular in shape to carry rainwater from the tank to the harvesting system.

STORAGE STAGE
The size of the storage stage depends on three things—amount of rainfall, estimated need and length of dry season.

In order to avoid building expensive piping networks, correct slopes of the road were calculated, and existing natural water streams were used at the Uttorayon Township.

PHOTOGRAPH \ Vibhor Yadav

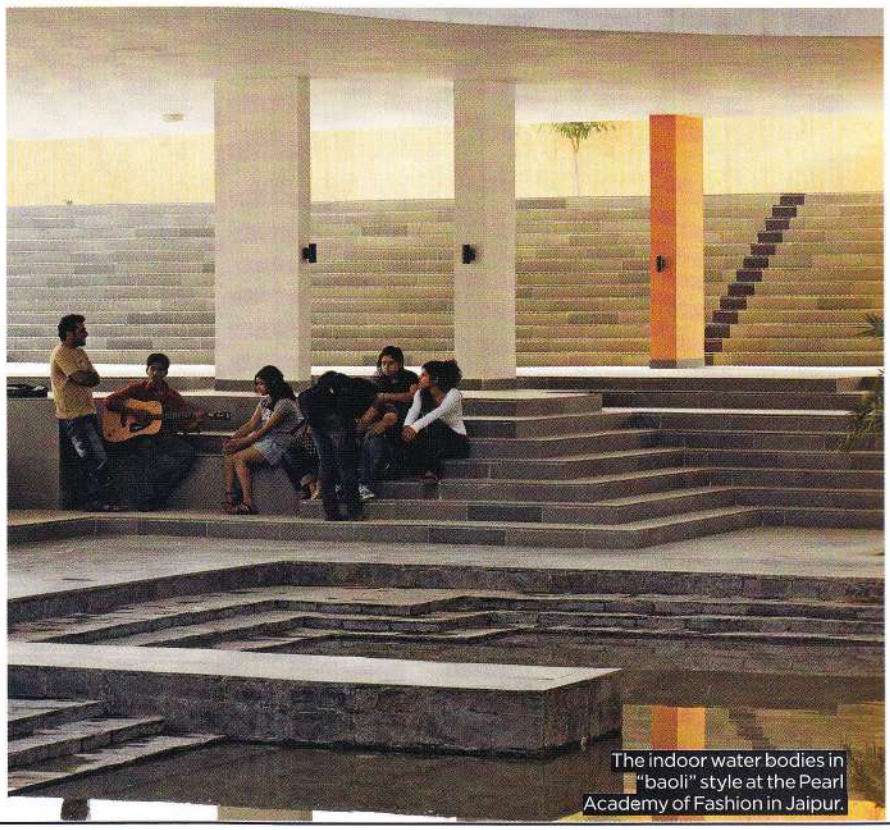
The architecture of the Pearl Academy in Jaipur has passive cooling strategies, prevalent in the hot-dry desert climate of Rajasthan, such as open courtyards, water bodies, a baoli and jaalis.

at 10 billion sq ft, valued at around $35-50 billion. Furthermore, according to data shared by IGBC, until 2017, more than 4,300 buildings in the country accounted for utilising green technology.

A building is classified as 'green' if it efficiently utilises resources for the purpose of being sustainable. It has five main features—site and design efficiency, reduced energy usage, reduced water consumption along with environmentally-safe construction materials and better air quality. Out of the five features, the ability to save and judiciously use water is the one that currently stands out.

The approach towards green buildings is to optimise the use of recycled grey water which is wash water from bath, dish and laundry water excluding toilet wastes, and free of garbage-grinder residues. Using recycled grey water supports the quantity of water required for water closets, car washing and garden watering. Benefits also include reduced use of freshwater, less strain on septic tanks, groundwater recharge, plant growth and reclamation of nutrients.

Another solution for water conservation is the use of modern day low-flow plumbing fixtures that not only conserve water but also provide



The indoor water bodies in "baoli" style at the Pearl Academy of Fashion in Jaipur.

PHOTOGRAPH \ Edmund Sumner

The 8th Century Chand Baori in Rajasthan, which has 3,500 steps.

convenience and ease of maintenance. They moderate the flow of water by using aerators, which break the stream of the water into tiny streams so that air gets mixed with it. They are used in faucets, toilets, urinals and shower heads. People use water lavishly when water flows in fixtures. Green buildings that use low-flow plumbing utilise 30% less water than standard flow. And this helps in water conservation and reduction of water bill.

Today, dual plumbing system are also being used in green buildings. This system functions by separating potable water and treated or reclaimed water in a building. One system supplies fresh water for the purpose of drinking and cooking while the other uses reclaimed, runoff water for areas such as gardening or flushing. As per criteria 20 of GRIHA, dual plumbing encourages decentralised waste water management. In buildings, water used in flush tanks, in toilets is more than what is necessary to flush a toilet fully; it is approximately 4-6 litres per flush. Use of low-flush toilets that operate between 2 litres to 3 litres per flush can result in substantial amount of water saving. Vacuum toilets, which are used in airplanes, are also gaining popularity; they only consume 1 litre per flush. Another option for green sanitation is water-efficient urinals. These urinals use less than 2.8 litres per flush and have an oil barrier between the urine and the atmosphere rather than air fresheners such as Odonil, to prevent the odour from escaping.

At Morphogenesis, we believe urbanisation, environmental sensitivity and a greener world are core issues that need to be addressed today and in the future. It is no longer a choice, or a "layer" that can be applied to the design of a building. Rather, it must be integral to the process of design, from concept to completion and to the entire life cycle of the development.

At the Uttorayon Township, natural sewage system of reed-beds have been used as an affordable alternative to a mechanised sewage treatment system.

PHOTOGRAPH \ Edmund Sumner