Designing Sustainable Futures:
Insights from the
International Conference on

Indigenous Knowledge Systems and Practices

ANANT NATIONAL UNIVERSITY
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India's First DesignX University

International Conference on
Indigenous Knowledge Systems and Practices

Designing Sustainable Futures

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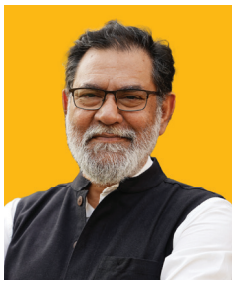

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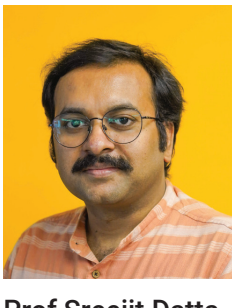


Prof Sreejit Datta

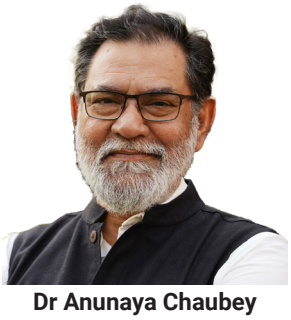
Prof Puneet Kumar

Foreword

In an era of pressing environmental challenges and societal inequities, revitalising Indigenous Knowledge Systems with modern practices can help emerge a vital pathway toward sustainable development. The International Conference on Indigenous Knowledge Systems and Practices: Designing Sustainable Futures, hosted by the Anant Centre for Indigenous Knowledge Systems and Practices at Anant National University, aims to bridge the gap between traditional wisdom and modern scientific-technological approaches.

Indigenous knowledge, cultivated over millennia and transmitted intergenerationally, embodies a profound understanding of ecological balance, resource management and community well-being. This conference seeks to emphasise the significance of the indigenous knowledge systems, which are often marginalised in the modern, mainly Western, discourse. There is considerable literature on “multiple modernities” – including “indigenous modernities” (Hosagrahar 2012) as well. By providing a platform for scholars, practitioners, and policymakers to engage in critical dialogues, we, at the Anant Centre for Indigenous Knowledge Systems and Practices, aim to explore how Indigenous Knowledge Systems and Practices can enrich innovative solutions to modern challenges.

Gathering across diverse backgrounds and disciplines, our collective efforts in this conference will focus on fostering interdisciplinary collaborations that respect and amplify the voices of Indigenous/local communities. Thus, the present initiative is not merely an academic exercise; it is a commitment to recognising the invaluable contributions of Indigenous knowledge systems and practices in shaping a sustainable future for all. Together, we aim to arrive at actionable strategies that honour the past while paving the way for a more equitable and resilient world.



Dr Anunaya Chaubey

Provost,
Anant National University

Message from The Provost

The need for sustainable solutions is more pressing in today's rapidly changing world, shaped by climate challenges and social and economic instabilities. Integrating indigenous knowledge systems and practices is one of the most promising approaches to designing innovative solutions. Rooted in centuries of experience and passed through generations, indigenous knowledge offers profound insights into ecological balance, resource management and community well-being. However, these knowledge systems are often overlooked in contemporary discourse. International Conference on Indigenous Knowledge Systems and Practices: Designing Sustainable Futures is Anant's initiative to bridge this gap and bring scholars, practitioners and policymakers to one platform to engage in critical conversations on how indigenous knowledge can complement modern technological advancements. By bringing the brightest minds working in the field of sustainability and safeguarding Indigenous knowledge, we aim to foster a deeper understanding of the interconnectedness between Indigenous and contemporary practices, ultimately contributing to a more sustainable and equitable future.

This book is a testament to that effort—a collective repository of knowledge, bringing together insights from experts at Anant and worldwide. It serves as both a reference and a catalyst for deeper discussions on sustainability, offering valuable perspectives for researchers, practitioners and anyone passionate about this critical subject. As we move forward, we continue to embrace our role as solutionaries , preparing and empowering the next generation of problem solvers while keeping design thinking, Indigenous knowledge systems and community impact at the heart of our curriculum.

Dr Rajendra Singh

Professor of Practice, Community Practice and Environment Design and Director, Anant Centre for Indigenous Knowledge Systems and Practices, Anant National University, Ahmedabad, India

Message from Dr Rajendra Singh

The International Conference on Indigenous Knowledge Systems and Practices: Designing Sustainable Futures, led by the Centre for Indigenous Knowledge Systems and Practices, brings together Indigenous knowledge practitioners and wisdom keepers worldwide so that people can benefit from the vast knowledge they bring with them. The conference also invites the KIVA Family members, who have been practising and conserving Indigenous knowledge for over 3,000 years. It's a significant event where masters of Indigenous knowledge from varied backgrounds and communities will converge under one roof, something that happens only rarely. It's an equally significant opportunity for the students and faculty of Anant National University to interact and engage with these people and understand why it is essential to conserve local knowledge and integrate it into contemporary practices. I am sure that this conference will pave the way for modern educators to approach teaching in a completely new way by taking a leaf from the knowledge of these wisdom keepers. The conference aims to strike a global dialogue between the knowledge keepers and modern educators to understand why it is important to continue nurturing the knowledge humans have gained over centuries and pass it on to the next generation.

This book, thus, becomes an important addition to the conference as it serves as a repository of insights and abstracts from experts from diverse fields who emphasise how integrating Indigenous knowledge into contemporary practices can make a lasting impact on the world battling with environmental and climate crises.

Concept Note

Introduction:

The International Conference on Indigenous Knowledge Systems and Practices: Designing Sustainable Futures represents a pivotal initiative aimed at integrating Indigenous knowledge with modern scientific approaches. Scheduled for February 21-23, 2025, at Anant National University in Ahmedabad, India, this conference seeks to address the urgent need for sustainable solutions amidst escalating environmental crises and social disparities.

Background:

The Anant Centre for Indigenous Knowledge Systems and Practices was established under the leadership of Dr Anunaya Chaubey and Dr Rajendra Singh to systematically document and preserve India's rich indigenous knowledge. This initiative focuses on various domains including traditional architecture (Bhavan Nirman), agriculture, water conservation, and cultural practices. By mapping both existing knowledge systems and those at risk of extinction, the Centre aims to safeguard invaluable traditions while integrating them into modern discourse.

Objectives:

The overarching aim of this international conference is to explore the integration of Indigenous Knowledge Systems and Practices with modern approaches to sustainability.

The main objectives include:

1. Exploring Indigenous Knowledge Systems: Understanding disciplines and practices that promote sustainability, conservation, and climate resilience.
2. Fostering Dialogue: Encouraging discussions between Indigenous wisdom, academia and technology-driven industry to design sustainable solutions for the future.
3. Collaborative Research and Documentation: Promoting interdisciplinary collaboration among researchers, communities, and policymakers.
4. Inclusive Development: Including and elevating marginalized voices within sustainability discourse and ensuring equitable recognition of their contributions.

Themes:

The conference will delve into several key themes:

- Integrating Indigenous and Modern Knowledge Systems
- Indigenous and Western notions of intellectual property
- Indigenous Knowledge in Food and Health Systems
- Indigenous Water Management and Agricultural Practices
- Climate Resilience: Adaptation and Mitigation
- Sacred Landscapes and Cultural Restoration
- Traditions and models of the built environment
- Technology Meets Tradition in Architecture and Design
- Policy Integration for Sustainability

Participation in this international conference offers participants an opportunity to:

- Connect with leading experts in the field of indigenous knowledge systems and practices.
- Network with like-minded individuals globally and learn from their local experiences.
- Gain insights into practical approaches to incorporating indigenous knowledge systems and practices into modern approaches of problem-solving.
- Contribute to a rich and transformative discourse shaping the future of sustainability and inclusivity.

We're currently standing at a crossroads in our global journey towards sustainability. This conference serves as a critical platform for dialogue and action. We hope to forge pathways toward a more equitable and sustainable future by integrating Indigenous Knowledge Systems with modern practices. We invite scholars, practitioners, policymakers, and community leaders to join us in this essential conversation.

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Experts on Indigenous Knowledge Systems and Practices: Perspectives and Interventions

Historical Evolution of Indigenous Knowledge Systems and Practices

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Indigenous/local/traditional/folk/community knowledge stands defined as knowledge that is geographically and/or culturally context-specific, holistic, dynamic, unorganised and adaptive. Indigenous knowledge is a network of knowledge, beliefs and traditions intended to preserve, communicate, and contextualise Indigenous relationships with their culture and landscape over time. It has been transmitted through oral traditions and narratives woven into the ordinary practices of daily existence.

The origins of Indigenous Knowledge Systems and Practices (IKSP) can be traced back to the earliest human civilisations. Across continents, indigenous communities developed sophisticated methods of agriculture, water conservation, medicine and architecture long before formal scientific methodologies emerged. For Example, in Africa, communities like the Maasai and the San people mastered rotational grazing, a method that ensures sustainable use of grasslands and prevents overgrazing. In the Americas, the Maya, Inca and other indigenous groups engineered complex irrigation and terracing techniques that maximised agricultural productivity while maintaining soil health. Similarly, in Asia, traditional rice cultivation in the paddy fields of India, China and Japan demonstrated an intricate understanding of hydrology, soil fertility and ecological balance. IKSP have been integral to human societies for millennia, shaping how communities interact with their environment, sustain their livelihoods and preserve cultural heritage. Unlike modern scientific knowledge, which often emphasises compartmentalised and specialised learnings, IKSPs are holistic and deeply intertwined with local ecosystems. Indigenous Knowledge Systems (IKS) are fundamentally rooted in the understanding that human beings are an integral part of nature rather than separate from or dominant over it. This perspective is deeply reflected in the spiritual and cultural expressions of communities that have safeguarded these knowledge systems for generations. The central principle of interdependence acknowledges that while humans can utilise nature's resources for their sustenance, they must also take responsibility for ensuring its regeneration and balance.

This entails using resources mindfully, respecting natural cycles and prioritising sustainability over exploitation. Furthermore, IKS upholds the belief that non-human beings—animals, plants, rivers and ecosystems—possess intrinsic value and an equal right to exist. Human interactions with nature, therefore, must be guided by reverence, respect and coexistence, fostering a relationship that is not extractive but mutually sustaining.

Throughout the world, Indigenous knowledge systems were marginalised primarily through the process of colonisation, where Western cultural dominance and the imposition of "modern" practices often viewed Indigenous knowledge as primitive, backward or superstitious, leading to its systematic devaluation, suppression and lack of recognition in formal education systems and policy-making, resulting in the erosion of traditional practices and knowledge transmission across generations.

Indigenous knowledge was deliberately erased from formal education and policy-making. The introduction of industrial farming, large-scale dam projects and Western medicinal practices further contributed to the devaluation of indigenous wisdom.

In the 75 years following Independence, India has also prioritised scientific and industrial advancements to drive modernisation. However, these developments have faced considerable criticism on multiple fronts. Concerns have been raised about environmental degradation, the excessive exploitation of natural resources, and the failure of these advancements to benefit the majority of the population. In response, some critics have sought alternative approaches, drawing from ancestral knowledge systems that communities have relied upon for generations—encompassing agriculture, textiles, architecture and water management. These knowledge traditions, often labelled as 'traditional' and 'tribal', were largely dismissed by modern scientific discourse, which deemed all prior knowledge systems obsolete. As a result, indigenous knowledge was pushed to the margins, occupying the lowest tier in the hierarchy of knowledge. When acknowledged at all—such as in the case of AYUSH medical systems—these traditions were expected to conform to modern scientific frameworks, effectively transforming them into replicas of biomedicine rather than preserving their distinct methodologies and philosophies.

From community control of common property resources to State's supremacy, the shift has caused the neglect of the knowledge practices of the traditional communities in areas like agriculture, textiles, architecture, etc. In the same manner, the indigenous wisdom of water management and usage has been ignored. In their work, Dying Wisdom: Rise, Fall and Potential of India's Traditional Water Harvesting Systems, Indian environmentalists Anil Aggarwal and Sunita Narain have attempted the impossible task of documenting the traditional water harvesting practices in the different geographical locations in India. From Kundis and Johads in Rajasthan, Haveli system in Madhya Pradesh, Maldharis system in Gujarat, Phad system in Maharashtra, Eris in Tamil Nadu, Guhls in Uttarakhand and Kuhls in Himachal, the book attained the status of a classic work in its domain. It has been pointed out that traditional knowledge did not fail to provide water even in the regions of scariest Rainfalls.

In the last few decades, there has been a resurgence of interest in IKSP, driven by growing concerns over environmental degradation, climate change and the limitations of Western scientific approaches. The researchers and policymakers have begun to acknowledge that Indigenous communities have long practised sustainability, often in ways that modern science is only now beginning to understand. These knowledge systems offer practical solutions and promote an alternative worldview in contrast to the industrial model's extractive approach - implementing such solutions requires significant transformations in knowledge of production, consumption and distribution of resources.

The revitalisation of indigenous knowledge with modern scientific approaches holds immense potential for addressing the environmental crisis. While scientific advancements offer precision and scalability, indigenous knowledge provides a holistic, long-term perspective rooted in sustainability and coexistence. Collaborative efforts between scientists, policymakers and indigenous leaders can pave the way for innovative solutions that respect both traditional wisdom and contemporary needs. Recognising and preserving IKSP is not just an ethical obligation but also a necessity for a sustainable future. By bridging the gap between tradition and modernity, humanity can harness the best of both worlds to build resilient societies that honour the past while securing the future.

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Ayurveda from the Colonial to the Contemporary: Knowledge System, Pharmaceuticals and Wellness

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The argument about Ayurveda's transformation

By now, Ayurveda is a medical knowledge system that is widely known, discussed, used, and even accepted in many places. When I began my research on it 35 plus years ago, this was not the case. While it was used by a large number of people in India and other parts of South Asia, the opinion-making class was then very much enamoured of biomedicine, or allopathy as we call it—and thought of the AYUSH systems as best forgotten. Very significant transformations in these knowledge systems had been taking place since the colonial period, however. Transformations were in the educational institutions, pedagogy, actual practice, and most of all, in the making of their medicines that had gone into manufacture. Each of them had been influenced deeply by and adapted to the systems created by modernity, yet had made efforts to retain their autonomy and distinctiveness. This battle continues till date and to my mind, is a fascinating one, providing very important insights into understanding the transformation of many like knowledge systems and also nudging their future directions. Ayurveda's proud claims to a global identity is to be both celebrated and understood with caution.

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The current practice of Ayurveda

Ayurveda is practised at many different levels—by traditionally and institutionally trained vaidyas catering to small populations in both rural and urban areas, by those in formal and informal spaces, and in government and private organisations. New kinds of institutions of practice have also evolved – apart from core clinics and hospitals that provide dedicated Ayurvedic treatment for illness, new spaces aiming to provide systems for wellness, are a new phenomenon over the years that I have been studying it. There is great variety in the latter, ranging from mechanical appropriation of the treatments for monetary benefits to those genuinely committed to holistic care. The most visible part of

Ayurveda has been the pharmaceutical companies manufacturing Ayurvedic medicines – both classical and proprietary-- and making them accessible as both 'over the counter' medicines for the public and also through 'ethical promotion' with allopathic doctors. The not so visible part of Ayurveda is the systematic, painstaking and rigorous 'scientific' research undertaken by those trained in both text and practice of Ayurveda and biomedicine. These researchers have studied the composition of complex drugs and sought to explain their expected action, the logic of the methods of treatment and the manner in which this knowledge system adapts to the contemporary. For this, not only had they to master both knowledge systems, but also to painstakingly offer a 'translation' of conceptual and epistemological categories between them—thereby offering a way out of the clash between the 'traditional' and 'modern' knowledge systems that so vexes much of the world. This form of translation has responded to the queries of scientists, and given a voice to the practitioners, helping them to overcome their antagonism to each other. And this work has been published in the best peer-reviewed 'scientific' journals of repute, internationally. This last contribution suffers from a great injustice, however, it has neither been sufficiently recognised, nor supported so that it can go further. Pharmaceutical companies making profit from huge sales are seen as the leaders of the sector, in the current frame of development, where capital gains are valued over all else. If the support to committed and capable researchers in Ayurveda is extended, the rewards to the knowledge system will be much greater in quantum today and in the long run.

Ayurveda's evolution through its encounter with modernindustry/knowledge practices

Modern pharmaceuticals in the form of pills, powders and tonics came to India with the colonial state and because of the support they received, acquired legitimate dominance in society. Ayurveda and other medical knowledge systems, that had been the mainstay of healthcare until then, suffered that dominance, but also learned from it. One of the lessons was to replicate two major institutions of biomedicine, which were the mass manufacture of medicines making them readily available, and the other was that of modern institutions and methods of learning. Each of these processes have been widely documented and written about over the last four decades that the interest in these knowledge systems has grown.

Ayurveda's potential for a sustainable future

Good practices of Ayurveda, whether in pharma or institutional care, has acquired an association with being expensive. The reason for this is that when the purity of medicine or practice, when sought to be achieved through typical modern methods of production (companies) or provision (treatment clinics), is going to be expensive. These methods require huge capital investments, and running costs. Ayurveda on the other hand, was meant to emerge from the daily lives of people, a part and parcel of what they ate, where they lived and what work they did—and meant to help them achieve a balance between all of this. When practised where everyday life is, then it is sustainable. This does not mean that we have to 'go back' to the way of life from which Ayurveda emerged. The beauty of many of these systems is their adaptability. So, if people work in cities and live in flats, the balance they need will have to come from creating better management of food and medicines—systems of local produce that can provide both—than assuming that both will come in packaged form manufactured in huge companies far away. Either of the latter are not sustainable, we know that by now. So, decentralisation of production, involving more people, less machines and catering to a local space, would be key. This requires out of the box thinking in politics, economics and knowledge, together in society.

The methods and sources used to study Ayurveda

I have held extensive discussions with different kinds of practitioners at all levels, across the country. I have also studied companies in detail—from manufacture to marketing. I have also studied non-governmental and civil society organisations working on health, that have creatively used and adapted Ayurveda for community health objectives.

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Stepwells as Disaster-Resilient Infrastructure: Lessons from Gujarat

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Abstract

Stepwells, or vavs, are an ancient water management system designed to provide year-round water access in arid regions like Gujarat. While primarily constructed for water conservation, stepwells have demonstrated resilience to climate extremes, serving as drought mitigation systems. However, their structural vulnerability to earthquakes, particularly evident during the Bhuj Earthquake (2001), has raised concerns regarding their role in disaster-resilient infrastructure.

This write-up examines the traditional knowledge system of stepwells and their current practice in Gujarat; the impact of the Bhuj Earthquake (2001) on stepwells and their structural vulnerabilities; the evolution of stepwells in disaster resilience planning and Restoration efforts post-Bhuj Earthquake and lessons for sustainable infrastructure.

Key Words: *Disaster, Resilience, Climate, Water, Earthquake, Structural Safety*

Gujarat, with over 669 identified stepwells, is home to some of the most intricate and historically significant water conservation structures. Many of these wells were built to withstand droughts and extreme climatic conditions. Their deep and enclosed architecture reduces evaporation, making them an efficient water storage system. Additionally, their location-based water recharge capabilities make them valuable for groundwater management.

However, despite their resilience against climate extremes, their structural integrity under seismic activity has been less explored until recent disasters, particularly the Bhuj Earthquake (2001).
The Impact of the Bhuj Earthquake (2001) on Stepwells

The Bhuj Earthquake (2001) (Magnitude 6.9) severely affected Kachchh district and surrounding regions, causing widespread damage to civil structures, including stepwells. Some of the major consequences included:

The Impact of the Bhuj Earthquake (2001) on Stepwells
The Bhuj Earthquake (2001) (Magnitude 6.9) severely affected Kachchh district and surrounding regions, causing widespread damage to civil structures, including stepwells. Some of the major consequences included:

1. Structural Failures
   - Cracks in stepwell walls, leading to loss of water retention ability.
   - Collapse of decorative elements such as archways and columns in heritage sites like Rani ki Vav.
   - Damage to load-bearing stone slabs, making access to water unsafe.
2. Water Contamination and Loss of Functionality
   - Due to structural collapse, debris-filled stepwells became unusable for

water storage.
• Some stepwells experienced water leakage due to fissures, reducing their effectiveness in water conservation.
3. Historical Stepwells Affected
• Dada Harir Vav (Ahmedabad): Reported minor structural damage.
• Adalaj Stepwell (Gandhinagar): Cracks in pillars led to restoration efforts in subsequent years.
• Stepwells in Bhuj and Kachchh: Several unnamed stepwells were filled with debris and abandoned.

The earthquake highlighted that while stepwells excel in water resilience, their structural vulnerability to seismic activity needs to be addressed.

Evolution of Stepwells in Disaster-Resilient Infrastructure

Following the earthquake, disaster resilience strategies began incorporating stepwells in a hybrid approach—balancing their historical importance with modern engineering solutions.

1. Structural Reinforcement for Earthquake Resistance
- Retrofitting damaged stepwells using mortar injection techniques to fill cracks.
- Reinforcing load-bearing stone slabs with modern steel supports.
- Seismic-resistant designs in restoration projects (e.g., Jal-Mandir stepwell initiative in Gujarat).

2. Stepwells as Emergency Water Reserves
- Recognizing stepwells as emergency water sources in urban disaster resilience plans.
- Using stepwells as alternative water supply sources during post-earthquake rehabilitation efforts.

3. Integration with Climate Adaptation and Flood Mitigation
- Stepwells have been included in urban flood mitigation strategies as temporary water storage reservoirs.
- Ahmedabad and Gandhinagar have undertaken projects to restore ten stepwells as part of climate resilience initiatives.

Restoration Efforts and Lessons from Gujarat

The post-2001 restoration efforts focused on preserving stepwells while enhancing their structural resilience. The Gujarat government launched the “Jal-Mandir” initiative (2007-08) to restore 40 stepwells.

Key Restoration Projects:
- Rani ki Vav (Patan) – Strengthened with new masonry reinforcements; UNESCO recognized in 2014.
- Adalaj Stepwell – Retrofitted for seismic stability and repurposed as a cultural tourism site.
- Junagadh Uparkot Stepwell – Cleared of debris and integrated into disaster-preparedness programs.

Lessons Learned:

1. Retrofitting heritage structures with seismic resilience measures is crucial to preserving them for future use.
2. Stepwells can be repurposed as emergency water reserves, enhancing disaster risk reduction strategies.
3. Community engagement is key—locals should be involved in stepwell maintenance and disaster preparedness planning.
4. Policy inclusion – Stepwells should be formally included in national and state

disaster resilience strategies.

Future Potential: Stepwells as a Sustainable Disaster-Resilient Infrastructure

In light of climate change and increasing disasters, stepwells can play a crucial role in disaster preparedness:

1.Multi-Hazard Resilience
- Stepwells can store water during droughts and act as flood mitigation reservoirs.
- Hybrid models—blending traditional knowledge with modern engineering—can make stepwells earthquake-resistant.

2.Decentralised Water Storage for Urban Resilience
- Gujarat's rapid urbanisation demands localised, sustainable water solutions.
- Stepwells integrated with rainwater harvesting systems can supplement urban water supply.

3.Tourism and Cultural Revival for Economic Sustainability
- Stepwell tourism (e.g., Ahmedabad & Patan) generates revenue, ensuring long-term maintenance.
- Heritage-based water conservation can support local economies.

Strategy for Seismic Hazard Analysis and Resilience of Stepwells in Gujarat

1. Seismic Hazard Analysis Framework

1.1. Seismic Risk Assessment of Stepwells
- Historical Seismic Data Collection
- Identify past earthquakes affecting Gujarat, particularly the Bhuj Earthquake (2001)
- Analyse ground motion records and intensity maps near stepwell locations (Gujarat Institute of Disaster Management, 2023).
- Structural Vulnerability Assessment
- Conduct geotechnical and structural studies to assess material integrity (Rana et al., 2021).
- Use ground-penetrating radar (GPR) and LiDAR scanning to detect cracks and subsurface instability (Singh & Patel, 2020).
- Identify seismic weak points such as unsupported spans, deteriorated stone slabs and foundation shifts (UNESCO, 2019).
- Geospatial Mapping of Stepwells in Seismic Zones
- Use GIS-based mapping to identify high-risk stepwells (Bureau of Indian Standards, 2022).
- Categorise stepwells into low, moderate and high-risk zones based on their structural and locational vulnerability (Mehta & Joshi, 2018).

1.2. Seismic Simulation and Load Analysis
- Finite Element Analysis (FEA) to simulate earthquake forces on stepwells (Desai et al., 2021).
- Shake table tests for scaled models of representative stepwells (Patel & Shah, 2017).
- Non-linear time-history analysis to assess dynamic response (Rao & Srinivasan, 2019).

2. Resilience Framework for Stepwells Against Earthquakes

2.1. Structural Strengthening and Retrofitting
- Stone and Masonry Reinforcement
- Injection of lime-based or polymer grouts to strengthen cracked masonry Stitching with stainless steel dowels and bars to prevent collapse (Jain et al., 2022).
- Strengthening of load-bearing slabs with micro-concrete jacketing (UNESCO, 2019).
- Foundation Stabilisation
- Use deep soil grouting or micropiling where the foundation has shifted (Singh

& Patel, 2020).
- Improve soil stability around stepwells through geo-textile reinforcements (Rana et al., 2021).
- Seismic Isolation and Energy Dissipation Techniques
- Introduce shock-absorbing base isolators in restored structures (Mehta & Joshi, 2018).
- Use fiber-reinforced polymer (FRP) wrapping to increase earthquake resistance (Desai et al., 2021).

2.2. Disaster Risk Reduction and Emergency Preparedness
- Early Warning and Monitoring System
- Install seismic sensors in and around stepwells to monitor structural response (Gujarat Institute of Disaster Management, 2023).
- Use IoT-based smart monitoring systems to detect early signs of stress (Patel & Shah, 2017).
- Community Awareness and Involvement
- Conduct training programmes for local communities on disaster preparedness (Rao & Srinivasan, 2019).
- Establish a "Stepwell Protection and Response Task Force" involving heritage conservationists and disaster management experts (UNESCO, 2019).
- Stepwells as Emergency Water Reserves
- Include stepwells in urban disaster resilience plans as emergency water sources (Mehta & Joshi, 2018).
- Implement controlled rainwater harvesting to maintain water levels (Jain et al., 2022).

2.3. Policy Integration and Future Planning
- Inclusion in Seismic Codes and Guidelines
- Update the Indian seismic building codes (IS 1893, IS 4326) to include heritage stepwell retrofitting (Bureau of Indian Standards, 2022).
- Implement a Stepwell Conservation and Seismic Safety Act in Gujarat
- Heritage and Tourism-Based Resilience Strategy
- Develop tourism-led conservation funding for stepwell restoration (Singh & Patel, 2020).
- Promote sustainable tourism models where restored stepwells serve dual purposes—cultural heritage and disaster resilience (Desai et al., 2021).

Conclusion

The Bhuj Earthquake (2001) exposed both the strengths and weaknesses of stepwells. While they proved invaluable for water resilience, their structural vulnerability demands modern seismic retrofitting. Post-earthquake restoration efforts in Gujarat have set a benchmark for integrating stepwells into disaster resilience strategies.

Moving forward, stepwells should be reimagined as multi-functional disaster-resilient infrastructure, blending traditional wisdom with modern engineering. Their inclusion in urban disaster resilience plans can enhance water security, reduce flood risks and preserve cultural heritage, making them a model for sustainable infrastructure in the 21st century.

The proposed framework integrates scientific seismic assessment, engineering interventions, community engagement and policy initiatives to enhance the earthquake resilience of Gujarat's stepwells. By blending traditional wisdom with modern technology, stepwells can be transformed into disaster-resilient infrastructure, ensuring their longevity and functional utility for future generations.

Jhum: An Indigenous Knowledge System of Agri Practice in Arunachal Pradesh

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The traditional agriculture practices in Arunachal Pradesh (AP) are fascinating. The state, nestled in the foothills of the Himalayas in Northeast India, was called Terra Incognita or No Man's Land till the beginning of the 20th Century. It is one of the 25 biodiversity hotspots in the world with an 83,743 sq km area (98% land, 2% water, 69% of the area is covered by forests), having an international border stretched over 1,680 km and internal border of 859 km, inhabited by 26 major and 110 sub-tribes inhabiting 15,80,000 people (2024).

Jhum is a mode of cultivation, a process of growing crops by clearing the land of trees and vegetation and burning them thereafter. This practice has been prevalent for centuries. After a few cycles, the burnt soil loses fertility, resulting in barren land, which is in sheer conflict with the sustainable development approach. The people maintain an intrinsic symbiotic relationship with the forest from the cradle to the coffin. The attribute is anthropogenic. They practice this due to the scarcity of plain land and the state's weak industrial and infrastructural status. This is not only particular to AP but also a basic characteristic of the entire northeast region (NER). It is estimated that more than 6 lakh tribal families in NER, Odisha, Andhra Pradesh and Himachal Pradesh practice jhum cultivation continuously (IGNOU).

The jhum practice varies from tribe to tribe, but its essential characteristics are similar. The more significant issue contributing to ills is that women were valued in such a labour-intensive jhum economy for production and reproduction. Akas, Mijis, Nyishis, Adis and Singphus tribes depended on slaves, similar to the number of wives, indirectly encouraging polygamy. Galo employs other locals on payments. Not all tribes practice this. Monpa, Sherdukpens, Apatani and Khampti (tribes) do not do jhum cultivation, and they practice monogamy. Monpa gather leaves of oak (Parmong) trees, which help in water retention and produce compost for agriculture. The sustainable mountain paddy-fish farming of the Apatani tribes is again a great example. This system is also found in China, Japan, Indonesia, the Philippines, Vietnam, Malaysia, Thailand and Myanmar.

The study is important due to the alarming rate of species extinction (about 2 species per day) in the age of climate change. Deforestation is one of the world's most pressing problems, jhum adds to it.

To describe the tribal way of life, Borang said they believe in Forest Gods or devils. Out of fear of these Gods or devils, they do not destroy forests unnecessarily. As their lifestyle revolves around the forest, no other person understands and loves the forest as a tribal. The Shukla Commission Report, 1997, on transforming the NER says that hill farming in the region is mainly under jhum. This form of farming is becoming less productive with a shrinking jhum cycle and has caused erosion and forest regression in some areas. Not all jhumia resettlement schemes have worked well, nor can jhum be ended simultaneously. The problem must be handled sensitively as jhum cultivation is also a way of life.

The Government of India's efforts mainly aimed at integrating the territory into

the mainstream of national consciousness and economic development. In the course of shifting cultivation and other developmental activities, remarkable varieties of flora and fauna are disappearing to such an extent that it has become an almost irreversible loss of forests and other natural resources. Several plant and animal species have become extinct or come under rare, threatened or endangered categories.

AP falls in the Himalayan region and functions as the earth's lungs. It is a natural habitat of more than 20,000 identified species of medicinal plants, yet many remain unidentified. Over 500 medicinal plants are recorded from the state, of which 250 are used in various Ayurvedic formulations. More than 80% of the world's medicinal flora is found in the Himalayan range of India. There are more than 5,000 species of flowering plants, 550 species of orchids, 91 species of bamboo and 18 species of canes. The state is the habitat of as many as 55 major mammalian species, of which 17 are rare or extremely rare. The rivers mark the distributional boundaries of certain species. Wildfire in the state is mainly spread by jhum burning, which usually engulfs the nearby bamboo garden and elephant grasses, adding to pollution and global warming.

Borang recorded that the tribes prefer hilly areas because they think plain areas are more prone to epidemics. Jhum pattern in the state is not nomadic but confined to a unique jhum site. Also, as the cycle of the main jhum is always maintained from 8 to 15 years, it has sufficient time to regenerate the forests in the fallow areas - an ecologically balanced sub-tropical environment. To him, the ten-year jhum cycle of PS Ramakrishnan is ecologically and economically viable.

Among India's 100 most climate-sensitive districts, 16 are in NER, of which 2 are in AP. In the long run, jhum destroys the ecosystem balance, as one inch of soil formation in nature takes about 1,000 years.

The ICAR evolved into a 3-tier hill farming package that combined forestry, horticulture or tree farming with terrace cultivation as one moved down the hill. Jhum improvement can be carried further through appropriate R&D. Nagaland has pioneered an excellent method of upgrading jhum by interposing a strong and increasing component of agro-forestry through assisted tree planting of selected fast-growing economic timber.

For the tribal community, jhum cultivation is a way of life, and we need to advance a passionate treatment for its abolition. Banning of jhum should be a deliberate choice, and reform should be from within. The first commercial tea estate in AP was the Donyi Polo Tea Estate. It contributed to reducing jhum, improving ecology, and improving domestic markets and exports. We must look at the forest as a source of minor forest products like herbs, medicinal plants, eatables, etc. Bamboo is found at high altitudes in AP, and the bamboo-based industry has high prospects. Apiculture contributes to crop productivity and has potential. The well-being of any community depends on the womenfolk. There are many taboos and myths, and the prevalence of polygamy needs to be removed as they are devoid of equal political and property rights.

In India, hills and Hillmans are essential and integral to the nation. All human races are bound to go through transition - adjustment of policies and legal settings become inadvertent. However, as we believe in the anthropogenic development model, no law should hurt various human folk's ethos, tradition and culture. This is more relevant when it is about the tribals, who are more sensitive. One of the five fundamental principles of Nehruvian Panchsheel is that tribal rights in land and forest should be respected. A hurried push of jhum may be injuring the tribal community system. Perhaps the appropriate option will be to replace jhum gradually with viable alternatives. We must work hard to regenerate jhum land.

What Does Indigeneity Mean in the Indian Intellectual Traditions?

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Cultural subjection is ordinarily of an unconscious character, and it implies slavery from the very start. When I speak of cultural subjection, I do not mean the assimilation of an alien culture. That assimilation need not be evil; it may be positively necessary for healthy progress, and in any case, it does not mean a lapse of freedom. There is cultural subjection only when one's traditional cast of ideas and sentiments is superseded without comparison or competition by a new cast representing an alien culture which possesses one like a ghost.

– KC Bhattacharyya, "Swaraj in Ideas" (c. 1928)

What does the term 'Indigenous' mean in the context of Indian intellectual traditions? No matter what culture or region of the world we bring under consideration, there can be no practical meaning in the word 'Indigenous' unless a degree of mental sovereignty is enjoyed by the culture that uses that category to describe itself or others in relation to a given location. There is contained in the term the sense of being 'native' to a particular region – as in 'native American', 'native African', 'native Australian' and so on. However, the very fact that these terms have come to be regarded as derogatory in the former European colonies makes it necessary to think up a new qualifier like 'Indigenous'. This approach obviously presumes that a new categorisation by means of freshly minted coinages can purge a community of its stigma of being dehumanised at the hands of its former colonisers. Perhaps, to a certain extent, it can.

However, the situation gets more complex in regions like North America, Southern Africa and Australia, where the colonisers have settled and have been cohabiting with the 'natives' for centuries. In such cases, questions of belonging, ownership, attachment to land, etc., become intertwined with the question of ethno-cultural and/or ethno-religious identities. Indigeneity, then, no longer remains a binary category amenable to a simple analysis of 'natives' and 'immigrants' – it assumes the position of a problem with a more complex challenge, that of discerning the fundamentals of a dynamic cultural process. Frequently, one finds that in such processes, contesting cultures vie with each other for dominance; they engage with each other and interact through multiple modes of exchange and assimilate one another – sometimes willingly, but often unwillingly.

When it comes to the Indian intellectual traditions, the term 'indigenous' brings to one's mind the socio-cultural, political, economic, artistic, philosophical and spiritual modes of thought and practice native to the Indian Subcontinent. In the Arthaśāstra, Kauṭilya presents a neat fourfold categorisation of these modes of thinking and doing: Trayī (religio-spiritual), Vārtā (commercial-agricultural), Ānvīkṣikī (analytical-philosophical) and Daṇḍanīti (political-juridical). This fourfold categorisation has been broadly followed by classical Indian thinkers who came after Kauṭilya. These modes of thought and practice have developed organically in the Indian subcontinent and have a distinct imprint of the Indic ethos on each of them. They have evolved into their present form over millennia through exchange, competition and assimilation. What is meant by assimilation here? In the philosophical

framework of KC Bhattacharyya (1875 – 1949), who is celebrated as the most formidable academic philosopher that colonial India has ever produced, autonomy of conscience is key to understanding and interpreting elusive concepts like 'Indigeneity' and 'Assimilation'. Bhattacharyya defines cultural assimilation as a process in which a culture willingly adopts another culture's expressions and symbols that articulate its own ideas and ideals better. The two crucial features of this definition are: a) wilful adoption of expressions/tropes/symbols from an outsider's culture, and b) a necessary equivalence or parallelism of ideas/ideals between the two cultures as a basis of such adoption. Autonomy is retained through a culture's willing participation in the process and ability to consciously discern the equivalence of its own ideas/ideals in another culture.

Accordingly, in the context of the long-standing traditions of Indian intellectual pursuits, indigeneity will become meaningful when Indian intellectuals maintain their mental sovereignty – 'Swaraj in Ideas' in Bhattacharyya's words – while interacting with the intellectual traditions of other cultures, such as that of the West. This requires, first and foremost, a thorough familiarity with the Indian intellectual traditions (broadly defined as the fourfold division viz., Trayī, Vārtā, Ānvīkṣikī and Daṇḍanīti). Secondly, this requires an independent critical apparatus, which consists of the principal conclusions of these Indic modes of thinking and acting, and which, at the same time, is capable of consciously assimilating another culture's expressions/tropes/symbols, albeit after processing them through due critical comparison and competition, as and when they better enunciate and accelerate Indic ideas and ideals.

Without such familiarity and critical autonomy, indigeneity can hardly be conceived in the intellectual pursuits of today's India. This is especially the case in India because, unlike many other regions of the world, some major systems and traditions that comprise this indigeneity in Indian intellectual culture are not only alive to this day but are also what can be described as 'mainstream'. Several popular techniques of mathematical calculation in arithmetic, algebra and geometry are case in point. Young students regularly learn these techniques of calculation in the primary and secondary levels of school education in India, often remaining unaware of the origins of these techniques in the Indian intellectual traditions, especially in the indigenous disciplines of Kalpa and Jyotiṣa, two of the six Vedāṅga-s. This ignorance is not without consequence. It generates in young Indian students a lack of a sense of belonging in their indigenous cultural ethos, which often ultimately results in a positive disdain for the home culture.

Thus, it is primarily a challenge for Indian educators, and Indian intellectuals in general, to be able to maintain mental sovereignty as described above and make sure that India's indigenous modes of thought and practice are not allowed to subside and sink below the conscious level of contemporary Indian culture. That will not only ensure the preservation and continuity of a wide range of thought, beliefs, practices and knowledge systems indigenous to the Indian Subcontinent, all deeply rooted in the historical and social fabric of India, it will also – and perhaps more importantly – guarantee the freedom of Indians in navigating both the cultural and the political spheres in today's competitive, ever-changing and volatile world.

Craft-Centric Learning: Integrating Indigenous Indian Knowledge Systems for Design Education

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The National Education Policy (NEP) 2020 stands out as a bold and significant reform in the Indian education landscape. One of the key objectives of the NEP 2020 is to usher in a renaissance of the storied Indian Indigenous Knowledge System (IKS) by revitalising it and integrating it into various existing curricula, with special emphasis on skill-based learning. While most current IKS revitalisation efforts tend to focus on linguistic and textual studies, there is a need to acknowledge the broader role it plays in the Indian educational substratum. This includes but is not limited to, art and craft practices, environmental conservation and construction. Students being introduced to and instructed in these knowledge systems can effectively develop soft skills such as critical thinking and empathy, as well as entrepreneurial and vocational skills. However, the danger of tokenisation must be considered, wherein the IKS practices will simply be added to the curricula as extracurricular activities without meaningful integration, adaptation and innovation for modern markets. Hence, we must bridge the gap between traditional education practices and modern economic practices and revitalise IKS practices.

Is the chisel mightier than the pen?

The Indian knowledge system of arts and crafts encompasses a vast variety of practices and cultures. Beginning as a means for our ancient ancestors to produce tools and products for day-to-day use, these processes were traditionally passed down through generations in artisan families, communities or guilds. However, these crafts faced an existential threat due to colonisation and declined due to industrialisation and cheaper, foreign-made goods. With the establishment of art schools in major Indian cities, the tension between Indian and European art forms began to impact various areas of society. It was not until the 20th century that debates began to take place around “Swadeshi Movements”. The rise of institutes such as Shantiniketan and Sriniketan, as well as a pan-Indian nationalist ideology, roused the sleeping giant of Indian Consciousness towards developing our native industries to achieve the goal of preserving traditional arts whilst adopting modernism for a new post-colonial India.

With the role of craft in education evolving so rapidly, it was bound to face a few challenges along the way. The shifting of learning objectives, students choosing general education over its vocational and technical counterparts and few schools willing to offer VET courses were some obstacles that India faced, and continues to do so even today. Pioneered by minds such as Anand Coomarawamy and EB Havell, who recommended that arts and crafts be integrated into standard education, the gulf between arts and crafts began to narrow. The further formalisation of craft and IKS into regular curricula and as the basis of education was helped significantly by institutes like the National Institute of Design (NID), established in 1961, and the National Institute of Fashion Technology (NIFT), established in 1986. Such institutions, along with the NEPs of both 1986 and 2020, further outlined steps to impart traditional craft skills as part of vocational education. Hence, it is essential to address the andragogy of design schools teaching craft-centric learning in India and present a way forward, developing strategies to promote traditional Indian knowledge in the modern context.

Indian arts and crafts, just like Indian cuisine, philosophy and architecture, have evolved continuously and dramatically. From cave paintings and prehistoric implements to contemporary art forms and bespoke products, these represent a fluid and dynamic landscape.

Today, the significance of these art and craft forms has evolved beyond the confines of a museum exhibit or an element of festivities or even as a means of livelihood for artisans. Today's art and craft forms are an expression of artistic identity that also double as functional art, enhancing the lives of people all over the world.

Closing the gap between craft and design has become a key focus of modern-day culture, leading to an increased interest in "Good Living", often defined as the convergence of aesthetic and utilitarian schools of thought. This has also led to craft-centric learning with renewed vigour.

Formal design education in India began around 1961, prior to which, the design education programmes in India adopted their andragogy as well as their thinking from the Bauhaus and Ulm school traditions. The first few institutes that provided formal design education in India were NID Ahmedabad (1961) and IDC (1969), among others. However, all these institutes had an innate connection with the ideas and philosophy of Bauhaus and Ulm traditions.

The very basis of design education in India is the foundation year, the first year of a student's journey, which introduces them to the skills needed for practice in all design departments. The curriculum of this foundation year continued to be influenced by the traditions of the German design schools, leading to a homogenisation of art and skill. For many years, the foundation programme remained unchanged despite the great speed with which tools and processes of design evolved in the information age. However, in the past few years, a paradigm shift has begun to take place, with material-based courses, community immersion, field interaction and craft documentation increasingly forming the base of foundation year courses.

With the National Education Policy (NEP) of 1986, a drift towards integrating vocational education into the standard curriculum was seen. This led to the establishment of multiple ITI, Training Research Centres and diploma courses that trained individuals in indigenous techniques of arts and crafts. These schools focused on promoting vocational skills to develop products using indigenous materials and techniques with a pinch of modernisation.

In the present era of rapid modernisation, a vast number of Indian crafts are facing extinction. The need of the hour is to make concerted efforts to preserve this heritage and incorporate it into the future of India. Recognising the value and role of IKS is a crucial first step in addressing the revival of traditional arts and crafts. Art learning has now received attention from the government, and NEP 2020 will take a leap in prioritising the Indian knowledge systems of arts and crafts in the country by addressing learner-centric education and accelerating industry-institute collaboration.

Despite this, a gap exists in incorporating indigenous crafts knowledge into educational curricula. This is often caused by the current prioritisation of studio-based exercises over field interaction.

Those involved with design education in India are, hence, naturally led to believe that early exposure to Indigenous knowledge and skills is paramount to preparing designers who not only teach craft-based practices but take the legacy of long-forgotten crafts ahead, eventually helping to preserve cultural heritage.

In conclusion, the integration of indigenous crafts knowledge into the curriculum can offer significant benefits for enhanced skill development. It can foster creativity, hands-on learning and problem-solving abilities by encouraging students to engage with materials and techniques that have been refined over centuries. This approach can help preserve cultural heritage while also equipping designers with the skills to take heritage practices into the future. However, if these practices are only studied in an academic sense, the curriculum may become tokenistic and not add the value it has the potential to add.

We, as the design fraternity, need to take concrete steps and prepare designers who can design, blending traditional craft techniques with modern technology. Only this can bring India to the forefront of changes and innovations in the world of design.

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Flowing Freely: Water and Culture in Indic and Indigenous Literature

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What grips today's urban planners, designers, ecologists and conservationists is how to ensure minimal ecological damage as the world turns increasingly urban. It is, therefore, natural that in such a world, ecological wisdom is emerging as a significant field of inquiry (Wang, Palazzo & Carper 2016) to avert the impending ecological crisis. Ecological wisdom has been deemed a form of intelligence that embodies a conscientiousness for co-existing with nature (Zhang, Zhang & Liu 2014) and protection of species (Wise & Abrahamson 2005). This article discusses some exemplars from classical Indic and Indigenous folk literature that participate in building ecological wisdom by nurturing recognition, respect and celebration of nature. Particularly, we focus on the social and cultural significance of water – "the vital component of the Earth's energy and climate machine", as iterated and reiterated in these texts (Tvedt, 2021).

Indic classical literature has eulogised water in its varied forms. Kailadas' Meghadūtam (Cloud Messenger) from the 4th/5th Century CE is a dialogue between the banished yaksha with cloud - a visible mass of water droplets - personified as a petitioner. This dūta-kāvya (Messenger poem) befriends the cloud as a confidante because as 'a being made of mist, light, water and air—not a man', only the cloud is capable of carrying the message of yaksha's heart to his beloved (5).

From this poetic invocation of the cloud, the poet then moves to describe its divine beauty:

"A fading rainbow glows like multicoloured light cast from precious gems,
Filling your dark body with brilliant radiance, as if you were Vishnu
When he became Krishna, the cowherd with shimmering feathers of peacocks" (15).

After the elevation of the cloud to the godhood, the narrative lingers on the rejuvenating impact of water as the cloud bursts into the rain:

"As you let your first raindrops fall, all of nature will conspire to guide your way
Bees will swarm to the pale auburn filaments of half-blown kadamba flowers,
And deer will gather along marshy banks to eat the first buds of banana tree blossoms,
And the elephants will march, smelling the intoxicating scent of the moist forest floor" (21).

While for Kalidas, clouds embody grandeur and growth, for the 17th-Century poet Jannanatha, water connotes the healing and cleansing power. In his poem Ganga Lahiri (Waves of Ganga), he pays tribute to the magnificent flow, movement and activities of the river Ganga, whose name itself originates from the verb gam, 'to go'. (Eck 1996). Jagannatha prays to the river for this ultimate salvation, stating:

"You are the indescribable abode of all dharmas.
You are a means of new happiness.
You are the most important of holy waters

You are, as it were, a pure raiment for all the three worlds.
You are the solace for the mind.
You are the dispeller of bad thoughts.
You are the receptacle of wealth. May your body (waters) remove our distress"
(Murthy, 11).

Legend has it that each of the 52 verses of this composition corresponded to the waters of Ganga rising a step at a time until they engulfed Jagannatha with the last prayer of purifying his body.

While the classical literature captures deep reverence for water-based cultural systems, the folk literature narrates the dire impact of water scarcity. Anjali Kapila (2002), in her participatory research with the women of the Garhwal region, catalogues the songs of water scarcity. These songs underline the centrality of water and verbalise the trauma of the women of the land who bear the burden of such scarcity:

"Even though it's raining, the water sources have
Gone further away
Dear Mother!
Because of water, I cannot complete my other tasks
The mountain path is steep
And the water in the springs comes only drop by drop
In the summer afternoons
Water becomes even more scarce
It is difficult to get water!" (Kapila 2002; 124)

Similarly, a folk marriage song or lullaby, 'Scorching Summer Has Arrived/ My Child's Father-in-law Get Me Some Water' (Vyas, 2023), from the Rathwa community of the Panchmahal region of Gujarat records how the narrator feels parched in the wake of the summer season and requests her child's father-in-law to get water for her when he arrives for the wedding. Similarly, the water-related distress of the Dang district makes its way into the lullabies collected from the region (Vyas, 2024). Peculiarly, the lullabies from Dangs are in the voice of the grandmother, who pacifies the crying child by stating that the mother is busy fetching water and will return soon. Through their study of folk songs about Bengaluru water bodies, Harini Nagendran (2020) showcases these cultural repositories of ecological wisdom pertaining to water. They record that as rural landscape Bengaluru areas such as Sarjapur turn urban, women sing:

"Gange, Goddess of the seven heavens,
Can our lakes survive without water?
And will the canals remain? Fishes survive in the lakes.
In the fields, paddy grows with water. Without water, all life will be destroyed,
O Gange. The entire universe belongs to you" (Nagendran, 2020).

Thus, while the ecological wisdom in the classical texts brings to life the bountiful abundance and rejuvenating value of water, the folk songs record the challenges emerging from not adhering to the ecological wisdom leading to water scarcity. Both the categories of literature are rich reminders of deep investment in water, its cultural meanings and value. This ecological wisdom that flows symbolically and materially through literature shows the way to do away with water blindness within dominant conceptual and theoretical traditions of understanding society, history and climate.

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Innovation Through Indigenous Methods – A Case Study of G-Filters for Water Purification

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Water is one of the resources that is a necessity for human survival. Hence, its security becomes more critical. For India, water security is an important challenge as population growth, accelerated urbanisation, industrialisation and climate change have put immense pressure on freshwater resources (Francis and Das, 2021). India comprises 18% of the global population and has just 4% of its water resources (Francis & Das, 2021). Hence, the demand for water is deemed to double by 2030, putting even more strain on the available supply. This needs immediate and innovative interventions - see Figure 1 (Watal, 2024).

Globally, international communities have been able to meet the Millennium Development Goal 7C target of reducing the number of people without access to improved water supply to half (Hering et al., 2016). In response to the crisis, several indigenous and localised innovations have emerged, blending traditional wisdom with modern technology to address water purification, filtration and conservation, particularly in rural and remote areas (Huang et al., 2021). In India, not only does the scarcity of water bodies pose a challenge, but waterborne diseases continue to be an issue that affects millions yearly. According to a study by Kumar, et al. (2022), it is estimated that 37.5 million people in India suffer from waterborne diseases every year, with diarrheal disease alone responsible for 1.5 million deaths. Furthermore, the economic burden is also equally concerning, with 73 million working days being lost due to these illnesses (World Bank, 2017).

Drinking water contamination is one of India's major public health concerns through contamination like arsenic, fluoride, nitrates and biological pollutants affecting millions (Khaturia et al., 2024). The study highlighted acute fluoride contamination in certain regions of Rajasthan, particularly the Shekhawati region, leading to chronic skeletal and dental conditions. This underscores the urgent need for cost-effective de-fluoridation technologies for water purification. This can also be a good alternative for ensuring safe drinking water at the household level (Khaturia et al., 2024). Additionally, urbanisation and industrialisation have also contributed immensely to intensifying water pollution, with rivers and groundwater increasingly contaminated by toxic metals, sewage and industrial effluents (Francis and Das, 2021).

Thus, the National Water Quality Monitoring Programme (NWQMP) has identified nearly 70% of India's surface water as unfit for consumption, necessitating robust purification interventions (Francis and Das, 2021).
At the household level, unsafe drinking water, paired with poor sanitation, significantly gives rise to diseases like cholera, typhoid and hepatitis, mainly in rural areas where the household is dependent on untreated surface or groundwater. Some studies have emphasised the potential of frugal, decentralised technologies in achieving universal access to clean water (Huang et al., 2021). For instance, the slow sand filtration (SSF) method, which offers low-cost, high-efficiency pathogen removal, is widely used in Europe and has been adopted by Indian communities (Huang et al., 2021). Moreover, biochar and metallic iron (Fe0)-based filters have emerged as effective, Indigenous

alternatives to chemical treatments, reducing reliance on expensive imported filtration components (Huang et al., 2021).

The traditional potter communities in Rajasthan have developed gravity-filters (also called G-filters). The G-filters have been changing the water purification landscape in rural areas. They are a frugal invention which uses clay and organic raw materials in a simple kiln technique to create gravity-based ceramic water filters. It is unique as it uses Indigenous know-how and traditional techniques of pottery making to make water filters. It leverages the Indigenous knowledge, techniques, and skills of the traditional potter community to understand clay and other materials and create a filter without the use of any other imported materials. Such communities use the pots for either storage or filtration. It further uses materials that are low-cost and locally available to purify water for drinking purposes at the household level in rural areas through a simple filtration process. The clay is porous, allowing the water to segregate the impurities and purify the water. A study conducted by researchers at the Indian Institute of Technology (IIT) Jodhpur also validated the efficiency of G-filters (Venugopal, 2019). The researchers at IIT Jodhpur and an NGO named Rupayan Sansthan have been promoting the usage of G-filters in rural areas in rural communities in Rajasthan communities by collaborating with the local potters' community. This not only ensures the preservation of traditional knowledge and skills but also provides opportunities for their livelihood, income generation and strengthening of the local economy, along with providing clean and pure drinking water (Parampara, Project, 2023).

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Indigenous Textile Repair: A Knowledge System at the Crossroads of Tradition and Sustainability

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For generations, India's indigenous textile repair knowledge system has practised the art of repair, breathing new life into old garments with stitches that carry stories. This represents a holistic, sustainable approach to garment care that offers essential solutions for contemporary fashion's environmental crisis despite being diminished by industrial production. This system's strength lies in its holistic integration of material culture understanding, local technical skills and traditional cultural values that promote longevity over disposability.

This analysis draws from local craft community observations of repair practitioners in India. The Rafu technique, commonly used by tailors in North India, delicately mends tears in fine fabrics, making the damage almost invisible. In Bengal and Bihar, Kantha quilting turns worn-out sarees into beautiful, layered textiles rich with detailed embroidery. Sujani, a patchwork embroidery tradition from Bihar, transforms discarded fabric pieces into stunningly intricate textiles. Similarly, appliqué work from Gujarat and Odisha gives new life to old fabrics by layering cut-out patterns onto base cloths.

The research mainly focuses on key techniques: Invisible and Visible mending and quilting with old fabrics, examining their evolution from necessary household practices to their current status in contemporary fashion.

The indigenous repair knowledge system in India operates through three interconnected components. As Fletcher (2016) observes, these traditional systems developed sophisticated approaches to maximising resources, minimising waste and valuing craftsmanship over mass production.

First, it encompasses deep material understanding - practitioners can identify fabric structures, fibre types and optimal repair approaches for each textile type. Second, it involves sophisticated technical skills passed down through generations, from invisible mending techniques to strategic reinforcement methods. Third, it incorporates cultural values that view repair as respecting materials and makers.

The mending technique exemplifies this crafts system's sophistication. Craft practitioners undergo years of training to master the art of invisible mending, learning to match thread counts, understanding fabric behaviour and executing repairs that become virtually undetectable. Similarly, quilting transforms worn textiles into new pieces, requiring intricate knowledge of fabric layering, tension control and decorative stitching (Brown & Webb, 2022).

The advancement of modern industry has significantly transformed this knowledge system. McLaren and Urquhart (2018) stated that mass production introduced standardised garments that often proved difficult or impossible to repair using traditional methods. The system was adapted by developing new

techniques for synthetic materials, but it simultaneously faced devaluation as cheap, replaceable clothing became prevalent.

Brown and Webb's (2022) study documents how traditional repair practitioners have responded to industrialisation. Some have adapted their skills to serve luxury markets, particularly in maintaining high-end garments like Pashmina shawls. Others have integrated modern tools and materials while maintaining traditional techniques, creating a hybrid practice that bridges old and new approaches. Vulcanisation is an example of this process.

Today, this knowledge system exists in various forms across India. Clark (2019) notes that traditional practitioners continue their work in smaller communities, while urban areas see them practised via drycleaners, a revival through repair cafés and sustainable fashion initiatives. Contemporary designers are reinterpreting these techniques, with brands like 11.11, IRO IRO, Pero and Doodlage incorporating visible mending into their clothing ranges.

The system has evolved from a necessity(frugal)-based practice to one that often serves as a conscious choice for sustainability. Thorpe (2021) observes that modern practitioners combine traditional knowledge with contemporary design principles, creating clothing and textiles that celebrate rather than hide their repaired form.

The Indigenous repair knowledge system offers three key contributions to sustainable fashion:

1. Technical Solutions: Traditional repair techniques provide time-tested methods for extending garment life, keeping it out of landfills and maintaining textile quality. Intergenerational technical skills need to be navigated for smoother transitions of these skill sets.

2. Educational Framework: The apprenticeship model offers practical skills transmission and material understanding methods. Also, documentation and archiving of material-based understanding and applicable skill sets will contribute to the diminishing Repair craft.

3. Cultural Values: It reiterates care, maintenance for prolonging and material emotional connectedness, providing a philosophical framework for sustainable consumption.

The knowledge system is finding new applications in modern contexts. Design schools incorporate traditional repair techniques into the curricula to re-establish the relevance of value systems around one's relationship with clothing and the need and ability to repair. Fashion brands establish repair services based on indigenous methods. These adaptations demonstrate the system's flexibility and relevance to contemporary needs.

To fully realise this knowledge system's potential, policy support is crucial. This could include formal recognition of traditional repair skills in mainstream crafts, integration into textile education programmes and incentives for repair-based businesses. Such support would help preserve these practices while adapting them for contemporary use.

India's indigenous textile repair knowledge system demonstrates remarkable resilience and adaptability. Despite challenges from industrialisation, it continues to evolve and offer sustainable solutions for contemporary fashion. Its holistic approach to material care and maintenance provides valuable lessons for addressing current environmental challenges in the fashion industry.

The system's survival and adaptation illustrate how traditional knowledge can remain relevant and vital in modern contexts. As the fashion industry grapples with sustainability challenges, this indigenous knowledge system offers practical techniques and philosophical frameworks for creating more sustainable clothing production and consumption approaches.

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Rejuvenating Chambal River in India: Decentralised Community Efforts and Indigenous Knowledge Practices

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This is a story of an extraordinary journey that the local communities of Karauli district in Rajasthan, like Meenas, Gujjars, etc., embarked on to revive 23 tributaries of the Chambal River. Led by Tarun Bharat Sangh (TBS), an NGO established by the Waterman of India, Dr Rajendra Singh, the community members reduced their reliance on factors driven by the state and the market and instead, adopted solutions based on indigenous rainwater harvesting techniques. Using locally available materials, the community members worked together in a decentralised community-driven manner, shaping around 1,000 traditional water structures. These structures included johads (earthen reservoirs), pokhars (ponds), anicuts, etc. To date, TBS has been able to revive six rivers - Nahro, Sherni, Badhe, Kharra Wai, Goder and Tewar – and they continue to work towards rejuvenating other tributaries.

Their success is a result of the collaborative efforts of the NGO and the local communities, who shared the labour and manpower. While TBS contributed monetarily, the community people volunteered with labour, inspired by the Gandhian principle of Shramdaan. As a large male population has migrated to cities in search of work, women and elders came forward to contribute with their efforts, resulting in this amazing feat.

This initiative didn't just restore water—it reshaped lives. The ravines in the Karauli district transformed economically, politically, culturally and ecologically. The initiative also reintegrated 3,000 former armed bandits into agricultural practices.

As water returned, families from other districts and states began settling and forging new relationships in a region once infamous for trafficking and forced marriages. Children are no longer malnourished, and elders, once plagued by night blindness, now enjoy the nutrition of homegrown leafy greens. The mines, once a last resort for survival, no longer dictate lives—people are finally free from the deadly grip of silicosis, an illness caused by years of inhaling silica dust.

Economically, the smaller traditional water structures built by TBS's efforts were cost-effective. They were constructed at a cost of Rs 1-2 per cubic metre of storage. The optimal structure storage of the area was around 1,000-1,500 cubic metres, which could potentially raise the annual groundwater table to 20 feet. An investment of around Rs 100 per capita on johads, raises the economic production of the village by as much as Rs 400 per capita per annum. The villagers are now growing cash crops like tomatoes and grapes as they have adequate water for cultivation. There is enough fodder available year-long for all the livestock. The water brought ecological balance to the area, with a variety of animals and birds returning to their natural habitats. The varieties of trees like khair, dhok, bargali and dho have enhanced the biodiversity of the forests.

In the beginning, villages like Maharajpura and Koripura in Karauli reaped the benefits of building water structures, and the ripple effect came into play for the villages downstream, benefitting from the horizontal fractures leading to water aquifers. Acknowledging the results, villages like Sharakpura, Mardei, Bhood Kheda and Braiti joined the TBS initiative. The volunteers of the organisation, Chaman Singh, Ranveer Singh, Chotelal Meena, Mukesh Singh and others, played a crucial role in understanding the rich knowledge bank of the local communities and working on awareness campaigns to lead community projects, highlighting the potential of collective action for sustainable management of common property resources.

Drawing deeply from the Indian philosophy that views the five elements- sun, earth, air, water and sky- as integral to human life and the divine, this transformation offers valuable insights to analyse the potential of the indigenous knowledge of water management. Indigenous knowledge is geographically and culturally context-specific, holistic and dynamic, rooted in collective memory, and encompasses generational wisdom about the interconnectedness between humans and their environment. The smaller water bodies thus represent a focus on the rejuvenation of water in the aquifers rather than the idea of extraction, which is a prime motivator of modern water management techniques, which includes 'big dams', concrete canals, tube wells, etc.

In recent years, there has been a renewed focus on Indigenous knowledge in the global policy framework in the face of the burgeoning climate crisis. The Dushanbe Declaration 2022 on the 'Water for Sustainable Development' highlighted that we should focus on "indigenous knowledge to achieve more effective and climate-resilient water and sanitation management". Similarly, IPCC 6th Synthesis Report 2023 mentioned how drawing on diverse knowledge and partnerships, including Indigenous people and local communities, can facilitate climate resilient, locally appropriate and socially acceptable solutions. However, the term indigenous knowledge is often used as a moniker, and the dominant paradigm in global climate policies is still centred around modern engineering solutions, which create more problems than solve existing ones.

The revival of Rajasthan's Chambal River is a compelling story of ecological transformation based on indigenous knowledge practices led by local communities in India. It offers actionable insights for fostering sustainability, equity and resilience in the face of environmental crises. To replicate such results, the process of knowledge production and dissemination needs to be democratised, which can be achieved by integrating indigenous knowledge into the modern education system. There is a need for equitable sharing and dialogue between diverse knowledge systems and practices for peaceful co-existence of humans, non-humans and the environment.

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Revisiting Traditional Building Practices in the Indian Sub-continent Through Contemporary Green Building Certification Parameters

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Many of us involved in the design and making of objects and environments for human consumption and occupation have often wondered about what kind of a planet we would be living on today - if the trajectory of 'growth' and 'development' had not been driven by industrialisation and the worldview of the Western world.

Instead of controlling and conquering nature in all its forms – would we have lived more symbiotically with it, like all the rest of the species?

Instead of focussing on efficiency, mass production and saving time – would we have celebrated individuality and the very act of doing and crafting things? Instead of inventing molecules, specialised materials and mechanisms, narrow in their purpose and detrimental after use – would we have looked at discovery in nature and growing such holistic and eco-synchronous elements in their efficacy and life-cycle?

Such questions are surely not very far-fetched and utopian for those who have been fortunate to be part of such a civilisational legacy. While they appear to belong to some very contemporary handbook on sustainability, inclusivity, biomimicry and ESG / SDG goals – actually, it is very easy to relate to them and see their demonstrations of how indigenous cultures have survived and flourished for centuries.

It is well-established that systems and strategies employed in the design, construction and operations of our traditional built environment have always been sustainable, energy-efficient and eco-friendly. Civilisations such as ours have always been doing this – in a very organic and socio-culturally inclusive and embedded manner. One did not need any rules, mandates or certifications to be sustainable – our understanding of ourselves was never really different from our surroundings, our society and our planet.
Yet, we seem to have lost that somewhere along the way – and now are we coming back to 'sustainability' as defined by the industrialised Western worldview.

As designers, builders and makers, we are innately compelled to evaluate our creations. Therefore, we constantly seek ways and means of ranking and rating them. Most of these evaluation systems are products of the industrial revolution and subscribe to a limited perspective. However, the reality of our globalised and technology-driven world demands that built environments across the world adhere to such evaluation criteria. Therefore, we see a plethora of green building certification systems being used in architecture, interior design and urban development. They are standardised and widely accepted methods of understanding and documenting the 'greenness' of a built environment.

Very often, one finds that proponents of both these green approaches (vernacular vs modern, technology-driven, certifiable) are at loggerheads with each other. This does not necessarily have to be the case.

This is an attempt to bridge this gap by looking at some examples of traditional materials, methods, techniques and strategies through the lens of modern green building certification systems. It tries to evaluate how some of our centuries-old indigenous methods of building would have fared under the green building rating systems used around us today.

Following are the categories listed in one such contemporary green building certification system that is exhaustively used currently in India – the 'India Green Building Council's (IGBC) Green Building Rating system';

- Sustainable Architecture & Design
- Site Selection & Planning
- Water Conservation
- Energy Efficiency
- Building Materials & Resources
- Indoor Environmental Quality
- Innovation & Development

This study looks at points awarded under each of the above categories and applies them to examples of how built environments were built and operated in India's traditional/vernacular approach. One looks at different buildings, methods of construction, approaches to building and occupation of spaces and demonstrates how our indigenous knowledge systems were far more holistic, sustainable and inclusive – and yet would have also performed very well when evaluated by modern green building rating systems.

Here are some examples:

Projects get credit for 'Reducing Development Footprint' – which means sustainable buildings and towns should not spread out and consume land (and expand infrastructure). This is exactly what the Western world did with its urban planning for centuries. Therefore, we have the curse of automobiles, highways, fossil fuels, pollution, etc. Compare that to the compact, dense and mixed-use areas in the 'old city' or 'walled' city core of any Indian city. This also contributes immensely to social inclusivity, well-being and richness of life (something not even covered by several rating systems).

Similarly, contemporary projects would get credits for 'Daylight in regularly occupied indoor areas' and 'Access to Views' – both of which are beautifully integrated and celebrated in our traditional architecture and interior elements like courtyards, verandahs, jaali (perforated screen), jharokha (projecting, enclosed balcony), etc.

There are several points earned if the paints, polishes and adhesives used in our buildings have low VOC. (volatile organic compounds). How about our traditional materials and finishes that are all made of natural materials, sourced locally, installed by local craftsmen and have zero VOC, let alone be harmful? Many of them were even edible!

Across all important aspects of 'sustainable' and 'green' buildings like water conservation, energy efficiency, passive cooling and heating, indoor environmental quality, health and well-being, social equity, etc. – each of our traditional buildings would score handsomely and surely be eligible for a Gold or Platinum rating today. Some would go beyond the innovations and holistic design and operational concerns that they demonstrate.

For the purpose of this study, the examples of traditional/vernacular built forms are taken from different parts of India – but given time and resources, one could also focus on individual buildings as detailed case studies (from various geographies and climate zones across India). One could convert this into a rigorous documentation and measurement exercise (which would also require several scientific and technological/measurement inputs from other experts) and evaluate one such traditional building through the lens of any contemporary rating system.

One hopes that such examples of comparing contemporary systems and techniques with Indigenous knowledge systems can be used as a way to demonstrate and create awareness about the richness of thought, process and collaborative/eco-synchronous approach towards life and everything that we built around us. Instead of subjecting ourselves and our civilisation to the limited worldview and norms of others, let us look to enrich ourselves from our own history and traditions. Of course, everyone across the world has created some very beautiful and valuable inventions, and we must be respectful of them and utilise them as best we can. But that should never become a restricting barrier to value something that we ourselves have always had and can now share with the rest of the world - at a time when it is desperately needed.

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Cooling Demands in Buildings through Indigenous Techniques: A Case Study of Solar Shades

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Changing climate has led to rising temperatures and heat waves, which has led to an increase in the need for cooling globally. In residential buildings the energy needs for space cooling is expected to triple by 2050. An increase in cooling needs indicates a rise in the use of air-conditioning (AC) systems. Further, the use of ACs in buildings leads to Greenhouse Gas (GHG) emissions. The cooling capacity in India is projected to rise to 610 million by 2030 thereby needing an additional 1010 power plants to meet the demand. Further, the power used to run the ACs, are added by fluorinated gas refrigerants (CFCs, HFCs and HCFCs) which are greenhouse gases from conventional air conditioning systems. Thus, the need to design buildings with minimal cooling loads without compromising on occupant comfort.

Indigenous architectural techniques which is inherently sustainable, and uses local materials and cultural practices on the other hand tends to offer many possibilities for better building design to reduce energy demand for cooling. In India particularly with a hot and tropical countries, architectural elements are adapted to cool the building naturally. Use of these techniques categorised as passive design techniques can result in mechanical heating and cooling equipment.

In 'modern' buildings, the building envelope is often the main source of heat gain/loss. The primary source of heat gain is sunlight absorbed through the walls, roof and windows. The most effective method being through the indigenous architecture technique of external shading.

Shading is a simple method to block the sun and it can get into the building through the doors, windows or other openings. This reduces the solar radiation and cools the building effectively.

Some of the indigenous shading devices are :

1. Jharokhas in Rajasthan
   It provide shade to windows and walls by preventing direct sunlight and helps with privacy and ventilation
2. Chhajjas in Northern and Western India
   It protects windows and walls from direct solar exposure thus reducing internal heat and keeping the walls cool. It also protect from monsoon rains.
3. Jaalis in Rajasthan and Gujarat
   It allows diffusing sunlight and reducing indoor heat absorption and helps with privacy. It has very detailed artisanship with intricate designs.
4. Kharkhoris In Goa and West Bengal and Maharasthra
   The external windows help adjust direct sunlight entering the room and help with ventilation.

The shading devices are categorised as side fins, overhangs and front screens. Side fins have vertical projections on the window. Overhangs are horizontal projections on the windows which reduce direct sunlight. Front screens are fixed

systems that cover window front while providing a balance of shading and natural lighting through the diffused light to enter.

Buildings with courtyards and act as thermal buffers and served as functional and social gathering spaces. In India the most available typology of residential buildings is the multi-storey building with flats. It is relatively easy to integrate external shading devices in the design of new and existing apartment buildings.

There are different criteria for shading buildings in different climatic zones. Well-designed solar shading devices can cause a reduction in indoor temperature. Using dynamic moveable external shading can further lead to a reduction by 60%-80%.

Several policies ensure legality, safety and efficiency of buildings in India. To bridge this gap, the Bureau of Energy Efficiency (BEE) introduced the Energy Conservation Building Code (ECBC)., which defines energy performance norms for commercial building for different climatic zones. While the goal is reduction of energy consumption with occupant comfort, health, and productivity, more weightage is provided to efficient cooling technologies and appliances.

Green building rating systems provide more weightage to passive design techniques. Further Energy Conservation Building Code – Residential or the Eco Niwas Samhita 2018 gives thermal performance benchmarks for residences. It details out the guidelines for form, materials and orientation of shading devices.

Indigenous passive cooling techniques reduces heat gain and improve occupant comfort which are cost-effective and reduce the need and size of air conditioning equipment. It is important to focus on the physical elements as well as the traditional craftsmanship and design principles that enhances the techniques socio-culturally rich and aesthetically pleasing. Thereby making the contemporary buildings functional and visually appealing.

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Assessing the Complementary Relationship of Ghats and Kunds in the Indigenous Knowledge Water Landscape of Varanasi

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Varanasi is a 3000-year-old continuously habituated city, also one of the holiest cities in India. There are many unique layers to this city. Be it the ghats (stepped banks), kunds (sacred water pools), Havelis (palatial mansions), forts or gullies (narrow alleys), each contribute to the unique fabric of the city. Here, the lives of the people are intertwined with this unique spatial fabric where intangible knowledge seamlessly gets interwoven in tangible physical spaces. Among the many layers, the present paper examines the unique waterscapes of Varanasi with two prime protagonists, the ghats and the kunds.

The ghats and the kunds share a unique symbiosis which dates back to antiquity, a water-based sacred landscape. The symbiosis is multidimensional in nature, with embedded knowledge that pertains to spiritual, cultural and ecological aspects. Here, the ghats become the predominant water bodies, with their seemingly long uninterrupted edge lining the revered Ganga, thronged by people from all over India and abroad. The kunds act as localised water bodies, serving the indwelling communities for rituals, purification, deity worshipping, etc. Both of these typologies play a significant role in the lives of people. The stepped access to water in both typologies makes the relationship with water unique. Whether one wishes to see the water or touch it, whether one wishes to use the water or dip into it or bathe in it, everything is possible. On the one hand, ghats serve as places of public baths, cremation and purification, and associated rituals. On the other hand, kunds act more as comparatively intimate spaces. The traditional knowledge pertaining to these water bodies is embedded in oral traditions like local folklore and pilgrimage narratives. Also, the rituals at the ghats and kunds are cosmologically aligned.

The ghats and kunds of Varanasi are physical manifestations of Hindu cosmology rooted deep in the cultural landscape. The knowledge which is inherent to these places is a rich amalgamation of rituals, culture, economy and ecology. Many of these water bodies are associated with deities in Hinduism. Surya (Sun God), Shiva and Vishnu are the prime among them. A few of the examples include:

- Lolark Kund: A sacred pool associated with blessings of fertility
- Durga Kund: Famous for pilgrimage circuits
- Manikarnika Kund: Located near cremation grounds, considered one of the holiest
- Nag Kuan: Kund dedicated to serpent worshipping, and the water has healing properties

These examples are some of the ones that have been preserved because of strong folklore and active worship traditions by the people of the community. Hence, they are still thriving in a better condition. In the case of another water body, Pushkar Kund or Pushkar Talab (pond), located close to the Assi Ghat, is in shambles. The temple near it also remains vacant. The community around

this water body is clueless about how to integrate the gigantic water body into its daily life. However, it must have been a thriving centre of rituals, worship and community life at some point in time.
In the case of Varanasi, it can be seen that ghats rose to prominence, forming the major identity of the city, whereas kunds lost their significance over time. The ghats became the face of the city; the lofty mansions stir up the image of Varanasi whenever one hits the search button, whereas the kunds stay there in the background. It is said that during ancient times, Varanasi had around 110 kunds, which slowly dropped down to 56, and now the city has only a few active kunds left. Many studies claim that the kunds and the Ganga were interconnected through underground water channels in ancient times. The kunds acted as sinks for the floodwaters of the Ganga. The ghats and the kunds were revered equally, as was the water that flowed in the river and overflowed in the kunds. During British rule, many of these connections were disrupted as the British officials were not well-versed in the Indian ways of life. They targeted kunds as breeding grounds for a lot of diseases and drained them or laid sewer lines beneath them. This disconnected many of the underground channels, and hence, they slowly dried up or got clogged as muddy drains. The cherry on the cake was the water from municipal taps. On the one hand, accessibility to water increased and eased the lives of people and women in general in day-to-day activities; on the other hand, this tap water gradually disconnected the community from the water reservoirs, few of which were left to exist in obscurity.

The existence of the kunds at various locations indicates their prominence in the social-spatial-cultural context. Different spatial arrangements of these kunds also talk about their diverse auxiliary uses, like congregation, performances or resting places. These kunds demonstrate that the idea of architecture is not just utility and function but beyond. The loss of the human-spatial relationship has induced a loss in age-old ceremonial activities, which made these kunds alive. It is the need of the hour to explore the human-spatial connections and relationships which are lost today. One needs to understand the lost association between cultures and architecture embedded in the urban fabric, where architecture is a medium of worship of culture and life. Thus, the echo of the present is to revive such water landscapes as the everyday architecture of the commons.

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Ancient and Indigenous Methods and Practices on Passive Refrigeration for Built Environment and Other Cooling Applications

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The vapour compression refrigeration system (VCRs) is the closest to an ideal refrigeration system that Nicolas Léonard Sadi Carnot, the famous French engineer, theorised and was expanded by others later on [1]. Not only that, such systems were robust and location-independent and provided high flexibility in scale, capacity, cost, etc. These advantages resulted in the widespread adaptation and implementation of such systems worldwide [1]. However, slowly, the drawbacks of the VCRs started appearing. These included the impact of refrigerants on the atmosphere, such as Ozone layer depletion, the greenhouse effect and global warming, releasing heat of compression in the atmosphere, resulting in being a contributor to the Urban Heat Island effect in modern urban spaces, using electricity from conventional energy sources, primarily fossil-fuel-based power plants, etc.
These systems are responsible for 20% of all electricity generated and 10% of all greenhouse gas emissions worldwide [2]. Due to this, refrigeration using VCRs became one of the most critical domains contributing to climate change. All these have immensely impacted life on earth and will continue to do so unless addressed suitably. Unfortunately, in the near future, we will not be able to stop using such technologies abruptly. Therefore, we must slowly migrate from VCRs to hybrid refrigeration systems, where passive refrigeration systems take care of most of the thermal load. This will effectively reduce the energy consumption by VCRs, thereby increasing their energy efficiency and reducing both direct and indirect greenhouse gas emissions.

Passive refrigeration systems are those that use naturally occurring processes to control or limit thermal energy (heat) entering the space being cooled and/or dissipate thermal energy (heat) generated inside. While doing so, they have little to no dependence on mechanical energy or electrical energy sources using conventional sources of energy, including fossil fuels. The techniques involved in such systems date back to the beginning of human civilisation. They were part of the vernacular architecture of almost all the regions with favourable climatic conditions [2]. One such example can be found in the houses in ancient Iran and Iraq and Rajasthan in India, particularly in hot, arid areas. They used tall towers with air vents at the top of the buildings. Those are called the Badgirs in Persian, shown in Figure 1. These systems drew cold air from the ground level by creating density gradients vertically by heating the air at the top and allowing it to flow out.

Another such technique of passive refrigeration used for centuries in places like Rajasthan, India, is using cool roofs by painting them with lime. This uses the property of high reflectivity of lime to reflect most of the incident radiant energy from the Sun. This simple method produced a 4.5C lower temperature inside the houses than the outside air. Roof treatments were not uncommon in India. Even in the eastern part of the country, in states like West Bengal, Odisha and Bihar, wet rice straws were used on the roofs during the summer. The technique is evaporative cooling with insulation by providing thicker porous layers on top of the roofs.

Traditionally, thick walls, lime as the binder, and rough outside wall surfaces with high albedo paints were common for houses in that part of the country. This was assisted by strategically planted trees with large canopies to provide shade. It was also common to have porte-cochères with high-rise roofs and high thermal storage materials on the roof, stairs and even in the parking area. All these served the purpose of providing cooler days with the help of nocturnal cooling and refrigeration storage using those storage materials. Similar architecture can be found almost everywhere in the northern part of India. The difference that may be observed is in the usage of materials. Almost all the materials used were locally available.

(a)

(b)

Figure 1: a) Typical Badgris (tall towers with air vents) for ventilation of hot air while drawing cold air from the ground level (Picture taken from https://www.kavehfarrokh.com/heritage/professor-s-roaf-badgir-irans-ancient-air-conditioning-system/), b) Typical ancient house in West Bengal, India (Picture taken from https://somethingspecialbyadity.wordpress.com/2013/09/07/a-bengali-home-a-hundred-years-old/)

Passive refrigeration in ancient India was not only used for space cooling but also had applications in food preservation, cooling water, and even water conservation by reducing the high rate of evaporation of water in dry and hot regions. Similar technologies, dating back to 300 BCE, can be found to date in countries including India, China and Turkey. All reported passive refrigeration systems used from ancient days are listed under a few categories in the following table. The table also lists the materials used in implementing such methods. It can be observed that most of the materials used were locally available.

Table 1: Typical methods of passive refrigeration worldwide. The materials used in implementing such methods are also listed down.

Method	Technology	Materials	Found in countries	Dated back to
Porous clay and ceramics	Evaporative cooling	Unglazed clay, terracotta, and ceramic	Egypt, Iran, Iraq, India, China	2500 BCE to present

Ice Storage in Yakhchāls	Radiative cooling and insulation	Thick mud brick walls reinforced with lime mortar, sand, egg whites, and goat hair	Central asia, Middle east, Afghanisthan	400 BCE to 1800s
Limestone and Marble	Radiative cooling, thermal storage	Limestone, marble, sandstone	India, Greece, Rome, Middle east	500 BCE to present
Wind Towers (Badgirs) and Ventilation Systems	Diffusion, convective heat transfer	Mud bricks, adobe, wood	Middle east, North Africa, India	1000 CE to present
Underground cooling structure	Geothermal refrigeration system	Stone, bricks, compacted earth	India, Turkey, China, Greece	300 BCE to present
Reflective and High-Emissivity Surfaces	Diurnal cooling	Whitewashed surfaces, polished metals, reflective ceramics	Middle east, Central asia, Europe	1000 CE to present
Shading	Insulation	Bamboo, Natural fibers	India, Japan, Southeast Asia	1000 CE to present
Khus curtains	Evaporative cooling	Khus grass, bamboo, wood frames	India	Ancient to present
Jali & Perforated Screens	Ventilation, venturi effect	Stone lattice (Jali), carved wood, terracotta	India	400 CE to present

Passive cooling, rooted in Indigenous knowledge systems, has long been a sustainable approach to climate adaptation. Traditional methods like courtyards, wind catchers, stepwells and earthen materials effectively regulated temperatures but had limitations. Their success relied on local climate conditions, making them less effective in humid regions where evaporation is slow or in urban areas where heat retention is high. Many techniques, such as thick mud walls and ventilated roofs, required large surface areas, limiting their use in modern dense spaces.

Unlike mechanical cooling, these methods worked gradually, demanding careful architectural planning for airflow and shading. Additionally, maintenance of organic materials like khus mats or thatched roofs required frequent upkeep. Air pollution and urbanisation now disrupt natural cooling, reducing the effectiveness of night radiation techniques like whitewashing rooftops. However, blending traditional wisdom with modern materials, such as solar-assisted ventilation, reflective coatings and hybrid cooling systems, can help revive and enhance passive cooling for contemporary needs.

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Who Claims Indigenous Knowledge? Decolonising Authorship, Intellectual Property and Epistemology

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The compositions of medieval bhakti Sant Namdev, passed down through oral traditions, complicate the very idea of authorship. Born in Maharashtra, a Marathi speaker, Namdev is attributed authorship of bhajans and songs in languages across North India. His verses are accorded a revered place within the Guru Granth Sahib. Yet, unlike the Varakari sants Jnandev, Eknath and Tukaram, Namdev is a resolutely aliterate figure in his pan-Indian public memory. In his study of Sant Namdev's multifarious legacy, Christian Novetzke (2003, 2008) posits the idea of "corporate authorship", which includes not only the ascriptive author but also the performer, the transcriber and other print intermediaries and the centuries-old Varkari kirtan tradition itself. This is a living body of knowledge that values improvisation, remix and renewal above the virtues of novel creation in the figure of an individual author.

This "corporate", commingled notion of authorship also presents vexing concerns for questions of intellectual property. Who claims authorship of a bhajan that has been rewritten through centuries? The complex mistranslations across knowledge systems – from Indian language worlds to English and Western language worlds have reverberations across domains of thought and practice. This short essay lays out some provocations and implications for a scholarly agenda at the intersections of institutional economics, creative economies and indigenous knowledge systems.
Like the idea of the author, scholars have shown that commonplace notions of law, public, property and religion translate incompletely across languages, sowing misunderstanding and confusion in their wake. Thus, the intellectual endeavour of decolonisation demands a careful and ongoing process of interpretation across emic and etic concepts, situating each in its cultural, economic, social and political context.

Indeed, emic visions of collective life and market exchange often get coded as "informal". Too foreign to Western-derived jurisprudence to be granted legitimacy and legality and yet too pervasive to be deemed illegal, the informal opens up a wide grey area, not only in a study of Indigenous urbanisms but also in foundational normative structures of everyday life.

A second implication follows for models of intellectual property. Indigenous and particularly folk heritage traditions across textiles, handicrafts and even repair abjures attribution to a single or even a group of inventors or innovators. Instead, know-how gets passed down to generations of gurus and learners, steadily accreting revisions, revisionings, mutations and improvements via the quotidian efforts of practitioners. As Compound 13 in Dharavi is attempting to show, even practices of waste disassembly and processing reveal deep forms of embedded expertise and innovation.

Once encoded and documented in writing, the oral and inarticulate means of practice may demand an author. Yet even here, as Sant Namdev's inheritance shows, the idea of creator remains nebulous in Western legal terms.

Against this backdrop, a regime of patent-based intellectual property that draws on Western ideas of creative authorship cannot but do profound violence to the located paradigms of collective invention. Do efforts to document and codify living tradition represent modes of appropriation, giving the transcriber and researcher undue authority and authorship over his or her subject? Do applications of intellectual property represent processes of intangible enclosure, such as the infamous Texmati rice variety, which attempted to patent centuries of agricultural technology, learning and improvisation embodied in India's basmati rice? Most worrying in a world of intellectual private property is a scenario where the originators of Indigenous technology must license their own creations from multinational corporations. What models of collective intellectual property can provide the necessary safeguards against, on the one hand, piracy and appropriation and, on the other, the widespread privatisation and consequent stagnation of living technologies? Aboriginal art in Australia, for example, offers models to consider.

Last but not least, returning to the themes with which this essay began, indigenous science and technology may look nothing like their Western counterparts. Instead of the fast technology of laboratories, how do we honour the slow technology of centuries-long collectivised efforts of documentation, experimentation and tinkering that characterise indigenous farming practice, for example? Central to just epistemology is the recognition that the women, Adivasis and subaltern creators that generate and transmit indigenous knowledge systems and practices, often in hostile conditions, deserve not only credit but due reward. This is an endeavour of epistemic justice, committed to seeing, acknowledging and protecting ways of living, thinking and doing that have long gone unseen and unheralded.

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Abstracts of Papers Selected for Presentation at the Conference

Tradition and Invention, the Past and Present and Providing Fresh Accounts of Creative Resist -
Blending Tradition with Technology: Indigenous Knowledge Systems and the Future of Fashion

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Abstract

This research explores the synergy between indigenous knowledge systems and innovative digital tools, such as CLO3D, to advance sustainable practices in zero-waste pattern cutting. Traditional crafts and indigenous approaches to garment-making often embody principles of resource optimisation, circularity and waste minimisation—values increasingly critical to addressing global environmental challenges. This study seeks to integrate these time-tested practices with modern 3D garment simulation technology, creating a hybrid methodology that is both rooted in heritage and forward-looking in application.

Through practice-based research, the project investigates how indigenous techniques, such as draping, block making and handcrafting, can be translated into digital workflows using Clo-3D and Adobe. It examines the potential of zero-waste pattern cutting as a sustainable design intervention, adapting indigenous knowledge to the digital environment while preserving its cultural essence. This integration facilitates the visualisation, testing and iteration of zero-waste designs, reducing prototyping waste and production errors.

The research contributes to designing a sustainable future by leveraging the precision and efficiency of Clo3D alongside the wisdom of traditional practices. It aims to create a replicable framework for sustainable fashion design that not only reduces environmental impact but also celebrates cultural heritage. The outcomes include a series of garment prototypes, a digital archive of zero-waste patterns inspired by indigenous methods, and actionable insights for integrating sustainable practices into modern fashion education and industry. Ultimately, the study envisions a design ecosystem where tradition and technology harmonise to promote environmental stewardship and cultural continuity.

Keywords: Zero-Waste Pattern Cutting, CLO3D, Indigenous Knowledge Systems, Sustainable Fashion, Digital Garment Simulation, Cultural Heritage, Sustainable Design Practices, Circular Fashion, Traditional Craft Techniques, Fashion Education.

Preserving Gujarat's Heritage: Leveraging Instructional and Interaction Design for Cultural Sustainability

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Abstract

The traditional crafts, architecture, water conservation practices and oral traditions of Gujarat represent a heritage that is both rich and symbolic of indigenous knowledge systems that provide sustainability, resilience and well-being to communities. However, globalisation and the rapid pace of modernisation put many of these traditions at risk of disappearing. This research looks into the potential use of Instructional Design and Interaction Design as significant elements in the preservation and revitalisation of Gujarat's heritage. By infusing digital technologies like gamified learning, AR/VR applications and interactive storytelling, this work is designed to create immersive platforms where indigenous practices are documented and distributed so as not to lose its significance in modern society.

The research focuses on developing:

- Instructional frameworks designed for learning ancient crafts and practices in contemporary educational environments.
- Interactive modules that provide experiential learning, like virtual tours of Gujarat's step-wells or interactive tutorials for crafts like patola weaving and Ajrakh block printing.
- Community-driven approaches empower local artisans and knowledge keepers to co-create content, bridging the gap between traditional wisdom and modern audiences.

This presentation will present the design and implementation of these initiatives into sustainability discourses and inclusivity worldwide using Gujarat's rich cultural heritage. The study also underscores equity in recognition of indigenous knowledge systems to be embedded in the curriculum of education and policymaking processes.

Through this initiative, we hope to conserve Gujarat's heritage while inspiring new ways to use this IKS to tackle present-day challenges.

Sacredscape of Nandgaon: Preservation and Regeneration of Heritage Resources

Theme – Sacred Landscapes and Cultural Restoration

Abirbhav Sanyal and Archana Sharma

Abstract

Braj is synonymous with the land of Lord Krishna as per Hindu Mythology. It has a distinct character due to the unique relationship that exists between natural surroundings, built environment and cultural traditions. The cultural heritage of this region has evolved around the natural assets, i.e. forests (vans and upvans), water bodies (rivers, kunds and streams), flora and fauna. These natural assets have been mentioned in the mythological texts along with their interlinkages with built forms and cultural practices. Today, the region encompasses most of the settlements in the Mathura district, where the majority of the settlements are connected through a pilgrimage path known as Chaurasi (84) Kos Parikrama, with 11 settlements located along the parikrama marg. Nandgaon is one of those settlements and will be the focus of this paper's study. Nandgaon holds religious and mythological significance as the home of Shri Nand Maharaj, father of Krishna. Built around Nandisvara Hill, the town has high natural significance as it is rich in ecological resources (such as vans and kunds), which served as the backbone for human interventions and resulted in the wide range of tangible and intangible heritage resources of the city. However, like any other historic city, Nandgaon is also struggling to deal with the developmental pressure and increased pilgrim/tourist activities that have been detrimental to the ecological and built heritage resources. Additionally, with the increased pressure on the city's existing infrastructure, basic needs such as sanitation, sewage, and solid waste management systems are crumbling. These issues of the settlement violate the SDGs developed by UNESCO, such as Clean Water and Sanitation, as well as Sustainable Cities and Communities. In order to ensure the preservation and regeneration of this historic city, there is a need for careful solutions, some of which largely pertaining to Sustainable Cities and Communities through the management of cultural resources, which will be explored in this paper.

Keywords: Nandgaon, Ecological Resources, Natural and Built Heritage, SDGs, Preservation and Regeneration.

The Role of Indigenous Knowledge Systems in Managing Chronic Illnesses: A Primary Study in Bhopal City

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Abstract

Chronic illnesses, such as diabetes, hypertension, arthritis and asthma, represent a significant and growing challenge for urban public health systems. This study investigates the role of Indigenous Knowledge Systems (IKS) in the management of chronic illnesses among patients in Bhopal City. Using primary data collected through interviews, surveys and focus group discussions with chronic patients, the research explores how traditional practices, including herbal remedies, yoga, dietary interventions and spiritual healing, are utilised to alleviate symptoms and improve quality of life. Key findings highlight the widespread reliance on IKS among chronic patients, particularly due to its accessibility, affordability and cultural familiarity. Patients reported significant benefits, such as improved symptom management, reduced side effects compared to modern medications and enhanced emotional and spiritual well-being.

The study also identifies major barriers to utilising IKS, including the lack of institutional recognition, limited availability of trained practitioners, and insufficient scientific validation of some traditional methods. Despite these challenges, the findings emphasise the potential of IKS to complement biomedical approaches, especially in low-resource settings. Participants expressed a desire for greater integration of IKS into public health systems, including better education about traditional practices and their safe use alongside modern treatments.

This research underscores the need for policymakers and healthcare providers to consider the integration of IKS into public health frameworks. Such integration could enhance chronic disease management by offering holistic, patient-centered, and culturally sensitive care options in urban contexts. Further studies on the efficacy and safety of specific IKS practices are recommended to foster greater trust and acceptance among both patients and healthcare professionals.

Keywords: Indigenous Knowledge Systems, chronic illnesses, public health, traditional medicine, herbal remedies, yoga, Bhopal City, diabetes, hypertension, arthritis, asthma, holistic care, urban healthcare.

Revitalising the Jajmaani System for Batch Production Through Generative Design

Theme - Integrating indigenous and modern knowledge systems.

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Abstract

This paper explores the possibility of revitalising elements of the traditional Indian Jajmaani System, using Generative Design within the confines of modern batch production methods. The jajmaani system can broadly be described as a complex, interconnected web of personalised goods and services provided by a Kamin (Provider) to a patron, The Jajmaan. However, it is far more than just that. It not only prioritises interdependence and reciprocity among diverse groups of people, it also fosters a culture of diversity in design", wherein products and tools are designed keeping in mind the specific needs and, more importantly, characteristics of a given end user.

Research into the jajmaani system and its functioning was carried out through ethnographic study, interviews and observation of blacksmith communities in Pangna, Himachal Pradesh and Barwala, Gujarat. This research helped us understand and define the underlying principles of the jajmaani system to a greater extent. By adapting these principles to the modern design process, a framework can be created for more effective production of custom-made, user-focused product solutions. Artisans used to working within the jajmaani system have developed sophisticated, intuitive reasoning to assess a user and their requirements, ranging from simple question and answer to observation, which is a system of indigenous knowledge with far greater value than immediately obvious. The ability of a kamin to develop a relationship with their patrons and their problems and solve them in an intuitive and iterative manner is indispensable to the modern field of design. Developing this advanced intuitive reasoning ability can help designers not only empathise with their end users better but also define their design objectives, as well as constraints, in a much clearer and more user-centric manner.

Generative design algorithms can then be used to bridge the gap between traditional and modern practices. Designers and artisans using their reasoning to define constraints can use generative design algorithms to assist in more efficient iteration, creating products that are a blend of human understanding and machine efficiency. This can also allow for products that combine traditional aesthetics and materials with modern functionality.

Nevertheless, concerns such as equal access to technology must be addressed, and frameworks must be developed to ensure equitable sharing of knowledge between designers and artisans. By mindfully navigating these challenges, the essence and user-centrism of the jajmaani system, combined with the precision and efficiency of modern design technologies can lead to a more vibrant and diverse design ecosystem.

Keywords: Jajmaani System, Diversity in Design, Intuitive Reasoning, Blacksmith Communities, Generative Design.

Propelling the Globe Towards 2030 SDGs : Amplifying “The Bharat Way”

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Founder of Prajasetu Foundation, author, Public Policy Scholar, Consultant, DGCA certified drone pilot, holds expertise in Governance and is a practising expert with the below works.

Abstract

A comprehensive policy contains all the relevant stakeholders under its consideration. In regards to SDGs and its goals for 2030 any document must heed that same thought by word and virtue. India’s SDG Localisation attempts are pretty impressive compared to those of other countries. It is because it deals with more of what is being already done and being shelved to dust, is being dusted to take back as a nuanced practice and renaming them as sustainable.

The thought behind this is that this approach goes hand in hand with the lifestyle of Indian en-masse globally, and if this can be done in India, it can be applied anywhere in the world. The paper shall speak elaborately on the efforts of the government of India that are akin to the goals of upskilling, entrepreneurship, and One District One Product (ODOP). As many things can be attributed to one, localisation can cover many unexplored areas as advocated in this paper by thought, spirit and action.

This multifaceted approach reflects the long-standing cultural, ethnic, linguistic, sociological and spiritual processes of the land of Bharat. For example, there is a town named Thanjavur in Tamil Nadu, India, which was the capital of the mighty post sangam Cholas dating from the 8th century AD. It holds significance for the maritime trade of not restricting to the spices, unlike the trade with Greece or Rome, but much more.

The ancient knowledge of following the turtle routes specific to monsoonal weather and navigating the ships to reach Sri Vijaya (currently Indonesia) and Kadaaram (Malaysia and Singapore). It also served great for the later Marathas from the land of Deccan (present-day state of India Maharashtra, Telangana and North Karnataka) with their own customs and specifications with their maritime knowledge that blended in forming the current day scenario.

This knowledge of nature eliminated quite a dependence on equipment and machinery. Why is this a need now? Many things of the present day use elements that are posed to be harmful to the environment. Such Indian and expanded practices of the APAC region can pose a solution to many such toxic materials. It is not a mere replacement or a market toppling strategy but it is a wholesome knowledge that the world needs to know and might take it forward for a sustainable lifestyle. This paper also speaks on inferences and insights that may influence a behavioural nudge into the minds of people.

Publications

- The report - **"Nurturing the roots of Indian democracy - Prajasetu's Chronicles"** on Electoral Inclusivity and increased voter participation is published.
- Authored and published the **Book "Why Vote? An Exploration of India's Electoral Process"** as a part of Bharat Electoral Literacy Fest
- She authored the book **"Cyber Savvy" - Cyber Safety for Women and Children** in collaboration with Tamil Nadu Police.
- Presented the paper **"The Indian model of SDG Localisation"** at MDI Gurugram, Haryana, India Can be contacted via krithikaramasethu1006@gmail.com and through phone @+917898289796

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Works

- The Research paper **"Resettlement, Employment and Entrepreneurship of Military Civilians** (Agniveer and Ex-servicemen)" was presented at the Indian Institute of Public Administration.
- Worked on the Research and Analysis for the Bharat Electoral Literacy Fest report for electoral inclusivity and literacy.
- Arranged for International consultation events and supported the Voice of Tamil Nadu - Tamil Nadu's Youth statement ahead of COP 29, Baku Azerbaijan, for **UNFCCC YOUNGO.**
- Fellow Consultant from the **Premier cohort** of the nation's prestigious Mukherjee Fellowship by Policy Politics and Governance Foundation, India.
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Popularisation of Regional Indian Music: Driver for Language Preservation

Pramit Goel

Abstract

India's rich cultural diversity is both a source of national pride and a complex challenge. With 22 officially recognised languages and hundreds of dialects, the country represents a microcosm of linguistic diversity. However, the rapid globalisation and dominance of certain languages like Hindi and English have led to the endangerment of many regional languages. Regional languages are increasingly under threat, with fewer young speakers, leading to a gradual decline in cultural practices tied to these languages.

In the Indian context, music in regional languages serves as a vital tool for maintaining linguistic diversity. It encapsulates the identity, history and traditions of a community, acting as a bridge between the past and the present. To help preserve these languages, this study identifies the non-native regions in India that offer the most promising opportunities for expanding the popularity of music for each of the 14 regional languages. It analyses the audio features of 41,000 songs from 14 Indian languages on Spotify, employing two approaches – clustering algorithms and Random Forest Regressors. An overlap between the regions identified by both methods for any given language is considered a robust result, providing greater confidence in the results.

The results show that while geographical proximity is a significant factor in determining non-native market fits for the music of a given language, alignment in preferences of audio features driven by cultural similarities plays an integral role as well. The findings have important implications for music industry stakeholders, including artists, management, digital platforms and governments, who can leverage this data to devise strategies to expand the reach of regional music. This includes designing targeted marketing strategies, fostering cross-regional artist collaborations, and optimising content recommendation algorithms, among others. For government bodies and organisations focused on cultural preservation, the cross-regional adoption of music offers an innovative approach to preserving endangered regional languages by expanding the reach of their music in non-native markets.

Keywords: Music, Ethnomusicology, Spotify, Language Preservation, Clustering, Random Forest Regressor

Medicinal Practices of Kunknas: An Indigenous Tribe

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Abstract

An important part of Indian culture is preserved by the indigenous community through their religious practices, beliefs, values and culture of the community. All these things are reflected in their lifestyle. The Kunkana community from Dang, Gujarat, also portrays a vibrant Indigenous culture with a deep understanding of holistic life. Deeply rooted in century-old wisdom, food and health systems are complexly intertwined with Mother Nature. It stresses the use of locally available resources to promote well-being and prevent diseases. In the domain of healthcare, Kunknas relies on herbal medicine, leveraging the rich biodiversity of the Dang forest. Plants like Neem, Kher, Turmeric, Ambla, Castor, Mango tree, etc. are used to treat ailments ranging from fever and infections to chronic conditions. In their practices, traditional healers or Bhagats play a crucial role by using holistic remedies such as herbal concoctions, poultices and therapeutic massages. Taking care of measures, such as regular exposure to sunlight, using the appropriate part of a tree or plant, using specific forest herbs or plants to repel insects, etc., are the things advised by Bhagats. For instance, Ambla is used in many ways, such as being eaten daily for immunity. Ambla powder with sugar is beneficial in hemorrhagic disorder, and mixing the Ambla powder with Raisin and Ghee and consuming it in small balls will help to prevent nose bleeding. Different parts of the Neem tree are used to prevent multiple diseases, such as neem leaves are used for skin disease, the bark of the neem tree is used for Jaundice, and fruit of the neem tree with the combination of jaggery helps to get rid of piles. And many more to be explored.

This paper delves into the Kunkana community's remarkable ability to lead a life closely aligned with nature, minimising the occurrence of diseases and adhering to the curative measures rooted in indigenous knowledge.

Keywords: Indigenous community, herbal medicine, diseases, cure

Harnessing Indigenous Knowledge for Food Security and Health: Insights from Tribal Communities of Dang

Theme: Indigenous knowledge in food and health systems

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Abstract

Dang district in Gujarat is known for its rich cultural heritage and diverse ecological landscape. It serves as the northern gateway to the Western Ghats and harbours some of the densest forests in the state. The district, with a predominantly tribal population (~94%), is home to communities like the Bhil, Konkana, Varli, Kotwalia, Kathodi, Gamit, etc. Their livelihoods are profoundly shaped by nature due to limited agricultural opportunities, relying primarily on forest-based activities such as the collection and sale of non-timber forest products (NTFPs), livestock grazing and bio-resource utilisation.

Field studies and interactions with tribal elders, women, and traditional healers revealed that wild edible plant use and harvesting practices are highly synchronised with seasonal cycles and embedded in their cultural and religious traditions. Through generations of experience, they have harnessed these bio-resources not only as a source of sustenance but also as a cornerstone of their cultural identity. The monsoon season marks the beginning of the availability of herbaceous flora, some of which are consumed during their tender stage due to better digestibility. Others with longer life cycles continue to provide nourishment until late monsoon. As rivers recede and water availability gets restricted to specific areas, plants which grow in these conditions appear. Several of these cold-adapted plants thrive and fulfil the dietary needs of these tribal communities, which has even led to unique local seasonal cuisines. With the advent of summer, water availability in the hilly terrain becomes more restricted and herbaceous vegetation diminishes. The perennial vegetation of the Southern Tropical Moist Deciduous Forest, which includes several trees and shrubs, produces a fresh flush of tender leaves that provide vital nutritional support to these tribal communities during seasonal scarcity. Over 200 wild plant species, including approximately 45 species of wild leafy greens, enrich the tribal diet with essential vitamins, minerals and medicinal properties in addition to providing nutrition. Traditional cuisine often serves as preventive medicine, reducing the need for external remedies because, as one tribal elder said: 'their food is their medicine.'

Growing dependence and easy availability of staple crops like rice, wheat and maize is eroding crop diversity and threatening indigenous traditional diets. This trend has significant implications for dietary resilience and nutritional security. Understanding and documenting the diverse traditional food systems that such tribal communities not only helps to understand our cultural diversity and heritage but may also guide our survival in these changing climatic conditions.

Keywords: Dang, Indigenous Knowledge, Leafy Vegetables, Traditional Food Systems, Tribal Communities, Wild Edible Plants (WEPs)

Saviour Tankas: Investigating the Traditional Water Harvesting System, Focusing on Parsi Dharamshala, Ahmedabad

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Abstract

Ahmedabad's Old City is home to many religious communities, including Parsis. The Zoroastrians, originally from Iran, who moved to Gujarat, are known for their unique religious practices and core beliefs about the essential elements of nature to be conserved and worshipped as they are needed for the survival of all species. Water is seen as a life-giving source, symbolising purity and renewal in Zoroastrianism, and this reverence is reflected in their traditional water harvesting system called "Tankas". Their age-old wisdom includes well-designed underground water harvesting systems that guarantee access to clean water in the hot summers of Gujarat. These tankas are also a common feature of many of Gujarat's pre-modern residences. Today's rapid urbanisation with mushrooming concrete construction has consumed our precious heritage and caused irreparable damage to our planet, including a global water crisis. The Parsi community is dwindling, and there is a need to inquire about and discuss the sacred traditional practices of this community and the Indigenous wisdom of water storage facilities, namely 'Tankas'.

The Parsi Dharamshala premises near Relief Road in Ahmedabad have about one hundred thirty-year-old buildings, including sacred water spaces. The underground tanka of the Dharamshala holds profound religious and cultural importance. Today, the Parsi Dharamshala, a grade II-A heritage building, stands abandoned, crying for restoration. In 2017, the historic city of Ahmedabad received the UNESCO World Heritage City status, which came with regulations to preserve the historic fabric. This research focuses on the explorations of Parsi tankas in Gujarat, specifically on the tanka of Parsi Dharamshala. The literature review sheds light on Parsi's way of living and their religious beliefs concerning water. It compares Parsi tankas with other tankas of a similar time frame to inquire into the role of the traditional religious practices of Parsis in cherishing this age-old practice. Interviews of Parsi patrons of Ahmedabad led to their oral history of the tanka, its functioning in its prime era and the reasons for its subsequent degradation. The research contributes by inquiring into the importance of this traditional water harvesting system and recommending appropriate ways of restoration with the advent of newer technologies while preserving the sanctity of the sacred.

Keywords: Parsi Dharamshala Ahmedabad; Tanka, Traditional water harvesting systems, Old City Ahmedabad

Ancient Approach in Modern Architecture: Implementing Indigenous Knowledge with the help of Biophilic Design Principles

Abhinav Agarwal

Abstract

Indigenous communities have lived in harmony with nature for hundreds of years. They have built environments that support ecological balance, human health and cultural identity. Their building knowledge comes from local materials, natural design methods and sacred landscapes. This wisdom gives us key insights into today's urban spaces, which often lack a connection to nature. This summary will look at how indigenous knowledge can shape nature-friendly architecture. It aims to show how architects and planners can make spaces that boost both ecological and mental well-being.

Biophilia is a love of life; it states that humans have only two purposes to live: one is to sustain/project themselves from death and to make positive integration with each other. (life and life-like processes). Kellert Stephen

Traditional settlements such as the Dong villages of China, where architecture is integrated with surrounding forests and water bodies, or the vernacular step-wells of India, which naturally regulate temperature and conserve water, demonstrate how indigenous designs were inherently sustainable. The Himalayan Dzongs of Bhutan, constructed with timber and rammed earth, symbolise resilience in the face of natural disasters and spirituality. In fact, indigenous architecture, while being responsive to climate, is deeply related to human emotions and cultural identity.

Analysing traditional building techniques, sacred spatial planning, and community-driven development models, this study reveals how the ancient design practices were climate-responsive and helped to maintain ecological balance, biodiversity and emotional well-being. This paper further explores how modern projects, such as the Bosco Verticale in Milan and the Nairobi Green Belt Movement, have incorporated nature-based solutions inspired by indigenous wisdom into successful designs.

The work thus bridges ancient methodologies with modern innovations, proposing a regenerative design approach moving from sustainability toward healing and restoration. It contests the notion that adding indigenous knowledge to modern architecture is a form of nostalgia; rather, it becomes an urgent call to create meaningful, resilient, and ecologically sensitive environments. By nurturing a built environment that respects and revives ancestral ecological intelligence, we might be building towards a future in which architecture does not compete with nature but rather coexists with it, ensuring planetary and human well-being.

"The only way to prevent nature is to integrate that" Stephen Kellert

Keywords: Indigenous knowledge, biophilic architecture, cultural restoration, sacred landscapes, ecological resilience, traditional building techniques.

Revisiting Traditional Building Practices in the Indian Sub-continent Through Contemporary Green Building Certification Parameters

Theme: Indigenous knowledge in food and health systems

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Abstract

It is well-established that systems and strategies employed in the design, construction and operations of our traditional built environment have always been sustainable, energy-efficient and eco-friendly. Civilisations such as ours have always been doing this – in a very organic and socio-culturally inclusive and embedded manner. One did not need any rules, mandates or certifications to be sustainable – our understanding of ourselves was never really different from our surroundings, our society and our planet. Yet, we seem to have lost that somewhere along the way – and now we are coming back to 'sustainability' as defined by the industrialised Western worldview.

It is equally true that today, our projects, clients and designers seek and/or require validation and certification that is based on technology and data driven models of evaluating sustainability. Therefore, we see a plethora of green building certification systems being used in architecture, interior design and urban development. They are a standardised and widely accepted method of understanding and documenting the 'greenness' of a built environment.

Very often, one finds that proponents of both these green approaches (vernacular vs modern, technology-driven, certifiable) are at loggerheads with each other. This does not necessarily have to be the case.

This presentation bridges this gap by looking at some examples of traditional materials, methods, techniques and strategies through the lens of modern green building certification systems. It tries to evaluate how some of our centuries-old indigenous methods of building would have fared under the green building rating systems (LEED / IGBC) used around us today.

In the future, more exhaustive documentation, measurement, and research on such a case study can reveal a more accurate picture, but this would be a good way to initiate that conversation.

Keywords: Green buildings, Indigenous, Sustainability, Vernacular systems, tradition, modernity, architecture, built environment, Green building Certification.

Exploring the Decline of Indigenous Food of the Indian Nepali Community: A Sustainable Approach to Health and Well-being.

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Abstract

The Indian Nepali community, as part of the Himalayan community, has a rich heritage of indigenous knowledge related to food and health systems, drawing on nature, cultural traditions, and sustainable practices. This community has been utilising the medicinal plants available within their surroundings, traditional ways of healing, and organic modes of farming for centuries as remedies to sustain their health.

This paper, therefore, tries to bring indigenous food and its healing system among the Indian Nepalese people into light and discusses their contributions toward nutritional security, prevention from diseases and environmental sustainability. From the therapeutic use of timbur, or Sichuan pepper, to salted ghee tea and fermented foods like gundruk and sinki, and from the medicinal values of Himalayan herbs to the sustainable agricultural practices like terrace farming and agroforestry that have helped the community support biodiversity and climate resilience. These practices give valuable solutions to modern health challenges related to malnutrition, diabetes and lifestyle diseases.

However, traditional systems have been threatened by modernisation, deforestation and a decline in intergenerational knowledge transfer. This paper calls for policy recognition, scientific validation and community-driven conservation as immediate steps toward integration with indigenous wisdom and modern public health strategies. This paper urges to revive and protect this food and health practice, which improves the sustainable well-being among the Indian Nepali immigrants, strengthens cultural identity and contributes to greater discourses about sustainability and health security in India.

Keywords: Indian Nepali community, Indigenous heritage, environmental sustainability

Tracing the Devolution of the Eri System: A Tamil Nadu Context

Theme: Indigenous Water Management and Agricultural Practices

Amshula Ravi and Snehasri Sundaresan

Abstract

The Eri system, which is culturally specific to southern India, is among the oldest and most significant indigenous knowledge systems. The Eri system is a reservoir-based water management system that distributes water across multiple areas, benefiting agriculture and the ecology as a whole. Furthermore, it recharges groundwater, prevents soil erosion and minimises flooding. Eris can be categorised as either non-system Eris, which is fed solely from rain, or system Eris, which is fed by channels that divert river water. The eris system is a network of tanks surrounded by embankments and bunds that perform the above functions.

These networks of tanks, referred to as eris, are rapidly disintegrating in the present day owing to encroachment and excessive siltation, which has drastically decreased their storage capacity due to modernisation and development activities. In the Tamil Nadu context, both rural and urban areas have been victims of the adverse effects of climate change in terms of flooding and droughts, and the eri system has failed to mitigate such risks of disasters despite being its primary function. Additionally, by centralising an extensively decentralised system, our colonial past has substantially contributed to its ineffectiveness, thereby hindering the sustenance of such a knowledge system in the present.

In order to comprehend how the eri system functioned as an Indigenous knowledge system and how its failure in conjunction with climate change has increased the risk of disaster-prone zones within Tamil Nadu, this paper traces the devolution of the system from its origins, mechanisms and inefficiency. The eri system comprised storage tanks made by damming streams that flowed downward and were primarily used for irrigation. They also served other purposes during floods and droughts and played a major role in mitigating soil erosion. The integration and utilisation of such ancient knowledge systems in contemporary knowledge systems will also be the main topic of this paper.

Keywords: Eri system, Climate Change, Disaster-prone zones, Modern Knowledge systems

The Thinking Hands

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Abstract

This paper talks about the importance of age-old indigenous craft practices and knowledge systems that form a very important part of today's design education system. It informs us about the exposure of young craftspersons to the fundamentals of Design as taught in formal schools, being inspired to bring about innovation in their craft.

It further sheds light on the amalgamation of the traditional methods of making that have, over time, advanced to create something new. Upgradation of skills and an urge to learn the vocabulary of Design brings inspirational creative interventions to traditional craft, paving a way towards international exposure too.

The intention here is to primarily look at how the tacit knowledge has been used to articulate design interventions through practice, and also the formal training undergone by young craftspersons that bring a twist into their work. It also emphasises on the importance of the craft practises that are an integral part of the Design Education at Institutions.

To explain the same, an example of artist communities of Kutch, Gujarat, India has been shared. A reference of their work and their thought process has been studied. To conclude, this case study brings forth a sense of awareness of the inspiration that young craftspersons of today gain from the formal Design schooling practices and interaction of students and the design fraternity over the years, enabling immense scope to sustainable futures.

Keywords: Indigenous knowledge systems, tacit knowledge, thinking hands, craft

A Bond Between a Design University and a Craft Community: Sustainable Solution for Indigenous Crafts of Our Country

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Abstract

Our country is home to a wealth of indigenous crafts, each carrying a profound cultural legacy. At the same time, students in design universities are more connected to the global market than ever before. What if design universities created an ecosystem where students, from their Foundation year, not only studied crafts as case studies—something most design schools already do—but actively collaborated with craft communities? And by collaboration I mean identify new markets, Design products, and facilitate selling products.

This approach presents a sustainable solution that benefits all parties involved:

a. Students gain hands-on experience, applying their design education in real-world contexts while also earning from their work.
b. Craft communities receive direct support, as students—guided by professional faculty—help them access new markets beyond their traditional scope.
c. Universities strengthen their relationships with craft ecosystems, contribute to better documentation of indigenous crafts and even create revenue opportunities through collaborations.

Many traditional crafts are struggling to survive as mass production becomes cheaper and more accessible. However, despite the dominance of industrial goods, customers still seek indigenous craft products for their unique character and authenticity. By integrating crafts into modern product categories, this approach can help artisans and designers bring their work to global markets.

To test this idea, I am currently working with three student groups on a project with the Koftgari craft community. Koftgari, a centuries-old craft, was traditionally used to decorate swords and shields—objects with little functional relevance today. During a field visit to Udaipur, students studied the craft in depth. Upon returning, they identified alternative product categories where Koftgari could be applied—such as women's accessories, watches and lamps—effectively opening three new market opportunities for the artisans.

Currently, the student groups are seeking funding for their project and have already made two visits to the community to develop the first phase of prototypes. A third visit is planned to refine the designs further.

As an educator, my goal is to make this initiative a success—creating a working model that can be replicated with other crafts and communities in the future. If design universities embrace this approach, they can serve as powerful enablers of sustainable craft development, ensuring that our country's rich artisanal traditions continue to thrive in a rapidly changing world.

Reviving Kashmir's Indigenous Theatre in the Modern Era

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Abstract

Kashmir's native folk theatre, Bhand Pather, has long represented the secular spirit of Kashmiriyat and functioned as a platform for political criticism, artistic expression and social satire. Bhand Pather was originally a staple of Kashmiri culture, performed in public places like village squares and busy marketplaces. However, this practice has been marginalised and is on the verge of extinction due to westernisation, technology, no institutional support, misrepresentations and socio-political upheavals, etc.

This study explores Bhand Pather's changing characteristics and prospects for a modern renaissance. I interact with traditional Bhand communities in rural Jammu & Kashmir through ethnographic fieldwork, recording their artistic processes from script to stage, performance structures and oral histories.

One of the main goals is to modernise Bhand Pather by incorporating contemporary performing methods while maintaining its essential qualities. As part of this, I encourage new thematic frameworks that tackle topics highly pertinent to modern Kashmir, such as environment, saving water, gender, violence, social elitism and politics, etc. Furthermore, the research aims to create new performance venues and interdisciplinary partnerships so that Bhand performers can innovate while maintaining their traditional roots.

This research attempts to both chronicle and revive Bhand Pather as a dynamic, living art form through workshops, experimental performances and archiving. The study imagines a time when Bhand Pather will once again play a significant part in Kashmiri cultural expression by bridging the gap betweenance and resilience. Performance studies, indigenous knowledge systems and cultural preservation in conflict areas are some of the topics covered in this work.

Past Perfect, Future Tense – Heritage of Cob Construction in Gujarat

Rooshank Mehta

Abstract

Gujarat has a long history of building with earth. Three types of construction practices that utilise earth as a predominant building material are traditionally observed in Gujarat based on the regional context. These are cob, adobe and wattle & daub constructions. Similar to many other traditional building practices, earth-based building practices are on a steep decline. Buildings with industrial materials have become popular despite being expensive, unsustainable, climatically inappropriate and hence, out of context for the rural areas.

Cob wall construction is found right from north Gujarat and Kutch up to the Bhal region near the Gulf of Khambhat and central Gujarat. Once, cob houses were predominant features of rural Gujarat, with houses standing up to three storeys high. However, today, the practice has declined. People do not want to live in the kutcha cob houses due to the aspiration for modern pucca houses and the labour-intensive nature of construction and maintenance. The lack of demand for cob constructions has resulted in a lack of work for the artisan, leading to the loss of knowledge regarding the soil and construction techniques. Very few artisans can currently build using earth. This leads to the downward cycle for cob, where lack of knowledge results in poor construction, further reducing its demand.

The Oad community in Gujarat was known for their cob construction skills. Oad families lived a nomadic life, travelling from village to village and constructing and maintaining people's houses. They not only offered their skills and services but also developed and preserved indigenous knowledge about local soils and their use in construction. The loss of this heritage of knowledge system has led to poor quality housing and a complete loss of livelihoods for Oads. This has also been one of the key factors in the change in lifestyles of rural communities.

The paper will focus on the practice of cob construction in rural areas of Gujarat. It will further discuss the issues and reasons for its decline and relevance in the present context from the climatic and livelihood perspectives.

Rooshank Mehta has been involved in documenting this traditional knowledge system and developing technical guidelines to move forward in the present context.

Keywords: Cob, building with earth, rural housing, traditional artisans, vernacular construction, Indigenous knowledge system

Revitalising Forgotten Kunds: An Ecological Approach

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Abstract

Water systems have historically played a vital role in shaping the ecological and cultural fabric of Indian cities. In Varanasi, a city renowned for its spiritual heritage, 108 sacred kunds (water reservoirs) once served as critical resources for water management, social interactions and spiritual practices. However, rapid urbanisation and neglect have led to the degradation of these water bodies, with only a few remaining functional today. Among them, Suraj Kund holds significant ecological and cultural value. Situated in the southern part of Varanasi, it is part of a larger network of interconnected water bodies, including Dashashwamedh Ghat, Ram Kund and Laxmi Kund. Suraj Kund functions as both a spiritual hub and an ecological reservoir. However, years of neglect, poor maintenance and limited community engagement have compromised its potential.

This research paper serves as a design guideline for the management of water bodies located within dense urban neighbourhoods in the Indian context. Key interventions include the use of innovative technologies such as artificial floating wetlands, permeable pavements, bioswales, grey water treatment systems and black water treatment plants. These strategies aim to restore ecological balance, enhance biodiversity and promote sustainable water management. Community-driven initiatives form the cornerstone of this approach, fostering local participation and instilling a sense of ownership among residents. The project aspires to preserve the spiritual sanctity of Suraj Kund while addressing modern environmental challenges, setting a precedent for the sustainable revitalisation of traditional water systems in dense urban contexts. By balancing heritage conservation with ecological innovation, this initiative serves as a replicable model for safeguarding India's water heritage for future generations.

Keywords: Ecological Restoration, Traditional Water Management, Urban Revitalisation, Suraj Kund, Community Participation, Sustainable Water Solutions.

Multi Scaler, Dispersed Sewage Treatment System: Built environment as a platform for capacity development towards sustainable water management for rural India

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Abstract

India's population surpassed 1.4 billion in April 2023, with rapidly increasing urbanisation. By 2030, around 40% of the population will live in cities. While industrialised nations allocate over 70% of water to industry and urban households, India, where 64% of the population remains rural, currently uses 82% of its water for agriculture. Urban water supply demands are growing, forcing cities to extend pipelines to distant sources, while rural areas suffer from disproportionate water distribution. This unequal access is contributing to rising resentment in rural communities. Additionally, sewage treatment in both urban and rural areas demands extensive infrastructure, such as pipelines, to collect and treat wastewater efficiently.

Transchem Agritech Pvt Ltd and Squareworks LLP are working on a decentralised sewage treatment solution called the Trans Bio-Filter. This system uses organic mediums and earthworms to treat sewage, offering several technological advantages over conventional plants. These benefits include the production of nutrient-rich by-products (vermicast), minimal energy consumption, no sludge generation and a small footprint due to natural aeration.

Despite these advantages, deploying this technology in rural villages has faced challenges, especially in Chikodra Village, Gujarat. Although the technology was installed with the support of a CSR programme, the project faced issues such as inadequate planning for sewage pipelines, insufficient community participation and a lack of awareness about sanitation and the built environment. The local community struggled to maintain the sewage treatment system and integrate it into existing social structures, leading to the sustenance of the project.

Lessons learnt from this pilot project highlight the importance of community involvement in the design and maintenance of such systems. Additionally, building awareness about the use of wastewater by-products, like natural fertilisers, is crucial. This paper argues that the future success of such decentralised and natural organism-based water management systems depends on incorporating them into the built environment. Furthermore, water consumption patterns in rural areas must be understood together with regional characteristics, and water management must be integrated into the planning process.

Keywords: biofilter, rural development, decentralisation, water management, community participation.

Threading Sustainability: Indigenous Craft, Architecture and Climate Resilience in the Marwada Meghwal Community of Kutch

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Abstract

Indigenous knowledge systems embody centuries of adaptation to environmental and socio-economic conditions, offering sustainable solutions that remain relevant in contemporary discourse. The Marwada Meghwal community of Kutch in Gujarat is culturally famed for its embroidery traditions, which extend to the climate-responsive architecture that exemplifies ecological wisdom and resilience. The present investigation seeks to understand how their crafts and built environments operate as integrated knowledge systems for sustainable livelihoods while also reinforcing cultural identity in the face of environmental change and socio-economic adversities.

The study examines the intricate embroidery of the Marwada Meghwal women, which extends beyond artistic expression to serve as an archive of environmental narratives, community histories and traditional knowledge. Their textile work's motifs and colour palettes often symbolise natural elements such as flora, fauna and water sources, reflecting a deep ecological consciousness. The research also explores the sustainable material practices embedded in their craft, including using locally available, biodegradable textiles and natural dyes, which align with principles of circular economies and zero-waste design.

Parallel to their textile traditions, the community's architectural heritage presents an exemplary model of indigenous adaptation to extreme climatic conditions. The bhunga—a circular mud house with intricate decorative elements—demonstrates an intuitive understanding of structural stability, material efficiency and thermal comfort. These structures are designed to withstand seismic activity and harsh desert climates and utilise locally sourced materials such as clay, cow dung and thatch, ensuring a minimal ecological footprint. The integration of community-driven construction techniques highlights the value of collective indigenous knowledge in sustainable settlement planning.

In the face of modernisation, globalisation and environmental stressors, both embroidery and architectural practices within the Marwada Meghwal community face existential threats. The market-driven standardisation, loss of artisanal skills and shifts toward non-traditional materials pose challenges to preserving these time-tested practices. This research underscores the critical need for policy interventions, educational programmes and cross-disciplinary collaborations to support the continuity of these indigenous knowledge systems.

Drawing together craft, architecture and climate resilience, this research helps facilitate a broader dialogue on integrating indigenous wisdom with contemporary frameworks for sustainability. Interrelating crafts, architecture, and climate resilience, this research facilitates a dialogue on integrating indigenous wisdom with contemporary frameworks for sustainability. The findings advocate for a more inclusive approach to sustainability—one that values indigenous methodologies as vital contributors to global environmental resilience.

Keywords: Indigenous knowledge, sustainable craft, Marwada Meghwal embroidery, climate-responsive architecture, cultural resilience, traditional dwellings, sustainability, environmental adaptation.

Indigenous Wisdom in Urban Conservation: A Case of Revitalisation of the Delhi Ridge Through Cultural and Ecological Restoration

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Abstract

Sacred landscapes are often considered a vital component of cultural and ecological assets that embody a deep connection between human societies and their relationship with nature. In the context of Delhi, the Delhi Ridge represents one such landscape that is more than merely a green space to protect the city but plays an important part in the city's ecology and culture. It has historical, religious, and ecological value as it is a part of the former Aravalli range that runs across the city. However, it has steadily deteriorated over time due to urbanisation, encroachment and neglect from both the government and the people. Because of this, the ridge's restoration calls for a strategy that incorporates indigenous knowledge systems and cultural restoration in addition to conservation and afforestation.

For generations, the indigenous groups residing within the vicinity of the ridge have used sustainable techniques that preserve ecological balance to live in harmony with the natural world. The reintroduction of native plant species that are suited to the dry climate of Delhi Ridge, such as Acacia nilotica and Anogeissus pendula can be guided by this local knowledge, which will ultimately help in restoring the groundwater table. Additionally, cultural restoration may strengthen the ridge's relevance as a living cultural and ecological organism via historical protection, community participation and the resuscitation of traditional environmental management.

The Delhi Ridge may be revived as a sustainable city-making paradigm by incorporating these knowledge systems into modern urban design. In urban ecological conservation initiatives, this method emphasises the necessity of comprehensive, community-based and culturally grounded restoration techniques. The research will explore the role of sacred landscapes and their associated indigenous knowledge systems in the restoration of the ridge, emphasising the interconnectedness of ecology, culture and community participation. It will also address the issues of urbanisation, deforestation and policy gaps while simultaneously examining the ridge's historical, ecological and socio-cultural significance. The research will also help highlight the importance of ethno-botanical knowledge in biodiversity restoration by documenting traditional methods of afforestation, water conservation and land management.

Keywords: cultural restoration, ecological conservation, ethno-botanical knowledge, sacred landscapes, indigenous knowledge systems

Reviving Storytelling Traditions: Cultural Restoration Through Indigenous Knowledge and Community Gatherings

Theme: Sacred Landscapes and Cultural Restoration

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SICCA Collective

Abstract

This paper portrays the case studies that focus on indigenous art forms in India, based on SICCA Collective's on-ground experience in documenting oral traditions. It describes the central theme of how, in the documentation and revitalisation of these traditions, the key to cultural sustainability and the empowerment of the communities lies. In detail, it investigates the Baul tradition of Bengal, the art forms of the Bhil community of Rajasthan and the other art forms of Gujarat. The paper argues that these artistic expressions are not only aesthetic artefacts, but also indigenous knowledge systems that are invaluable to sustainable living practices.

The research methodology is an ethnographic approach, with in-depth interviews with community members and artists and documentation of performances and traditions. For the Baul tradition, the study analyses the lyrical content of their songs - exploring the themes of philosophy, spirituality and social commentary while also documenting the unique musical instruments and the performance styles. Through the Bhil community case study, it observes that the practice of singing together at festivals is still a crucial part of their culture. Seasonal and folk songs are sung by women from different households. Such gatherings are sites for strong social bonds, oral history and community participation. As the women sing, young girls play traditional games, and they add to their own improvised versions, ensuring that these folk traditions continue to evolve from generation to generation.
The research also focuses on the observations of various communities in Kutch through different art forms, focusing on textile traditions and reviewing the impact of these practices on the cultural identity of the tribes and how these practices are interconnected with their cultural identity and ecological understanding.

This paper highlights how these art forms are interconnected with the livelihoods of the communities and their relation with nature and the environment. It also explores the challenges that these traditions face, including modernisation, lack of intergenerational transmission and economic pressures. The documentation of these indigenous art forms by SICCA Collective not only serves to preserve cultural heritage but also empowers communities to reclaim their narratives. The study also investigates how this material can be used for educational purposes, cultural tourism initiatives and building sustainable economic opportunities for their communities, leading to a sustainable future.

Keywords: Indigenous Knowledge, Cultural Preservation, Storytelling, Oral Tradition, Community Resilience, Sustainable Development

Revisiting Indigenous Maximalism: A Sustainable Approach to Craft Revival

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Abstract

Maximalism has always been at the heart of Indian culture—reflected in grand festivals, intricate temple carvings, handcrafted textiles like zardozi sarees and the vivid storytelling of Madhubani paintings. Unlike modern perceptions of excess, Indian maximalism was deeply rooted in sustainability. Artefacts, garments, and architecture took months or years of meticulous craftsmanship, designed to last for generations. Natural materials like clay, metal and dried leaves were used to create functional beauty, such as dona pattal, an eco-friendly leaf plate that fed hundreds while leaving minimal waste.

For centuries, India embraced slow living and longevity as a way of life—seen in heirloom jewellery passed through generations, the enduring elegance of a mother's saree or the preserved pottery of Harappa. Maximalism was not about waste but about value. However, with globalisation and the rise of Western minimalism, this cultural identity has been overshadowed, leading to a decline in traditional crafts and economic sustainability for artisans.

This paper aims to differentiate between ornamental excess and culturally rich maximalism—challenging the dominance of Western minimalism in mainstream design. Indigenous maximalism is not just an aesthetic; it is a philosophy of conscious consumerism, handmade craftsmanship and storytelling. By embracing our local roots, we can revive traditional crafts, support artisans and create a sustainable future where design is not just functional but deeply meaningful.

Keywords: Maximalism, Indigenous Design, Craft Revival, Sustainable Practices.

Timeless Water Systems: Reviving the Legacy of Ahmedabad's Stepwells

Prathma Mehta

Abstract

When it comes to Indigenous knowledge systems and Water Management Practices, traditional stepwells in the city of Ahmedabad are the first thing that comes to mind. These stepwells, or vavs, dating back to the Solanki and Vaghela dynasties, were not only utilitarian but also held immense cultural and spiritual significance. These subterranean structures were a testament to India's indigenous water management systems, blending architectural ingenuity with sustainable hydrological practices. Reviving these old water systems can be crucial in tackling the current issues of water shortage, especially in light of the mounting pressures of urbanisation and climate change.

Integrating Indigenous and Modern Knowledge Systems
A robust and resilient urban water infrastructure can be produced by combining contemporary hydrological engineering with conventional stepwell designs. Modern urban planning can incorporate strategies like rainwater collection, groundwater recharge, and passive cooling systems that are built into stepwell architecture.

Indigenous Water Management and Agricultural Practices
Stepwells historically sustained agrarian communities by providing a year-round water source for irrigation. Groundwater recharging was ensured by their tiered structure, which allowed for gradual percolation. By integrating stepwells into community-based water-sharing networks, urban agriculture and decentralised water management can take advantage of these ancient systems and lower reliance on over-extracted borewells and municipal supply.

Climate Resilience: Adaptation and Mitigation
Historically, stepwells were essential climate adaptation strategies in Ahmedabad's arid climate. Their deep constructions produced microclimates that reduced the urban heat island effect and provided cool places to rest. By lowering surface runoff, averting flash floods and recharging aquifers, stepwell restoration and integration into green urban corridors can support climate resilience.

Sacred Landscapes and Cultural Restoration
Stepwells were not just utilitarian but also held sacred significance, serving as pilgrimage sites and community gathering spaces. Restoring them presents a chance to restore lost cultural connections and reintroduce them as social hubs in the city. These structures may reclaim their place as essential components of Ahmedabad's socio-spatial landscape by increasing their accessibility and awareness through heritage tourism and public involvement.

Technology Meets Tradition in Architecture and Design
Stepwells can be kept functional while maintaining their architectural integrity by using strategies like digital mapping, structural retrofitting and sustainable water purification.

Policy Integration for Sustainability
Stepwell conservation and adaptive reuse require a unified policy framework. To stop invasion and deterioration, government incentives, community involvement and legal protections must be strengthened.

Restoring Ahmedabad's stepwells is not only a conservation measure; it is also essential given the city's declining water supplies and climate change. Stepwells can once again play a crucial role in an urban future that is sustainable and water-secure by combining traditional knowledge with modern innovations.

Jhum and Other Traditional Agricultural Practices in Arunachal Pradesh

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Abstract

The traditional agriculture practices in the tribal state of Arunachal Pradesh (AP) have been fascinating. The state, nestled in the foothills of the Himalayas in northeast India, was called *"Terra Incognita"*, or No Man's Land, till the beginning of the 20th century (Begi, 2008). AP is the biggest state in the North-East Region with an area of 83,743 sq km; 98% is land, of which 80% is forest cover, and 2 % is water, with a population of 15,80,000 (2024, estimated) also blessed with its vast biodiversity. AP is among the world's 25 biodiversity hotspots (Mandal R K, 2009). Approximately 69% of the area is covered by forests, with an international border of over 1,680 km and an internal border of 859 km.

Among various agricultural practices, jhum or Shifting Cultivation is prevalent. From the above statistics, we see plain land is scarce, which perhaps compelled the tribal people to opt for jhum cultivation. The process involves clearing and burning the forest land. The burning enriches the soil's potash, adding to its nutrient content. After a few cycles, the burnt soil loses fertility, resulting in barren land. As per an estimate, more than six lakh tribal families of NE states, Odisha, Andhra Pradesh and Himachal Pradesh, practice jhum cultivation continuously (IGNOU, MARD, Study Materials, 2007).

In the age of sustainable development, this practice is deplorable. Against this backdrop, the study is attempted. The aim is to bring a constructive debate to the fore and reflect on whether debarring farmers from this practice will lead to snatching their livelihood and what the allowable option can be. Then, what other sustainable practices are there for them?
There are 26 major and 110 sub-tribes in AP. Major tribes like Adi, Aka, Miji, Nyishi and Singpho depended on women workers for jhum cultivation, which also led to polygamy. Galo tribe employs other locals on payments. Jhum involves lots of manual labour. Not all tribes practice jhum, and other sustainable practices are not well-known to the public. For example, the Apatani, Khampti, Monpa and Sherdukpen, all major tribes, follow monogamy and practice settled cultivation. Monpa gather leaves of oak (Parmong) trees, which help in water retention and produce compost for agriculture. Paddy-cum-fish farming of Apatani is a form of settled cultivation.

The planet is afflicted with the darker sides of climate change. This study seems important to the Himalayan heights. Deforestation is one of the world's most pressing problems, jhum adds to it. Sustainability is our common destination.

Keywords: Arunachal Pradesh, Jhum, Sustainability, Paddy-cum-fish Farming, Land of Mon.

Indigenous Knowledge and Agrarian Futures: The Resurgence of Natural Farming in India

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Abstract

Natural farming, as the name implies, is a technique of agriculture that focuses on the naturalness of the processes that go into the production of food. However, its epistemic roots are not confined to the mere art of growing food naturally; it has a deeper connotation. Natural farming is not just a practice but represents an alternative epistemology that draws its base from indigenous knowledge systems, which have been marginalised under the pretext of embracing modernity and scientism.

With the coming of the Green Revolution in India, which signified the advent of a new modernity in the field of agriculture, there was a heightened othering of the so-called traditional methods and ways of farming. Caught in the duality of modernity and tradition, practices that supported natural farming were dubbed "unscientific", "backwards" and "unproductive". This othering led to the marginalisation of not just indigenous practices but also indigenous food systems. However, today, we are witnessing a resurgence of natural farming in 21st-century India through movements like Zero Budget Natural Farming (ZBNF).

This article uses the politics of knowledge as its epistemic framework to understand the resurgence of natural farming in 21st-century India. It employs a qualitative methodology based on fieldwork findings from case studies in the villages of Bhopal and Sehore districts of Madhya Pradesh. The central question the author poses is: Is the resurgence of natural farming in 21st-century India a sign of the decline of the superficial claims of the success stories of the Green Revolution? How do we see practices like Zero Budget Natural Farming (ZBNF), which are not just acts of growing food naturally but also a broader social movement that challenges the hegemonic narrative of capitalist industrial agriculture? Through these questions, the author tries to understand the current challenges in incorporating practices like ZBNF and the broader implications of its adoption within India's agricultural landscape.

Keywords: Indigenous Knowledge System, Natural Farming, Politics of Knowledge, Traditional Food Systems, Zero Budget Natural Farming (ZBNF)

Rethinking Urban Planning: The Role of Wetlands in Ahmedabad's Water Management and Flood Control

Mansi Shah

Abstract

Today, worldwide, urban wetlands that are recognised for their ecological and hydrological importance are increasingly threatened by urbanisation and poor management practices. Wetlands provide critical ecosystem services such as flood regulation, groundwater recharge and biodiversity conservation. Yet, their degradation due to urban expansion, pollution and mismanagement has reached alarming levels globally. According to the Ramsar Convention, approximately 35% of the world's wetlands have been lost since 1970, with urbanisation identified as a primary driver.

Ahmedabad, a rapidly urbanising city in India, faces significant challenges in managing its water resources and mitigating flood risk. Conventional urban planning approaches have often overlooked the importance of wetlands in addressing these challenges. Rapid urbanisation destroys the water bodies, and that directly affects the ecosystem. (Patel et al. 2021, n.d.). Ahmedabad, located on the banks of the Sabarmati River, was historically enriched by a network of 200 wetlands, including lakes and stepwells. In an interview with The Secretariat, Manvita Baradi (Urban Management Center) said, "At one point, Ahmedabad had more than 200 lakes, all of which have been encroached upon. Through them, the surrounding areas were able to recharge groundwater, which would then also improve the quality of water. Even pavements are supposed to be permeated.

This research critically examines the potential of wetlands as key infrastructural assets in Ahmedabad's urban water management and flood resilience. By rethinking urban planning through an ecological lens, this study investigates how integrating wetlands into city planning norms can enhance water retention, mitigate urban floods and contribute to sustainable urban development. Through spatial analysis, policy review and case studies of successful wetland-integrated urban planning models, the research aims to establish a framework that recognises wetlands as natural infrastructure.

This study advocates for a paradigm shift, proposing that wetlands be formally integrated into Ahmedabad's urban planning and governance. The findings will offer valuable insights for policymakers, urban planners and environmentalists, providing evidence-based recommendations to reimagine wetlands as multifunctional assets in urban infrastructure. By doing so, the research contributes to the broader discourse on sustainable urban development, ensuring that Ahmedabad's growth aligns with ecological integrity and long-term water security.

Keywords: wetlands, urban planning, water management, flood control, nature based solutions, sustainable urbanisation.

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