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Indigenous Wisdom, Modern Comfort: Revisiting India's Architectural Heritage

स्तम्भोत्तरादिकाङ्गानां द्रव्यं द्रुमोपलेष्टकाः ।।
(Mayamatam, 15:61)



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When summers make homes unbearably hot and winters bitterly cold, comfort often comes at a cost: rising electricity bills from air-conditioners and heaters. As India faces frequent weather extremes, the contribution to high costs and subsequent carbon emissions undermines a sustainable future. For centuries, India's diverse regions developed climate-responsive building practices that worked with local conditions to support human comfort. Historical treatises such as the *Samarangana Sutradhara* and *Mayamatam* discuss spatial organisation, materials, courtyards and gardens in relation to the environment. As climate change reshapes building needs, revisiting this traditional architectural heritage could offer valuable lessons for comfortable, energy-efficient buildings today.

In the cold Western Himalayan regions, Srinagar's *dhajji diwari* houses exemplify centuries-old climate-responsive architecture. Built with natural thermal insulators such as moisture-resistant deodar wood and mud plaster, along with heat-absorbing stone/brick infill, they trap heat indoors and keep the cold out. In Himachal Pradesh, the indigenous *kath kuni* houses use double-skinned walls made of alternating wooden beams and loose stone infill (that contains trapped air), creating an effective insulating layer. Interior mud plaster further reduces heat loss, keeping homes naturally warmer. In the wetter Eastern Himalayas, the Mon people of Chug Valley, Arunachal Pradesh, build traditional *wahm* houses from local rocks, clay and wood. Their thick stone-and-clay walls help keep interiors cool in summer while shielding occupants from frigid rains and winds during the monsoon and winter.

Across the hot and arid or semi-arid landscapes of states such as Rajasthan and Gujarat, *baoris* or stepwells, such as the *Chand Baori, Rani ki Vav, Adalaj ki Vav,* formed part of the traditional systems of water management and community life. Apart from providing groundwater and aiding in water conservation, their descending stairways, subterranean chambers and stone-lined shafts provided shade from the sun's heat and cooled surroundings. For instance, the *Adalaj Ki Vav* is a five-storeyed octagonal stepwell, whose ceiling openings let air and light into the well. Direct sunlight never touches the steps except at noon, maintaining cooler temperatures inside the well.

Traditional homes, such as Rajasthan's *havelis* and Gujarat's *pol* houses, have courtyards that serve as social hubs and natural microclimate regulators. During the day, shaded courtyards remain cooler than the hot outdoor air. As the warm air inside rises and escapes (the stack effect), cooler, fresh air is drawn in from surrounding rooms and *verandahs.* At night, open-sky exposure releases the stored thermal heat while cool air sinks into the space, cooling the thick masonry walls. Many courtyards also feature central plants or water features that cause further cooling through evaporation. Several such homes also harvest rainwater within their premises. The collected rainwater in the courtyards gets drained into the basement, beneath the central courtyard, further cooling the atmosphere.

India's architectural heritage further boasts of a perforated screen made of stone, the *jali. Jalis* offer benefits, such as passive cooling and glare mitigation, over glass. Once air enters through the screen, the small chambers cause it to increase in velocity and drop in pressure, which in turn cools the air and ambient temperature (the Venturi effect). For instance, the eastern façade of Hawa Mahal in Jaipur, Rajasthan, features 953 intricately carved *jharokhas* equipped with stone-pierced *jali* screens. These *jharokha* windows aid in making the interior spaces pleasant during the high summer temperatures.

Materials such as Makrana marble, red/pink sandstone and red bricks were commonly used to build notable structures such as the Taj Mahal, Agra Fort and Hawa Mahal. These dense materials have high thermal mass; they absorb and store large amounts of heat during the day and release it gradually as night temperatures drop. In contrast, today's thin, uninsulated concrete walls transfer high temperatures directly into building interiors within hours, while concretised urban surroundings retain heat and amplify the Urban Heat Island (UHI) effect long after sunset. Furthermore, surface albedo plays a critical role in passive cooling: exterior surfaces made of marble or finished in light colours reflect solar radiation, avoiding dark colours that absorb more heat. For example, the traditional buildings of Jaisalmer, Rajasthan, use light golden-yellow sandstone to reflect intense solar radiation. Interior mirror work, as seen in the Amber Fort, Jaipur, Junagarh Fort, Bikaner and *Bhungas,* Kutch (*Lippan kaam*), naturally amplifies indoor lighting through multiple reflections, while exterior mirror work on the *Bhungas* and other rural homes complements the light-coloured lime-plastered walls, reflecting away harsh heat.

Adequate tree cover and green landscapes can reduce temperatures significantly through shade and evapotranspiration. For instance, the Isa Khan Tomb, Delhi and Amber Fort, Jaipur, display the calming effect of greenery, often further enhanced by cooling water features. Indian subcontinent's prominent garden-tomb, Humayun's Tomb, Delhi, is centred within a four-quadrant *charbagh* landscape. Fruit orchards, flowering trees and other natural vegetation provided shade and food, complemented by cooling fountains and water channels.

In warm, humid tropical climates, vernacular architectures such as the *Chang Ghar,* Assam and *Nalukettu,* Kerala, developed natural ventilation and protection from heavy rains over centuries. Along the flood-prone Brahmaputra plains, the indigenous Mising tribe from Assam builds the *Chang Ghar,* a stilted house raised above ground level. The stilt height is determined by the highest local flood levels. Families live on the upper floor (which gives access to cool air), while the ground floor accommodates poultry and livestock. The construction materials used are lightweight, flexible and readily available. Perforated bamboo walls and floors allow air circulation, keeping the interiors cooler, while thatched or reed roofs provide cover.

Nalukettu (meaning 'four blocks') is the traditional homestead system prominently found in the coastal regions of Kerala. Four halls are arranged around a central open courtyard (*nadumuttam*), which brings light and ventilation into the house. Laterite stone walls, plastered with a mix of mud, straw and organic binders, e.g. cow dung, provide thermal mass to moderate indoor temperature fluctuations. Teak and jackfruit wood are used for beams, columns and other structural elements, while terracotta bricks and clay tiles are suited to the region's warm, humid climate. The steep-sloping tiled roof, supported by wooden beams, allows heavy monsoon rain to drain quickly. Extended rafters and deep eaves protect the walls from sun and driving rain, while gabled roof windows help release hot air trapped beneath the roof. Here too, the central courtyard draws warm air out and pulls cool breezes in to relieve humidity.

India's architectural heritage shows how vernacular knowledge can regulate microclimates without energy-intensive technology. Structures tailored to local climates, such as cold, hot-dry and tropical wet climates, consume less energy, ease infrastructure strain and perform better during extreme weather. Modern designs can adopt IKS-grounded passive strategies, such as leveraging courtyards and *jalis* for airflow, prioritising sustainable materials such as bamboo and terracotta, among others.

In line with Bharat Ki Soch's vision of synthesising this vernacular wisdom with modern engineering for future sustainability, embracing these lessons allows us to construct modern spaces that provide a practical pathway towards low-carbon, climate-resilient cities.

Fable with Moral

Fountain of youth



Deep in the highlands, an elderly woodcutter and his wife shared a peaceful life. They had grown old together, their faces etched with the lines of many happy years. Yet, two reasons made them sad. They had never been blessed with children and they deeply feared the day old age and death would inevitably tear them apart.

One morning, the old man ventured deeper into the forest than usual to gather wood. Due to dense fog he quickly lost his way. For hours, as he struggled to find the route, his limbs turned heavy with exhaustion. Just as his strength began to fail, he stumbled upon a crystal-clear spring. Desperate, he scooped up the water and drank to quench his thirst.

Instantly, vitality surged through his veins. Bending over the water, he gasped at his reflection. The wrinkles were gone, his gray hair had turned dark and he possessed the strength of a twenty-year-old man. He had found the legendary fountain of youth.

He raced back to his cottage. When he knocked, his wife opened the door but recoiled in fear, failing to recognize the handsome stranger. "It is me, your husband!" he cried out, explaining the miraculous spring. Overjoyed and desperate to match his newfound youth, she asked for directions. "Wait here," she urged, hurrying out into the forest alone.

Hours passed and the sun began to set, but she did not return. Growing anxious, the young woodcutter retraced his steps back to the spring. The forest was silent except for a faint, rhythmic sound. Reaching the spring, he found no sign of his wife-only a small bundle wrapped in her clothes resting on the moss. Inside, a tiny baby girl wept softly.

His heart sank as the grim truth became clear. In her desperate greed to be young again, she had drunk far too much of the magic water.

MORAL OF THE FABLE: Refrain from greed

Did you know?

India's farmers mastered below-sea-level farming over 150 years ago!

In Kerala's Kuttanad region, farmers have been cultivating rice on land lying approximately 1-2 metres below sea level for over 150 years! Kuttanad is a low-lying delta and wetland region in Kerala, extending across parts of Alappuzha, Kottayam and Pathanamthitta districts. It is surrounded by the backwaters of Vembanad Lake and a network of rivers and canals. The area is often called the 'Rice Bowl of Kerala' because of its extensive paddy cultivation.



What makes it exceptional is that much of its agricultural land lies below sea level, presenting farmers with two major problems: seasonal flooding and saltwater intrusion. Instead of abandoning these wetlands, generations of farmers developed methods of managing water so that rice could be cultivated on the exposed soil.

During the 19th century, local communities constructed protective earthen embankments, known as *bunds,* and used traditional water wheels called *chakrams* to drain excess water from enclosed fields. These reclaimed agricultural lands, known as *kayalnilams,* enabled rice cultivation in places otherwise submerged by backwaters. The practice expanded significantly after 1865, when the princely state of Travancore encouraged land reclamation.

Remarkably, this centuries-old system continues today, supporting farming and wetland livelihoods in one of India's most unusual agricultural landscapes. In 2013, the United Nations Food and Agriculture Organization recognised the 'Kuttanad Below Sea Level Farming System' as a 'Globally Important Agricultural Heritage System'.

Wisdom Word Search

R	A	R	N	N	I	R	J	H	A	R	L	T	S
V	P	I	Q	K	I	K	S	A	N	G	O	A	H
P	K	T	U	D	O	S	F	K	L	P	W	R	O
A	H	U	A	W	A	O	A	L	L	O	J	U	B
L	U	C	M	R	X	W	Z	R	A	U	K	S	D
L	N	H	N	G	T	S	F	N	G	O	Q	H	O
O	A	A	G	A	A	Q	K	U	W	A	M	R	D
B	I	K	A	W	A	L	L	A	S	A	S	E	U
I	U	R	K	N	G	R	J	P	U	L	L	N	S
T	T	A	M	L	A	B	R	I	S	H	T	I	H
O	I	J	A	I	B	O	B	O	R	J	Y	O	A
O	S	C	N	Y	W	B	L	D	M	O	I	W	N
D	I	G	A	N	T	O	R	E	K	H	A	F	M

WORDS TO FIND
Amlabrishti, Digantorekha, Jaiboborjyo, Nisarga, Nirjhar, Pallobito, Rituchakra, Shobdodushan, Tarushreni

THE WISDOM LEXICON

AMLABRISHTI: Rainfall made unusually acidic by atmospheric pollutants.
DIGANTOREKHA: The line where the earth and sky appear to meet, symbolising vastness and distance.
JAIBOBORJYO: Waste from plants, animals, and other living organisms.
NISARGA: The natural world, especially when viewed through a poetic or aesthetic lens.
NIRJHAR: A waterfall or flowing mountain stream, frequently used as a poetic symbol of vitality and freedom.
PALLOBITO: Covered with fresh leaves or buds; suggestive of renewal and flourishing life.
RITUCHAKRA: The recurring cycle of seasons, a significant theme in nature poetry and classical literature.
SHOBDODUSHAN: Harmful or unwanted noise that disturbs humans and animals.
TARUSHRENI: A row or succession of trees, often evoking a picturesque landscape.

These terms come from Bengali, one of India's 22 Scheduled Languages.

Marvels of India

HASTIVANAS/NAGAVANAS



The *hastivanas/nagavanas* (elephant forests described in Kautilya's *Arthashastra*) were state-protected habitats that fused ecological foresight with administrative discipline.

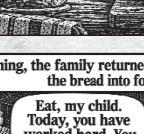
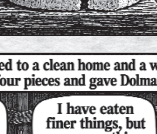
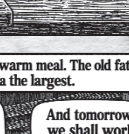
Protected Habitat Management
Kautilya directed kings to establish them on the kingdom's borders, often in mountains, riverine tracts, lakesides or marshlands. A designated superintendent (*nagavanadhyaksha*) and forest guards protected them, monitored their boundaries and prevented unauthorised killing or capture in them. He instructed officials to record every elephant and to punish anyone who burned a *hastivana* with death by fire.

Sustainability by Design
Because elephants had high military and ceremonial value, preserving their habitats became a state priority. Rulers mapped the *hastivanas* across the subcontinent based on the quality of elephants they produced. Forests in Kalinga, Karusha, Dasharna and the East produced the finest combat elephants. Forests in Anga, Malwa and the West produced elephants of lesser strength.
Scholars argue that this preservation and restoration model created *de facto* sanctuaries: large forest tracts remained intact, benefiting elephants alongside other flora and fauna.

Ashokan Ethical Extension
Emperor Ashoka's Pillar Edict V prohibits burning the *hastivanas* and protects animals in them.

Modern Relevance
By combining statecraft with conservation ethics, they anticipated today's elephant corridors.

QUIZ Environment & Sustainability

Questions	Option A	Option B	Option C	Option D
1 Which of these animals are recognised as water purifiers to maintain clean, potable water?				
2 Which of these trees are not known for purifying the air?	Banyan	Neem	Bael	Mango
3 Which of these plants can be used to counter soil pollution?	Cardamom	Mustard	Vanilla	Rosemary
4 Which medieval monarch composed the encyclopedic text 'Manasollasa' that contains chapters on animal care and veterinary medicine?	King Someshvara III	King Krishnadev-araya	King Mihira Bhoja	King Amogha-varsha I

Answers: 1 - B, 2 - D, 3 - B, 4 - A

didactic tale

The Spoilt Daughter

MORAL OF THE STORY: Love that shields us from every hardship may leave us helpless; true care prepares us to face life