Sustainable Architecture Practices

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Sustainable Architecture Practices

Produced by
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British Council

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Foreword

A Note from the British Council

The British Council's core mission is to build collaborative global communities that inspire innovation and enterprise, creating new opportunities for the UK and global creative sectors to connect. Led by the Bengal Institute for Architecture, Landscapes and Settlements, this British Council-commissioned research initiative brought together specialists from both Bangladesh and the UK to jointly produce a national overview and case studies. This model of international collaboration increases the circulation of design knowledge and builds stronger connections between design sectors globally.

The UK creative industries contribute £124 billion GVA (Gross Value Added) and 2.4 million jobs and the UK Government's 2025 Creative Industries Sector Plan identifies the importance of further driving innovation-led growth. This research identifies exemplary practices in Bangladesh that expand and deepen global conversations on research and design in architecture and design innovation for sustainability. Further, this research demonstrates how architecture in Bangladesh fosters a creative economy that generates local livelihoods and supports the transition from informal to formal employment.

Sustainability here is reframed not as an aspiration but as a critical "survival strategy" and an "ethical practice" — a framing that resonates with the UK's own Net Zero priorities. The report provides critical insights in support of Bangladesh's National Adaptation Plan, exploring how spatial practice can protect biodiversity and mitigate disaster risk in a country where climate-related events affected 3,766 persons per 100,000 in 2021. It also celebrates the policy advances — including the National Environmental Policy 2018 and National Agriculture Policy — that have catalysed grassroots movements such as urban rooftop gardens, transforming city spaces into productive landscapes.

The research addresses the pressures of rapid urbanisation by highlighting community-led housing processes and approaches to public space that prioritise social equity and climate resilience. In line with the UK's commitment to green practices and supply chain resilience, and with SDG 12 on Responsible Consumption and Production, it showcases resource circularity through architecture that upcycles industrial materials — repurposing gas pipes, for instance — to redefine what sustainable construction can look like.

The findings presented here are relevant beyond Bangladesh. Active dissemination of this work is essential to driving broader global impact — and to ensuring that no marginalised community is left behind.

Sadia Rahman, Head of Arts at the British Council in Bangladesh

Sevra Davis, Director of Architecture Design and Fashion at the British Council

Foreword

A Note from the Bengal Institute

The topic of sustainability is now part of a shared global concern although it gets articulated differently in different places. On the one hand, sustainability calls for a brake on industrial and corporate capitalism, and all that spins out of it, such as unbridled urbanization, consumerism and waste culture, and on the other hand, it presents a new paradigm in thinking and practice, we might say, ethical practice, especially in what we do as humans on the earth, and to the earth.

Architecture plays a critical role in advancing the practices of sustainability. While sustainable practice in architecture is a fairly well-trodden topic, we can still rehearse a few things that are ongoing. We can list the following topics critical to sustainable practices in architecture: energy efficiency, carbon reduction, health and wellness, ecological security, social equity, community enhancement and creative economy.

Our task for this project was simple enough to identify and describe sustainable architecture practices in Bangladesh. In going forward, we became aware of a few things:

> that we will not distinguish between formally and professionally produced architecture and what can be described as informal, or in the words of Bernard Rudofsky, 'architecture without architects'; that we will not adhere to a simple understanding of architecture as building form, but architectural practice as a spatial practice that involves a process; and, that we recognize the broadness of the scale of sustainable practices – from organizing a region in response to climate hazards and the arrangement of a city for social equity to how a farmer innovates a water pump in his village.

As a consequence, we anticipated that our research on sustainable architectural practices in Bangladesh will yield a revised understanding of architecture, perhaps even broaden the scope of what we consider as architecture.

We are grateful to a number of key people for, first, instigating a renewed reflection on sustainability, and second, identifying topics and themes particular to Bangladesh. Dr Atiqur Rahman, Professor Ripin Kalra and Khondaker Hasibul Kabir, as key members of the core research team, and other members from Bengal Institute, provided the necessary foundational direction. Redefining utility with moral and social consciousness, Dr Atiqur Rahman emphasized social responsibility in planning and development activities. He also talked about the significance of the ecosystem – the mutuality of things that are made and that happen. He mentioned those in the context of resource allocation and consumerist waste culture. Professor Ripin Kalra reminded us that

buildings are big consumers of energy and that we need to face the challenge together through a community partnership. He also stressed nature-based solutions in sustainable and resilient adaptive practices in the context of hydraulic Bangladesh. Khondaker Hasibul Kabir emphasized community and partnership, that is, the power of activism and the crucial need for community engagement from the start. He made an important point: Sustainability is not just design—it's a survival strategy.

Architecture plays a critical role in advancing the practices of sustainability. While sustainable practice in architecture is a fairly well-trodden topic, we can still rehearse a few things that are ongoing. I can list the following topics critical to sustainable practices in architecture: energy efficiency, carbon reduction, health and wellness, ecological security, social equity, community enhancement and creative economy.

— Kazi Khaleed Ashraf

This author made a point about how, in Bangladesh, what was once inherently sustainable through local and historical knowledge is now either lost or subsumed in a new economic world order. It is therefore important to reevaluate indigenous practices, techniques and skills while we adopt innovations and developments. In a context where waste and consumption remain an important aspect of going forward, there is a need to discuss the shifting nature of human habits, behavior and perception, in how our needs and desires – in terms of how they are manufactured – play a big part. If there was a bottom line to our discussions, it was this: Architecture needs to find a new relevance by focusing on ecology, environment and climatic ethics.

It was agreed in our deliberations that advocacy plays an important role in the advancement of the ideas and practices of sustainability. Kabir accurately noted the need for an active awareness of sustainability in education, governance, and professional culture, and David Knox of the British Council stressed the need for communication and shared knowledge for a broader impact. While the immediate task of the current project was to locate and identify exemplary practices, we hope that the findings will go far in awareness and advocacy.

A considerable portion of the project involved researching and identifying projects that fell under our categories of sustainable practices, and further documenting and studying the details for elaboration and presentation. A big team worked under the able leadership of Nusrat Sumaiya. The team included Farhat Lamia, Saleh Ahmed, Rida Haque, Mashiat Iqbal, Shamim Ahmed, Asif Shifat and others.

We thank the British Council in Bangladesh, especially David Knox and Sadia Rahman, for initiating and supporting the important research project.

Kazi Khaleed Ashraf, Director General of Bengal Institute of Architecture, Landscape and Settlements

Introduction

Sustainability is now a global rallying call for the sustenance of the earth as we know it and for the survival of humanity upon it. There is an acknowledged consensus among nations to realign development goals and practices toward a more balanced and enduring future. Within this global context, architecture emerges as a critical discipline, both as a responsibility and as a response, to shape the physical, social, and ecological dimensions of sustainability.

In Bangladesh, sustainable architecture is increasingly recognized as essential for addressing environmental challenges, fostering resilient communities, and promoting social and economic equity. In a country characterized by diverse climates, dense urban settlements, and vulnerable rural ecologies, architectural interventions must go beyond aesthetics to embody ecological stewardship, social inclusion, and cultural continuity.

This report has been developed under the Sustainable Architecture Practices research initiative, supported by the British Council. It presents curated case studies of exemplary architectural and spatial practices across Bangladesh. Each case represents a particular theme or category of sustainability that is locally grounded yet globally significant.

Through a rigorous multi-phase research process involving expert consultation, project scoping, and thematic selection, the study identifies ten representative projects that demonstrate how sustainability in architecture can be both a design principle and a way of life. These projects range from community-led housing and educational environments to innovative agricultural systems and adaptive industrial practices. Together, they reveal that sustainability in Bangladesh is not a distant ideal but a living, evolving reality shaped by local knowledge, creativity, and collective resilience.

Nusrat Sumaiya, Director of Research, Bengal Institute of Architecture, Landscape and Settlements

Methodology

The Sustainable Architecture Practices (SAP) research project was undertaken to identify, analyze, and document exemplary architectural and spatial practices in Bangladesh that embody the principles of sustainability. The study was designed to be both rigorous and inclusive, combining expert consultation, systematic review, and field-based documentation. The process ensured that the selected projects represent not only design innovation but also social and ecological responsibility.

The research was carried out in four phases to ensure methodological coherence, analytical depth, and representational diversity.

Phase 1

Research Design and Expert Consultation

The first phase focused on developing a framework to define sustainable architecture within the specific context of Bangladesh. While global benchmarks and international standards were reviewed, the definition was grounded in local realities—ecological conditions, climatic challenges, and social and cultural dynamics.

A series of workshops and consultations were held with leading experts in the field, including **Professor Kazi Khaleed Ashraf, Dr Atiqur Rahman, Professor Ripin Kalra, Architect Nusrat Sumaiya,** and **Architect Khondaker Hasibul Kabir.** Their insights guided the conceptual foundation of the study and established parameters that reflect sustainability as both a professional and community practice.

The discussions emphasized four key principles for evaluation:

1. Responsiveness to climate and environmental conditions
2. Inclusion and participation of local communities and actors
3. Adaptation and innovation with indigenous materials and techniques
4. Promotion of social equity and sustainable development

This phase concluded with the identification of ten thematic categories of sustainability, representing the diverse ways architectural practice contributes to environmental resilience, social inclusion, and economic transformation in Bangladesh.

Phase 2

Project Scoping and Documentation

The second phase involved identifying and documenting a broad range of architectural and spatial projects that demonstrate sustainable practices across different contexts and scales. The research combined expert recommendations with an extensive desktop review and selective fieldwork.

Information was gathered from a variety of sources, including:

1. Published design reports, academic articles, and institutional archives
2. Award and exhibition listings highlighting design innovation
3. Media coverage and project documentation
4. Networks of professionals and academic institutions across Bangladesh

This process yielded a pool of more than forty projects that demonstrated sustainability through various approaches. The projects represented a wide range of typologies and scales, spanning residential, educational, industrial, agricultural, renewable energy, and community infrastructure interventions. They included both professionally designed works and community-led initiatives.

Each project was reviewed for its location, typology, scale, innovation, and social impact, ensuring that the selection reflected geographic, typological, and social diversity across Bangladesh's varied ecological and cultural regions.

Phase 3

Project Assessment and Thematic Division

Following identification, each of the shortlisted projects was assessed using six key parameters to ensure a consistent and transparent evaluation process. These parameters helped the research team understand how each project addressed sustainability across environmental, social, cultural, and economic dimensions.

Evaluation Parameters

1. Geographic Representation
Projects were selected to represent the diverse ecological, cultural, and socio-economic contexts of Bangladesh, with coverage across multiple administrative divisions.

2. Typological and Scalar Diversity
The projects encompass a wide range of building types and scales, from small household units to medium-scale schools, factories, and large community or flood-adaptive landscape interventions.

3. Climate and Environmental Responsiveness
Each project demonstrates strategies for climate adaptation, energy efficiency, and material innovation, prioritizing designs that minimize environmental impact and enhance resilience.

4. Social and Cultural Relevance
The projects actively engage with communities, preserve and reinterpret local traditions, and promote inclusivity, participation, and cultural continuity.

5. Creative Economy
The projects foster local skill development, participatory design, and livelihood generation, linking sustainable architecture to broader socio-economic benefits.

6. Alignment with Sustainable Development Goals (SDGs)
Each project was reviewed for its alignment with relevant SDGs, highlighting contributions to global sustainability objectives through local and context-sensitive action.

Based on these assessment parameters, the projects were organized into ten thematic categories that reflect distinct but interconnected dimensions of sustainability in architectural and spatial practice. Each theme captures a specific aspect of how design contributes to environmental responsibility, social inclusion, cultural continuity, and economic transformation. Within each category, several projects were shortlisted, and one representative project was selected for in-depth documentation and analysis.

The Ten Thematic Categories

1. Building for Community Welfare
2. Improving Education Access
3. Advancing Food Production
4. Making Sustainable Building Forms
5. Applying Modularity
6. Planning for Climate Resilience
7. Reviving Indigenous Practices
8. Applying Adaptive Reuse
9. Practicing Material and Craft Innovations
10. Creating Innovation in Water and Energy

Sustainable Development Goals

Each of these themes was developed through iterative consultation and comparative analysis, ensuring that the final selection represented the breadth of sustainable practices across Bangladesh. The thematic framework not only guided case study selection but also structured the subsequent analysis presented in this report.

Phase 4

Field Visits and Report Compilation

In the final phase, the selected projects were visited by members of the research team for detailed documentation. The field visits provided first-hand insights into design intent, construction techniques, material use, and community engagement. They also allowed the team to verify information gathered through secondary sources and to record lived experiences of users and stakeholders.

The documentation process included:

1. Site visits and photographic documentation
2. Interviews with architects, users, and community members
3. Collection of drawings, models, and technical details
4. Review of project reports and archival sources

This phase generated a rich body of qualitative and visual data, forming the foundation of the case studies presented in this report.

Analytical Dimensions

Critical Thinking

Each project was examined not only for its physical and technical qualities but also for its environmental, social, and ethical implications. The team critically evaluated design decisions to understand how they addressed sustainability in context. Documentation was developed to communicate design intent, user experience, and cultural meaning in a clear and accessible way.

Triangulation

Multiple sources of evidence were combined to ensure the accuracy and depth of the analysis. Observational data, interviews with architects, users, and stakeholders, as well as archival and technical materials, were brought together to create evidence-based narratives for each case study.

Field-Based Refinement

During fieldwork, the team reassessed selected projects, identified emerging or under-recognized practices, and refined the thematic categories based on real-world observations. This adaptive process ensured that the report captured not only established examples but also evolving and grassroots practices shaping sustainability in Bangladesh today.

The final report represents the outcome of this comprehensive and reflective research process. It combines expert knowledge, analytical frameworks, and grounded field experience to present a nuanced understanding of sustainable architectural practices in Bangladesh. The findings are organized into ten thematic sections, each illustrating a key dimension of sustainability through one selected project, supported by related examples and reflections.

10 Thematic Frameworks
10 Primary Case Studies
24 Further Case Studies

After assessing and documenting all shortlisted projects, they were organized into ten thematic categories that capture the different ways sustainable architectural practices are being interpreted and implemented across Bangladesh. Each theme represents a distinct yet interconnected dimension of sustainability, reflecting how design engages with people, environments, materials, and systems.

Together, these themes form a comprehensive framework that connects architecture with broader processes of ecological resilience, social inclusion, cultural continuity, and economic transformation. Within each theme, several projects were shortlisted for their relevance and innovation, finally one project was selected for detailed documentation and analysis. The following section introduces each thematic category along with one primary case study and further case studies.

1. Building for Community Welfare

Design can help communities organize, support each other, and take ownership of change. The projects in this category focus on collective processes where residents plan, save, and build together. They emphasize social inclusion, affordability, and local leadership as key elements of sustainable community development.

Primary Case Study
Jhenaidah Citywide Housing Process, Jhenaidah

Further Case Studies
Floating Homes / Dream House, Dular Char, Shariatpur
Incremental Slum Upgrading, Jogen Babu Maath Slum, Dinajpur

2. Improving Education Access

Learning spaces in Bangladesh often go beyond the idea of a conventional school. They can be classrooms, training centres, or community hubs that bring people together. The projects in this category show how education and architecture can work together to make learning accessible, climate-responsive, and meaningful to local communities. When education is designed with people and their surroundings in mind, it becomes a shared platform for empowerment and creativity.

Primary Case Study
METI Handmade School, Rangpur

Further Case Studies
Arcadia Education Project, South Kanarchor
Floating Schools, Various Locations
DESI Training Center, Rudrapur, Dinajpur

3. Advancing Food Production

Food production in Bangladesh takes place in both rural and urban settings, often in challenging environmental conditions. The projects in this category explore how architecture and design can support agriculture and aquaculture through innovation and adaptation. They include floating farms that thrive during monsoon flooding, sorjan farming that combines land and water, and rooftop gardens that turn city spaces into productive landscapes. Together, they demonstrate how architecture can contribute to food security, local economies, and ecological balance.

Primary Case Study
Floating Farms, Various Locations

Further Case Studies
Urban Rooftop Gardening
Floating Cage Fish Farming
Sorjan Farming: A Climate-Smart Approach

4. Making Sustainable Building Forms

Well-designed buildings respond to their environment through their form, orientation, and materials. The projects in this group demonstrate how architecture can use natural light, ventilation, and structure to reduce energy use and improve comfort. They show that sustainability can be achieved through design decisions that make buildings functional, efficient, and humane. These projects include industrial, institutional, and hospitality buildings that prove environmental responsibility and aesthetic quality can work hand in hand.

Primary Case Study
Green Field of Karupannya Rangpur Factory

Further Case Studies
Dusai Resort & Spa, Moulvibazar, Sylhet
Mohila Samity Complex, Dhaka
BRAC University, Dhaka

5. Applying Modularity

Flexibility and efficiency are essential when designing for housing and infrastructure in areas vulnerable to climate change or economic stress. The projects in this category explore modular and prefabricated systems that allow for easy construction, transport, and future expansion. They illustrate how modularity can be used not only to reduce cost and waste but also to create adaptable homes that respond to the changing needs of people and environments.

Primary Case Study
Munshiganj Prefabricated Houses

Further Case Studies
Khudi Bari, Various Locations
Low-Cost Resilient Char House, Paldangi, Faridpur

6. Planning for Climate Resilience
Resilience has become one of the most urgent concerns for architecture in Bangladesh. The projects under this theme address the realities of floods, erosion, and rising sea levels through design that works with nature instead of against it. They explore landscape-based strategies, raised settlements, and adaptive building typologies that protect both people and ecosystems. Each project demonstrates that climate resilience is not just technical preparedness but a way of living in balance with natural systems.

Primary Case Study
Jol O Jongoler Kabbo (Pilot Bari), Pubail

Further Case Studies
Raised Settlements, Jamuna River Network, Northern Bangladesh
Zinda Park, Purbachal, Dhaka
Coral Marine Habitat and Restoration, St. Martin Island

7. Reviving Indigenous Practices
Traditional knowledge offers sustainable solutions that have evolved over generations. The projects in this group draw from local materials, construction methods, and spatial traditions to create contemporary architecture rooted in place. They demonstrate how indigenous practices can be revived, adapted, and celebrated as valuable sources of resilience, identity, and ecological awareness.

Primary Case Study
Zinda Community Village

Further Case Studies
The Santals Settlement, Rajshahi Division and Other Regions
The Garo Settlement, Mymensingh, Netrokona, Tangail, and Sylhet Regions
HOMEmade Family Houses, Rudrapur

8. Applying Adaptive Reuse
Reusing existing buildings helps reduce waste and preserve cultural memory. The projects in this category transform old structures and traditional settlements into spaces with new life and purpose. They show that adaptive reuse can extend the lifespan of materials and buildings while connecting the past with the present. Sustainability here is about continuity, care, and creativity.

Primary Case Study
Amber Denim Loom Shed, Gazipur

Further Case Studies
Design Studio, Atelier Robin Architects, Hazaribagh, Dhaka
Floating Hospitals, Friendship NGO
Pani Community Centre, Rajarhat, Kurigram District, Rangpur

9. Practicing Material and Craft Innovations
Materials and craftsmanship are at the heart of sustainable architecture. The projects in this category experiment with local, recycled, and low-impact materials to create affordable and expressive buildings. They also revive and support traditional crafts by involving local artisans and builders. These works show that sustainability can come from both invention and continuity, combining human skill with creative thinking.

Primary Case Study
Swapner Bari (Amphibious House)

Further Case Studies
Ukhia Schools, Cox's Bazar
Botol Bari (Bottle House), Kuakata
Plastic Bottle House, Cumilla

10. Creating Innovation in Water and Energy
Access to clean water and renewable energy is essential for sustainable living. The projects under this category explore simple, low-cost technologies that improve daily life and reduce environmental impact. They range from biogas systems and natural cooling techniques to devices that generate electricity from river currents. These innovations show how small-scale ideas can make a large difference in the way people live and use resources.

Further Case Studies
Shobuj Shakti (Green Strength) Biogas Plant
Generating Electricity Using River Current, Purakata Village, Barguna
Natural Cooling Chamber / Fridge

Rangpur Division

Primary Case Studies

Green Field of Karupannya Rangpur Factory

METI Handmade School – Rudrapur, Dinajpur

Further Case Studies

DESI Training Center – Rudrapur, Dinajpur

HOMEmade Family Houses – Rudrapur

Raised Settlements – Jamuna River Network

Pani Community Centre – Rajarhat, Kurigram District

Rajshahi Division

Further Case Studies

The Santals Settlement – Northern districts of Rajshahi Division

Khulna Division

Primary Case Studies

Citywide Housing Process – Jhenaidah

Barishal Division

Primary Case Studies

Floating Farms – Gopalganj, Pirojpur

Further Case Studies

Generating Electricity using River Current – Purakata village, Barguna

Botol Bari | Bottle House – Kuakata, Patuakhali

Various Locations

Primary Case Studies

Shobuj Shakti (Green Strength) Biogas Plant

Further Case Studies

Floating Schools

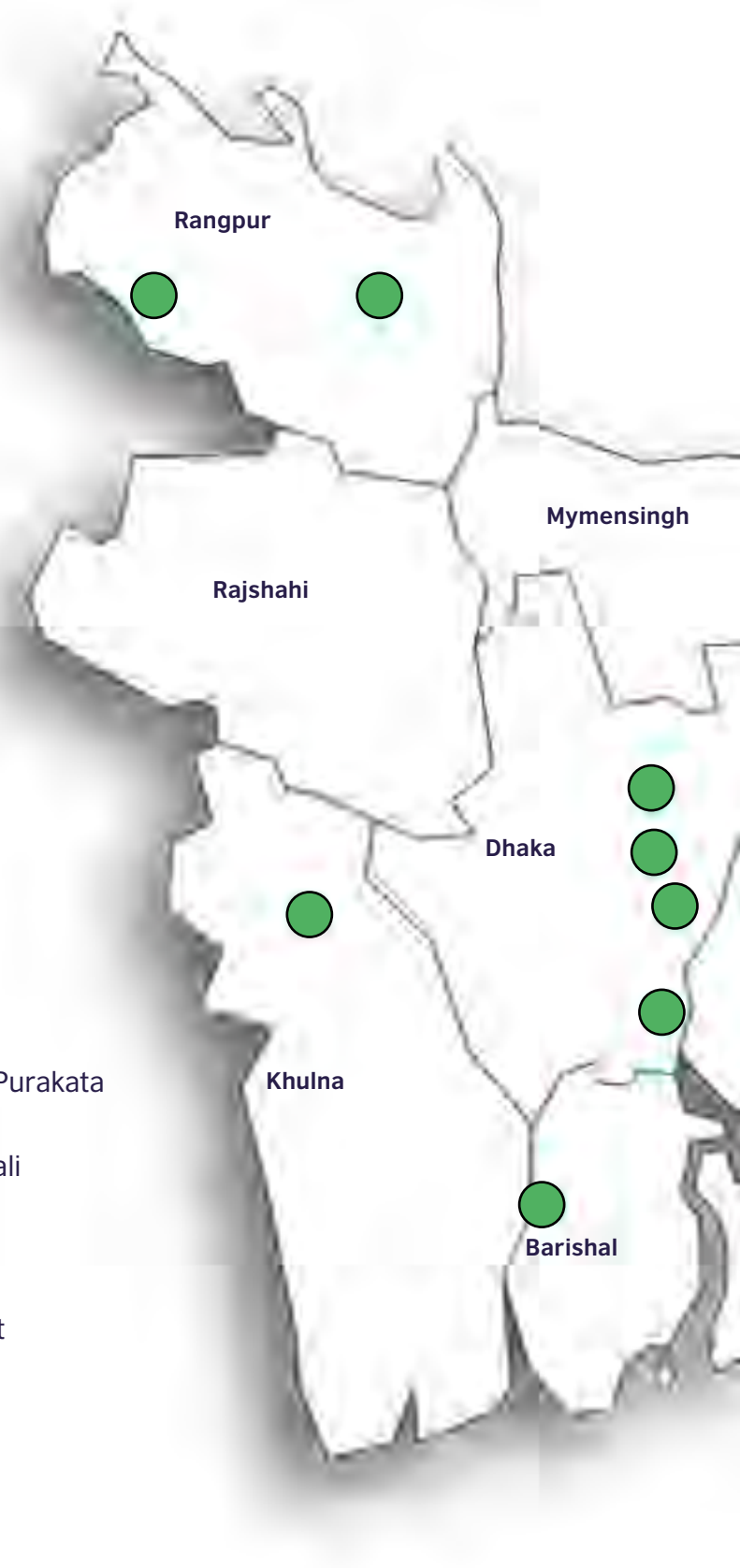
Urban Rooftop Gardening Bangladesh

Floating Hospitals

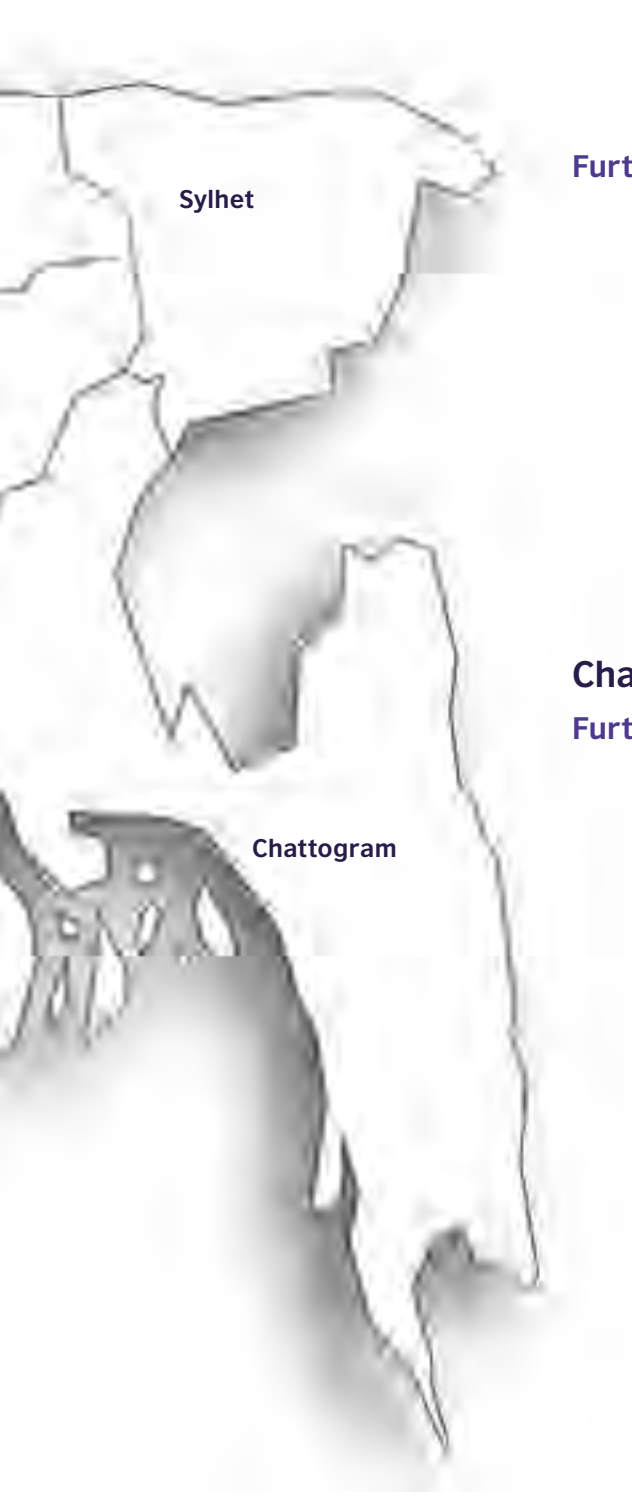
Natural Cooling Chamber / Fridge

The Garo Settlement

Sorjan Farming: A Climate-Smart Approach



Geographical Distribution of Sustainable Architecture Projects Across Bangladesh



Sylhet Division

Further Case Studies

Dusai Resort & Spa – Moulvibazar, Sylhet

Dhaka Division

Primary Case Studies

Swapner Bari (Amphibious House) – Uttarkhan

Zinda Community Village – Rupganj, Narayanganj

Jol O Jongoler Kabbo (Pilot Bari) – Pubail, Gazipur

Amber Denim Loom Shed – Gazipur

Prefabricated Houses– Bikrampur, Munshiganj

Further Case Studies

Mohila Samity Complex – New Baily Road

BRAC University – Merul Badda

Atelier Robin Architects Design Studio – Hazaribagh

Zinda Park – Rupganj, Narayanganj

Floating Homes / Dream House – Dular Char, Shariatpur

Arcadia Education Project – Dhaka

Low-Cost Resilient *Char* House – Dhaka

Chattogram Division

Further Case Studies

Ukhia Schools – Cox's Bazaar

Miyawaki Micro-Forest – Mirsharai

Plastic Bottle House – Cumilla

Coral Marine Habitat and Restoration – St. Martin Island

Green roofs shown in the Jhenaidah Community Housing project.

Theme 1: Building for Community Welfare

Primary Case Study: Jhenaidah Citywide Housing Process

Architects: Co.Creation Architects

Location: Jhenaidah

Year: 2017

The Jhenaidah Citywide Housing Process, part of the broader initiative "Let's Build Jhenaidah Together," began in 2015 as an ambitious community-led effort to improve housing and living conditions in marginalized neighborhoods of Jhenaidah Municipality, Bangladesh. Spearheaded by architects Khondaker Hasibul Kabir and Suhailey Farzana, this initiative embodies a shift from conventional top-down planning toward participatory urban transformation. The project empowers residents to become active agents in the design, financing, and construction of their own homes, thereby fostering self-reliance, dignity, and stronger community ties.

The initiative promotes a "people first" approach, where the community takes the lead in identifying needs, planning collectively, and managing funds through savings groups. By linking collective savings, community mapping, and participatory design, the process strengthens financial independence, supports women's leadership, and nurtures a deep sense of ownership. What began as a localized housing improvement project has evolved into a citywide network of communities working together for inclusive urban development.

Narrative

The Jhenaidah Citywide Housing Process began within Jhenaidah Municipality, a riverine town along the Nabaganga River in southwestern Bangladesh. The city faces multiple urban challenges, including rapid and unplanned growth, poor drainage, pollution, and limited access to essential services. Home to more than fifty low-income neighborhoods, Jhenaidah's residents often live in informal settlements with little municipal support. The city's institutional capacity remains weak, with over half of engineering posts vacant and minimal access to professional design expertise. As a result, urban growth has taken place informally, shaped more by the resilience and creativity of local people than by formal planning systems.

In response to these conditions, the housing process grew out of a broader low-income housing initiative launched in 2014 under the Platform of Community Action and Architecture (POCAA) a network of architects and urban practitioners promoting community-led housing across Bangladesh. Initially piloted in five cities, the initiative aimed to empower low-income groups to improve their housing and neighborhoods through collective action. Early experiences showed that physical improvements alone were not enough; lasting change required social cohesion, financial independence, and trust between communities and development actors. Many residents, long marginalized and skeptical of outside organizations, were hesitant to participate. Recognizing this, architects Khondaker Hasibul Kabir and Suhailey Farzana, both from Jhenaidah, reimagined the process to prioritize participation and trust-building. Their approach positioned communities as equal partners rather than passive recipients. Working with local institutions such as ALIVE, the Thana Nirbahi Officer, the District Commissioner, and the Municipal Mayor, they created a support network that connected community knowledge with institutional backing. This collaboration enabled the identification of priority neighborhoods, the mobilization of local savings, and the start of participatory housing design.

At the heart of this initiative are Khondaker Hasibul Kabir and Suhailey Farzana, co-founders of Co.Creation.Architects (CCA), who describe themselves as community architects acting as facilitators rather than distant designers. Through their work with POCAA, the Asian Coalition for Housing Rights (ACHR), and the Community Architects Network (CAN), they have contributed to a regional movement for participatory urban transformation. Their philosophy is rooted in the belief that empowering the urban poor is essential for social equity and environmental balance. The Jhenaidah initiative reflects this vision, showing how co-created architecture can become a powerful tool for community empowerment and sustainable urban change.

Top: One building unit of the Jhenaidah Housing project.

Bottom: Staircase of a Jhenaidah Housing unit building.

“Institutional systems hesitate because this process shifts power to the people.”

— Khondaker Hasibul Kabir

Top Left: Sitting with community people. Top Right: Toilet of the Jhenaidah Housing project.
Bottom: Courtyard of the Jhenaidah Housing project.

Transformative Journey: From Dreams to Reality

1. Community Identification and Selection

The project began with the selection of five low-income communities: Mohishakundu Shordarpara, Mohishakundu 2, Shoshanpara, Vennatola, and Arappur. These areas were chosen for their high vulnerability and lack of basic services, but also for their potential to work collectively. Building trust was a gradual process, as residents were initially cautious about outside involvement. Through open dialogue, transparency, and support from local leaders, the project team developed mutual trust with residents. This collective willingness became the foundation for the community-led savings process that followed.

2. Savings Groups

Once trust was established, residents of Mohishakundu Shordarpara formed five savings groups, each led by an elected representative. Members contributed small weekly amounts to create a shared savings pool. The fund was used for housing improvements and small community projects, helping residents learn how to manage money together. More importantly, the savings process strengthened cooperation, trust, and accountability among neighbors. What started as a way to save became a means of empowerment and long-term community resilience.

3. Seed Fund Creation

As the savings groups grew stronger, the project received a seed fund of BDT 2,000,000 (USD 24,000) from the Asian Coalition for Housing Rights (ACHR) with support from the Asian Coalition for Community Action (ACCA). Instead of offering grants, the project used a revolving loan model to ensure sustainability. The fund, managed by the local organization ALIVE, was distributed among the savings groups to support families most in need of housing improvements. Loans were repaid with a small interest rate agreed upon by the community, allowing the fund to expand and help more households over time. This system kept financial control within the community and reinforced ownership, transparency, and shared responsibility.

4. Mapping and Planning

With the financial systems in place, the community began turning their ideas into concrete plans. Through a participatory mapping process led mainly by women and supported by community architects, residents documented land plots, housing layouts, roads, and shared spaces. Workshops encouraged everyone to imagine their “dream houses,” using drawings and small models to express their ideas. These sessions helped shape realistic housing designs while building a shared vision for a better neighborhood. The process brought together technical knowledge and local creativity, resulting in plans that were both practical and deeply rooted in the community’s culture and aspirations.

5. Construction & Participation

The construction phase marked the realization of the community’s shared vision. Residents took part in every stage, from sourcing materials to

managing construction and contributing labor. With guidance from architects Khondaker Hasibul Kabir and Suhailey Farzana, the community used simple, low-cost design strategies that made good-quality housing affordable. Each house was built at an average cost of BDT 100,000 (USD 1,200), with the option to add features such as toilets, doors, or windows for an additional BDT 20,000 (USD 243). Practical solutions like exposed brick walls, filler slab roofs, and frameless openings helped reduce costs while ensuring durability and comfort. In two years, 20 houses were completed, each designed to fit the needs of individual families. The process not only improved living conditions but also built pride, ownership, and solidarity among residents.

6. Expansion & Knowledge Sharing

The success of Mohishakundu Shordarpara inspired neighboring communities to begin similar initiatives. The network expanded from five to nine active communities, with more showing interest in joining the process. Residents of Mohishakundu, especially women leaders, began mentoring others on community mapping, savings management, and construction planning. They also organized workshops for nearby settlements, sharing their experiences and lessons learned. This peer-to-peer approach replaced dependence on external support with collaboration and shared learning. As a result, the network continues to grow organically, creating a city-wide movement where communities support one another and work collectively toward more inclusive and participatory urban development.

Field Insights: Voices from the Ground

The Jhenaidah Citywide Housing Process grew from trust, patience, and continuous dialogue between architects and residents. The experiences and reflections of both groups show how an idea rooted in empathy evolved into a living example of collective transformation.

Beginnings and Motivation

“We realized the structured formal process does not work for communities. People understand their problems but cannot make it happen within such rigid systems.” — Suhaily Farzana

When architects Khondaker Hasibul Kabir and Suhaily Farzana returned to their hometown, they envisioned a process that placed people, not projects, at the center. Instead of beginning with formal plans, they started by being present, opening a small office, planting a garden, and spending time with residents. Through these small and consistent gestures, friendship turned into collaboration and trust began to grow. The initiative emerged not from policy or institutional design, but from patience, listening, and shared experience. It showed that meaningful urban change begins with relationships, not construction.

“We realized the structured formal process does not work for communities. People understand their problems but cannot make it happen within such rigid systems.”

— Suhaily Farzana

Building Collective Strength through Savings

"Communities need a glue that holds them together, and that glue is savings." — Khondaker Hasibul Kabir

Savings became the foundation of collective strength in Jhenaidah. Families began contributing small amounts regularly, first at home and later through group bank accounts. This created both a financial and emotional safety net. "At first, we hesitated to form a savings group, but when we were told the savings would be in our names, we started saving," recalled one community leader. Seed funding from the Asian Coalition for Housing Rights (ACHR) through the Asian Coalition for Community Action (ACCA) program added trust and flexibility. It supported the community's ability to make financial decisions independently. Exchange visits to Sri Lanka and the Philippines inspired confidence and new ideas.

As one resident shared, "Every small achievement gave us the courage to dream bigger."

Savings thus became more than a financial tool. It was the first step toward collective empowerment and self-reliance.

Design as a Shared Learning Process

In the design workshops, residents were asked to build small models of their dream houses. One woman made a model of a large home. When the architects asked how she would build something so big with limited money, she replied that she would build it gradually, step by step, as she could afford it. That simple exchange revealed how deeply the community already understood the idea of incremental housing. Reflecting on that moment, Suhaily Farzana said, "They were teaching us what incremental housing really means."

Through this process, architecture became a shared learning experience. Land limitations encouraged creative thinking, leading to new ideas such as two-story houses that made better use of small plots. The architects then developed low-cost prototypes using local materials and simple construction methods that could be built for about 120,000 taka. When they showed these models to the community, the response was immediate. Kabir recalled, "When the models were made, people could not believe such houses could be built with so little money. They said, 'If we can build a house like this, we would even pay extra.' That is when we realized that beauty has value."

For the architects, these experiences redefined design itself. "A woman told us she needed two rooms side by side because her sons could not be separated. Every person has their own reasons, and that changed how we think about design," Suhaily reflected. The process blurred the line between designer and resident, turning design into a shared act of imagination, learning, and discovery.

Top: Planning process during construction with community members.

Bottom: Discussion between community leaders, the architect, and Bengal Institute personnel.

Dignity, Social Identity, and Belonging

Khondaker Hasibul Kabir said, “Housing is not only about shelter but also about dignity and social identity.”

As new homes began to rise, residents’ understanding of housing expanded. It was no longer only about having a roof, but about pride, recognition, and a sense of belonging. For many women, having a brick wall or a strong roof represented progress and self-respect.

Suhaily Farzana explained, “When women said they did not want a poor person’s house, it was not about materials, it was about respect.”

“We lived in a slum before, where people looked down on us. Now people treat us with respect.” — Community Leader

These small physical improvements created deep emotional change. A sturdy home meant children could invite friends, and women could sit on the roof and talk freely. The sense of dignity and self-worth became as important as the house itself.

The Role of Women

Throughout the process, women emerged as the driving force of change. Their patience, foresight, and sense of responsibility shaped the success of the housing initiative.

Suhaily Farzana said, “Women have patience. They think about the future and the sustainability of their homes.”

Although men were initially skeptical, women quickly earned trust through their efficiency and commitment. Community leaders proudly described their role in leading the process. “We controlled the work, negotiated prices, and even convinced the mayor to waive building fees.”

Their active involvement strengthened transparency and accountability within the community. Khondaker Hasibul Kabir reflected, “We realized the true power lies with women. They manage savings, think about the future, and pay attention to details that men often overlook.”

This leadership also created new opportunities for social and economic empowerment. “Because we now have space in our homes, we can work together and sell what we make,” said one participant. The process transformed women from participants into leaders, turning homebuilding into a path toward confidence, equality, and long-term resilience.

Collective Power and Shared Learning

A community member from Mohishakundu said, “I alone could not make the environment better. We all have to be better to change the environment.”

This spirit of working together became the foundation of the housing process. Participation turned into a source of pride and confidence as residents developed new technical and organizational skills. They learned to check material quality, manage budgets, and coordinate construction, taking full responsibility for the work they once relied on others to do.

“We went in groups to the brickfields, checked the quality ourselves, and bought materials in bulk. Buying together helped us get better quality at a lower price,” said a community leader.

These collective practices built transparency, unity, and trust. Through mapping, planning, and building together, communities discovered that improvement required everyone’s contribution. By sharing knowledge and responsibility, they turned cooperation into strength and became true partners in change.

Reflections on Policy and Systems

Khondaker Hasibul Kabir said, “Institutions hesitate because this process shifts power to the people. Systems are not ready for that.”

While communities grew stronger, formal institutions often struggled to adapt to this new way of working. Kabir recalled how officials initially dismissed the approach. “They said it works elsewhere, not here. So we decided to create an example.”

Suhaily Farzana reflected, “There are too many schemes, grants, relocations, and loans, and people are confused. If they can get something for free, why take a loan? People want freedom but fear the responsibility that comes with it.”

Kabir added another layer to this reflection. “Sometimes the challenge comes from within communities too. They repay institutional loans with interest but not community loans. That is something cultural, behavioral, and worth studying.”

Despite these challenges, the Jhenaidah Citywide Housing Process continues to expand through a growing network of communities determined to take charge of their own development. It shows that when trust and collective learning are nurtured, people can reshape both their environments and their futures.

“We realized the true power lies with women. They manage savings, think about the future, and pay attention to details that men often overlook.”

— Khondaker Hasibul Kabir

Stair Working as a Lightwell

Material and Construction Strategies

1. Raised Plinth
Elevated plinth protects homes from flooding while minimizing extra construction cost.

2. Filler Slab Roof
Lightweight fillers replace excess concrete, reducing cement use, weight, and cost.

3. Pre-Cast Stairs
Pre-cast stair slabs reduce shuttering, construction time, and concrete use.

4. Rat-Trap Bond Columns
Hollow brick bonding lowers material use while maintaining strength.

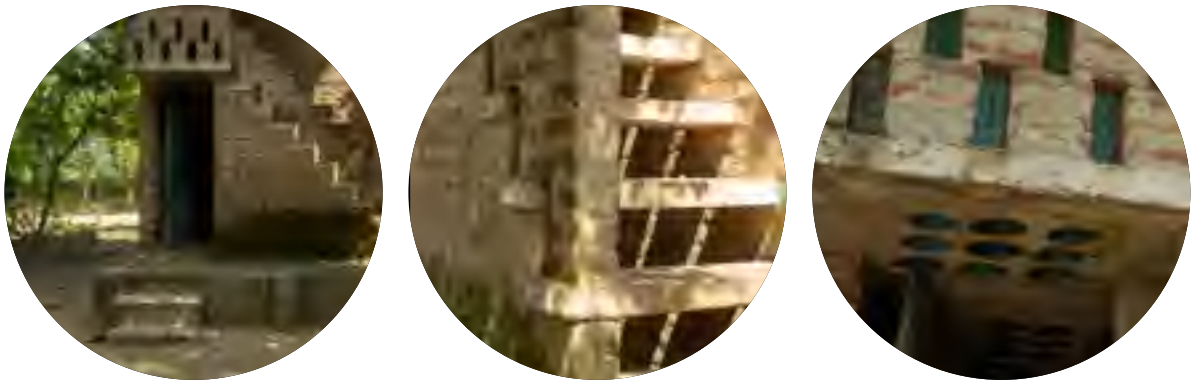
5. Exposed Brick Walls
Unplastered brick walls reduce finishing cost and resist saline damage.

6. Local Materials & Labor
Nearby materials and local craftsmen reduce cost and support local skills.

7. Brick Jali Screens
Brick jali replaces metal grills, improving ventilation and lowering cost.

8. Frameless Doors & Windows
Minimal timber and bearing-mounted shutters reduce material use and improve airflow.

Exploded Axono of Building for Community Welfare



Staircase Details.

Perspective View of Building for Community Welfare

Key Strategies and Innovations

Community-Managed Savings and Finance
Small weekly savings formed a resident-led revolving fund, building trust, financial independence, and collective decision-making.

Participatory Design and Construction
Residents co-designed through mapping and model-making, turning design into a shared, learning-driven process rooted in local aspirations.

Incremental Housing and Flexible Design
Homes were planned for gradual expansion, enabling affordability, adaptability, and efficient use of limited land.

Low-Cost, Local Materials and Techniques
Use of exposed brick, filler slabs, and local methods reduced costs, improved durability, and built community skills.

Citywide Community Network
Savings groups formed a citywide network, strengthening collaboration, peer learning, and engagement with local government.

Women's Leadership and Ownership
Women led savings, construction, and negotiations, strengthening transparency, agency, and long-term sustainability.

Dimensions of Sustainability

Geographic Representation
Located in Jhenaidah, representing smaller municipalities within Bangladesh's riverine and climate-vulnerable context.

Typological and Scalar Diversity
A process-driven housing model operating across household, neighborhood, and city scales, expanding beyond conventional building-based interventions.

Climate and Environmental Responsiveness
Local materials and incremental construction reduce environmental impact while improving comfort and resource efficiency.

Social and Cultural Relevance
Participatory processes strengthen trust, collective identity, and the social value of housing as dignity and belonging.

Creative Economy and Local Capacity
Skill-building and local sourcing generate employment, strengthen craftsmanship, and support community self-reliance.

Alignment with the Sustainable Development Goals

SDG 1 – No Poverty: Addresses housing insecurity for low-income households.
SDG 5 – Gender Equality: Strengthens women's leadership and participation.
SDG 8 – Decent Work and Economic Growth: Generates jobs through local construction.
SDG 9 – Industry, Innovation and Infrastructure: Demonstrates a replicable housing model.
SDG 10 – Reduced Inequalities: Increases agency of marginalized communities.
SDG 11 – Sustainable Cities and Communities: Promotes inclusive urban housing.
SDG 12 – Responsible Consumption and Production: Encourages resource-efficient construction.
SDG 17 – Partnerships for the Goals: Built on multi-stakeholder collaboration.

Shelter for Climate-Vulnerable Riverine Communities, Dulur Char, Shariatpur

Further Case Study: Floating Homes / Dream House

Organizations: University of Dundee, Resilience Solution,

BRAC University C3ER, Global Resilience Partnership

Location: Dular Char, Shariatpur

Year: 2017

Key Strategies and Innovations

Community Co-Design
Developed with local families through workshops, ensuring needs like courtyards for adults and play areas for children.

Resilient Structure
Built on a 40-tonne buoyant platform, guided by vertical posts, and resistant to cyclones, earthquakes, and erosion.

Water Security
Rainwater harvesting system with 17,000L storage, supplying safe water for up to six months.

Food & Livelihoods
Integrated chicken coop, aquaponics, and vertical farming to support nutrition and income generation.

Clean Energy & Waste
Bio-digester converts organic waste into methane for cooking, promoting circular resource use.

Cultural & Environmental Fit
Combines traditional methods with modern innovations for sustainability and identity.

Targeted Impact
Designed for climate-vulnerable riverine communities, fostering resilience and ownership.

Incremental Slum Upgrading Project, Jogen Babu Maath Slum, Dinajpur.

Courtesy: © Azuko.org

Further Case Study: Incremental Slum Upgrading

Partners: Simple Action for the Environment (SAFE) &

Local Community

Location: Jogen Babu Maath slum, Dinajpur

Year: 2010

Key Strategies and Innovations

Community-Led
50 households from diverse religious and occupational backgrounds guided the participatory design and planning process.

Housing
11 double-storey bamboo houses constructed with local techniques.

Community Facilities
A bamboo and rammed earth community center built for shared use.

Infrastructure Upgrades
Shared sanitation and shower facilities, improved urban drainage, and better road surfaces.

Democratic Representation
An 11-member elected committee (since 2016) manages decision-making and accountability.

Sustainability
Emphasis on self-reliance, use of local materials, and skill-building for long-term resilience.

METI Handmade School, Rudrapur, Dinajpur

Theme 2: Improving Education Access

Primary Case Study: METI Handmade School

Architects: Anna Heringer and Eike Roswag

Location: Rudrapur, Dinajpur

Year: 2006

A compelling example of improved rural architecture in Bangladesh representing a return to the principles of sustainable ecological design and promotion of a socially effective enterprise. Making a two-storey school in a remote, rural area becomes a demonstration for a better and joyous learning space, community participation, and improved building technology. Local building and material techniques were enhanced with additional knowledge. Community participation was motivated by the onsite residence of the architect in the community. The architects, termed as “embedded architects” because of their living with the community, described the school as “hand-made by local craftsmen, pupils and teachers together with a European team of architects, craftsmen and students.” Inspired by a regional practice, the use of earth and bamboo as principal building materials draws on creating self-confidence and maintaining sustainability while improving on the existing techniques through training local laborers, schoolchildren, and teachers during the construction process.

Narrative

Rudrapur sits in Bangladesh's northern alluvial plain, where rural households traditionally build with earth and bamboo. These vernacular methods often lack foundations and moisture protection, which shortens building life and erodes public confidence. METI reverses that dynamic by improving traditional techniques and wrapping them in an inclusive building process. The design offers two distinct atmospheres that mirror METI's pedagogy. The ground floor is enclosed by thick earthen walls for focused, quiet study, with softly shaped cave spaces at the back of each classroom for retreat, play, and reflection. The upper floor uses a light bamboo frame with generous openings, a large shared room, and views across the trees and village ponds to support movement, group learning, and an open teaching style.

The construction strategy combines a brick foundation and damp proof course with load-bearing cob walls, bamboo ring beams and ceilings, and a four-layer bamboo frame at the upper level. All materials and labor were local. Twenty-five nearby tradespeople were trained on site in improved earth and bamboo techniques, while pupils and teachers participated to understand and value sustainable construction. The entire budget circulated within the village and surroundings, reinforcing a local creative economy and reframing earthen construction as durable, comfortable, and beautiful.

Transformative Journey: From Earth to Empowerment

Community Immersion and Trust Building

The process began with immersion. Architects Anna Heringer and Eike Roswag lived in Rudrapur throughout the design and construction period, working side by side with Dipshikha, a local NGO that had been active in rural education and development for decades. This daily presence built mutual respect and trust, transforming the architects into facilitators rather than outside experts. Living among the villagers allowed them to observe how people built, learned, and shared space—insights that shaped both the school's architecture and its pedagogy. The partnership with Dipshikha ensured the project was not a temporary intervention but an extension of an existing community movement for self-reliance.

Co-Design and Learning-Led Spatial Concept

The design process evolved through discussions with teachers, students, and craftspeople around the philosophy of "learning with joy." The school's architecture was envisioned as an active participant in that pedagogy. The ground floor, with thick earthen walls, offers calm, protected classrooms where concentration and intimacy are encouraged. At the back of each room, organically formed "caves" provide retreat zones for play, reflection, or quiet exploration. In contrast, the upper floor is light and airy, a space for group learning and movement. The bamboo framework, wide openings, and connection to the landscape embody openness and freedom. The building's spatial duality, enclosure below, expansion above—mirrors the balance between focus and imagination that defines the school's teaching method.

Top: East Side of METI Handmade School, Rudrapur, Dinajpur

Bottom: METI Handmade School, Rudrapur, Dinajpur

The design process evolved through discussions with teachers, students, and craftspeople around the philosophy of "learning with joy." The school's architecture was envisioned as an active participant in that pedagogy.

Bamboo Details of METI Handmade School, Rudrapur, Dinajpur.

Technique Upgrading and Prototyping

Before full construction, a period of hands-on experimentation refined the building techniques. Earth, bamboo, and straw were locally sourced and tested in different compositions. The cob technique was improved with a 50-centimeter brick foundation and a double layer of polyethylene film serving as a damp-proof course, key adaptations that significantly improved durability and moisture protection. Structural details such as bamboo ring beams and window lintels were prototyped to resist wind loads and extend longevity. These improvements transformed earth and bamboo from “poor people’s materials” into durable, respected resources. The testing process became a form of communal research, involving architects, villagers, and even children, all learning through making.

When completed, the school became more than a building, it was a social and cultural landmark.

Local Skills Training and Shared Making

During construction, 25 local tradesmen were trained in the refined techniques. Women and young people participated as well, making the process a platform for skill transfer and empowerment. Learning was reciprocal, villagers shared indigenous knowledge of material behavior and climate, while the architects introduced technical refinements and structural reasoning. Every phase became a learning workshop. The school was literally handmade by local craftsmen, pupils, teachers, and a small team of international volunteers. This co-production fostered a sense of ownership and pride, ensuring that the new knowledge would circulate long after the building was complete.

Construction and Detailing

Construction followed an incremental, hands-on rhythm. Layers of straw-earth mixture were piled in 65-centimeter lifts, and trimmed after partial drying. Successive layers integrated door and window frames, while a bamboo ring beam provided horizontal stability. The ground floor ceiling was made from three layers of bamboo canes: two parallel outer layers and a perpendicular middle layer tied with jute rope, topped with bamboo planking and an earthen infill to ensure thermal insulation and rigidity. The upper floor frame consisted of four-layer bamboo beams, vertical and diagonal bracing, and wind-resistant joints secured with handmade dowels and rope. Bamboo rafters supported a lightweight corrugated roof lined with timber boards and ventilated through a textile ceiling. Openings framed by bamboo latticework brought daylight, breezes, and views of the surrounding village pond and trees. Finishes used clay plaster, lime wash, and colored textiles, creating a tactile, sensory environment that celebrated local aesthetics.

Community Celebration and Lasting Influence

When completed, the school became more than a building, it was a social and cultural landmark. A multi-faith inauguration with readings from the Quran, the Gita, and the Bible symbolized unity. For the villagers, METI proved that beauty, comfort, and modernity could emerge from their own materials and skills. The process inspired confidence in earthen construction and seeded follow-on projects across northern Bangladesh. Training during the project produced a cadre of skilled builders capable of replicating and adapting the methods in housing and public buildings. METI continues to function as both a school and a living workshop for sustainable architecture, embodying a philosophy where education, environment, and community empowerment are inseparable.

Construction followed an incremental, hands-on rhythm.

Roof Joinery Detail and Pivot Doors of METI Handmade School, Rudrapur, Dinajpur.

Top: Bamboo Roofing Details of METI Handmade School, Rudrapur, Dinajpur.

Bottom: Interior Space of METI Handmade School, Rudrapur, Dinajpur

Field Insights: Voices from the Ground

The story of the METI Handmade School comes alive through the voices of its students, teachers, and builders. Together, they reveal how learning, building, and community have intertwined to create a place where education and empowerment grow from the ground up.

Learning in a Living Environment

For the students, the building itself is a teacher. Its earthy walls and open, light-filled rooms shape how they experience learning every day.

“Since the building is made of mud, it feels warm in winter and cool in summer, which is very helpful for us.”

The natural materials make the environment comfortable and inviting. Students feel proud that their school stands out in the village.

“There is no other building like this nearby. We like it very much.”

Learning at METI extends beyond textbooks. The rhythm of the school day blends reflection, creativity, and study.

“When we arrive in the morning, we first do meditation. It clears our mind and helps us think new thoughts. Then we share our news with everyone before classes begin.”

Education here encourages balance between discipline and joy, academic growth and emotional well-being.

“The way education is provided here supports both physical and mental development. I think it is very effective for us.”

Students connect these experiences with aspiration.

“I want to become a mathematician. Every year we get to participate in the Math Olympiad, and it makes me happy.”

Teachers and the Culture of Care

The school’s philosophy centers on self-reliance and respect, blending traditional values with modern teaching. The Headmaster explains that METI’s education is built on four pillars: Knowledge, Structure, Skills, and Technology.

“Along with academic knowledge, life skills are essential. Students use an honesty store, learn computer skills, dance, music, and practical work. This helps them prepare for life, not just exams.”

The daily structure begins and ends with meditation and reflection, giving students time to think, share, and feel part of a community.

“This system increases interest in learning. Children love to come to school — attendance is always one hundred percent.”

The Headmaster reflects on the importance of restoring mutual respect between teachers and students.

“In the past, teachers cared for students like their children, and students respected teachers like fathers. I hope this tradition returns.”

Building with Hands and Heart

The craftsmen who built the school remember it as a project of learning and experimentation.

“The master of everything was Anna Heringer. She taught us how to test the soil. We made it sticky, dropped it from a height — if it cracked, it was not good. If it stayed together, we used it.”

The team mixed soil and straw in layers, refining traditional earthen construction into a stronger, more durable system.

“We applied six layers of soil and straw, each about two feet thick. After partial drying, we cut and leveled them. These walls are so strong that rats or thieves cannot break them.”

The process was collaborative and inventive

“We first tried jute and human hair, but they did not work. Only straw gave the right strength.”

Bamboo was treated through experimentation as well.

“At first we soaked bamboo with medicine, but insects damaged it. Later, a machine from Nepal helped drain the water and fill it with medicated water. It worked perfectly.”

For many of the local masons, this was the first time they worked with such care, precision, and mutual learning. Their skills have since spread to other projects, showing how architecture can create livelihoods and pride.

Community and Lasting Impact

For the administrators, METI represents a long-standing partnership between local and international efforts rooted in shared purpose.

“The building was constructed in 2005 and received the Aga Khan Award in 2007. Later, other mud buildings were added. Everything here is environmentally friendly, with minimal concrete work.”

The school’s impact goes beyond its walls.

“Because of this design, children are eager and excited to come to school. Attendance is one hundred percent. This was possible only because of such a unique building.”

METI Handmade School is more than an educational institution; it is a living example of learning through making. The students learn in a space that breathes, the teachers guide with care, and the builders carry forward new skills grounded in old wisdom. The walls, made of earth and bamboo, hold not just classrooms but stories — of patience, pride, and the quiet power of doing things together.

Drone view of METI Handmade School, Rudrapur, Dinajpur

Top: Drone view of METI Handmade School, Rudrapur, Dinajpur
Bottom: Western Side of METI Handmade School, Rudrapur, Dinajpur

Learning Spaces & Atmosphere

1. Dual Classroom Atmospheres

Ground-floor classrooms feel calm and enclosed, while the upper-floor classrooms are open, light-filled, and suited for active, group-oriented learning.

2. Daylight and Ventilation

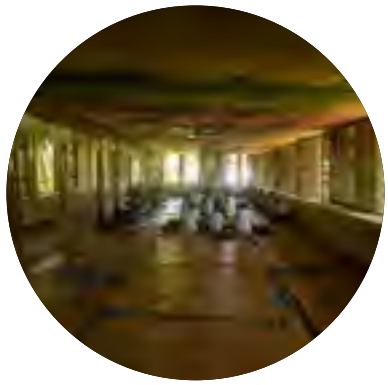
Large bamboo screens, lattice openings, and cross-ventilation bring soft daylight and cool breezes into every classroom.

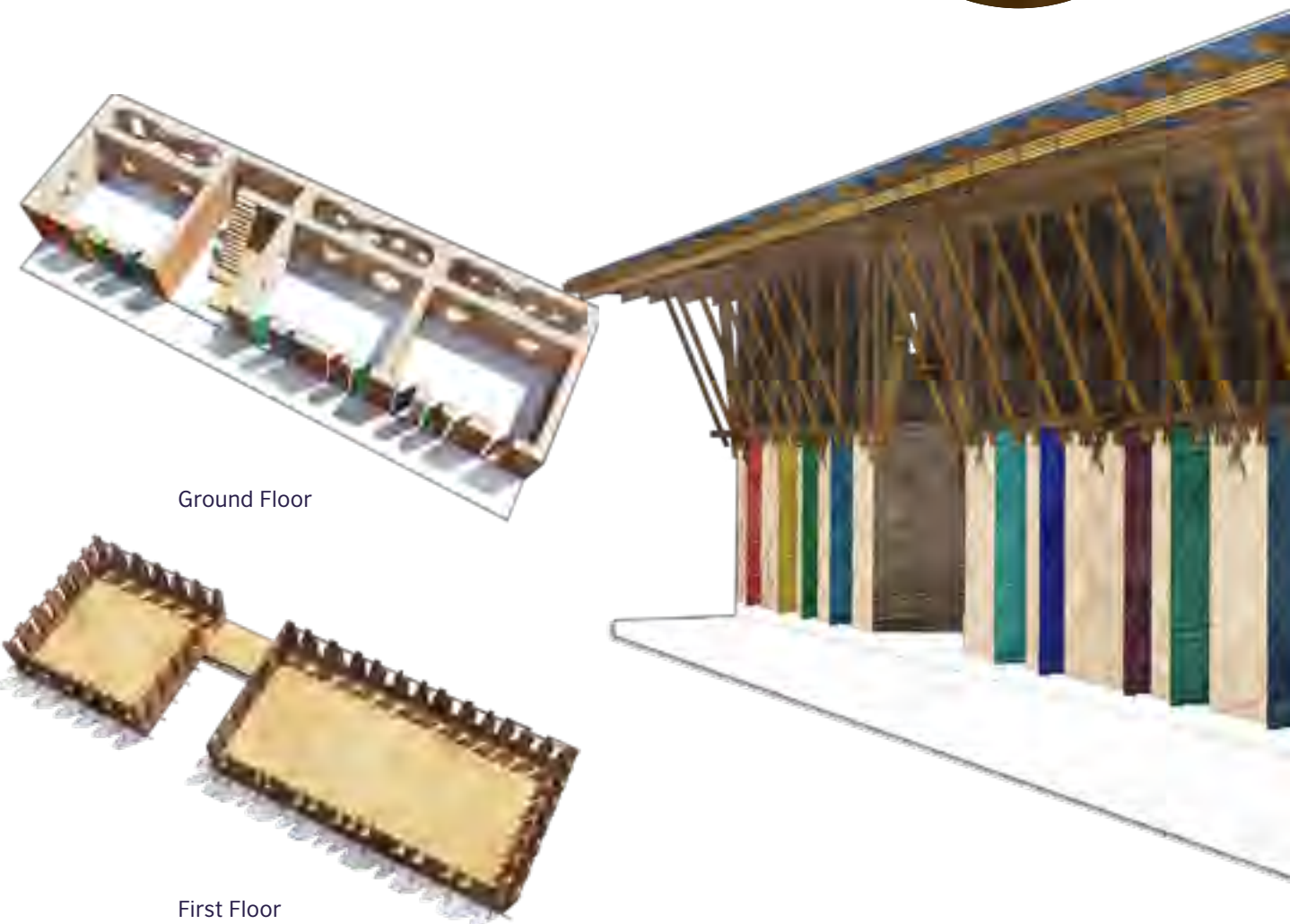
3. Connection to Landscape

Upper-floor openings frame views of trees, ponds, and village life, creating a learning environment connected to nature.

4. Cave Spaces for Creativity

Sculpted earthen alcoves provide intimate zones for play, imagination, and quiet reflection within each classroom.



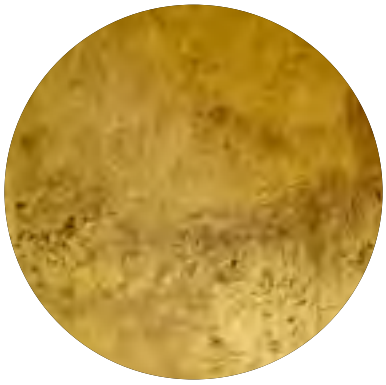


Ground Floor

First Floor

Perspective View of METI Handmade School

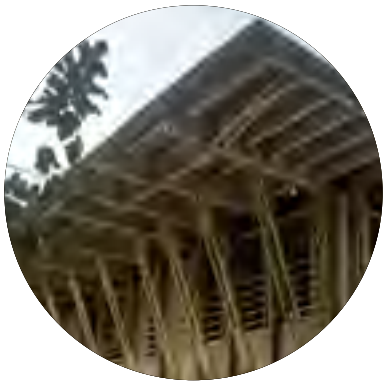
Material and Construction Strategies



1. Raised Brick Plinth & Damp Proofing
A 50 cm brick plinth with a polyethylene damp-proof layer protects the house from ground moisture and seasonal dampness.

2. Cob Earth Walls in Measured Lifts
65 cm thick cob walls are built in layered lifts, trimmed for alignment, with door and window frames integrated during construction.

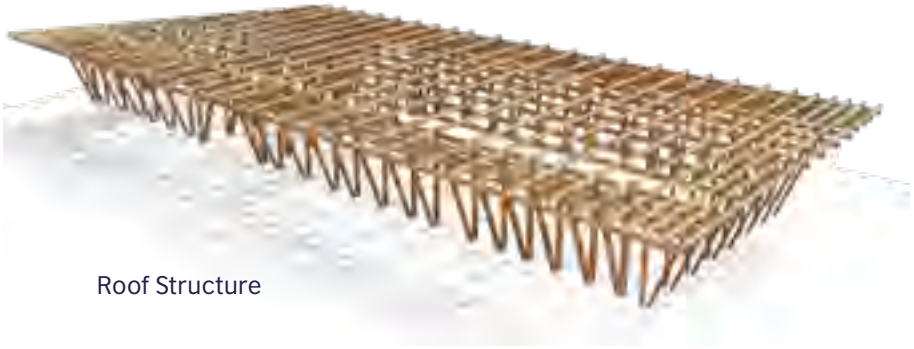
3. Reinforced Bamboo Structural Frame
A four-layer bamboo beam system with ring beams, lintels, and diagonal bracing strengthens the structure and improves wind resistance.



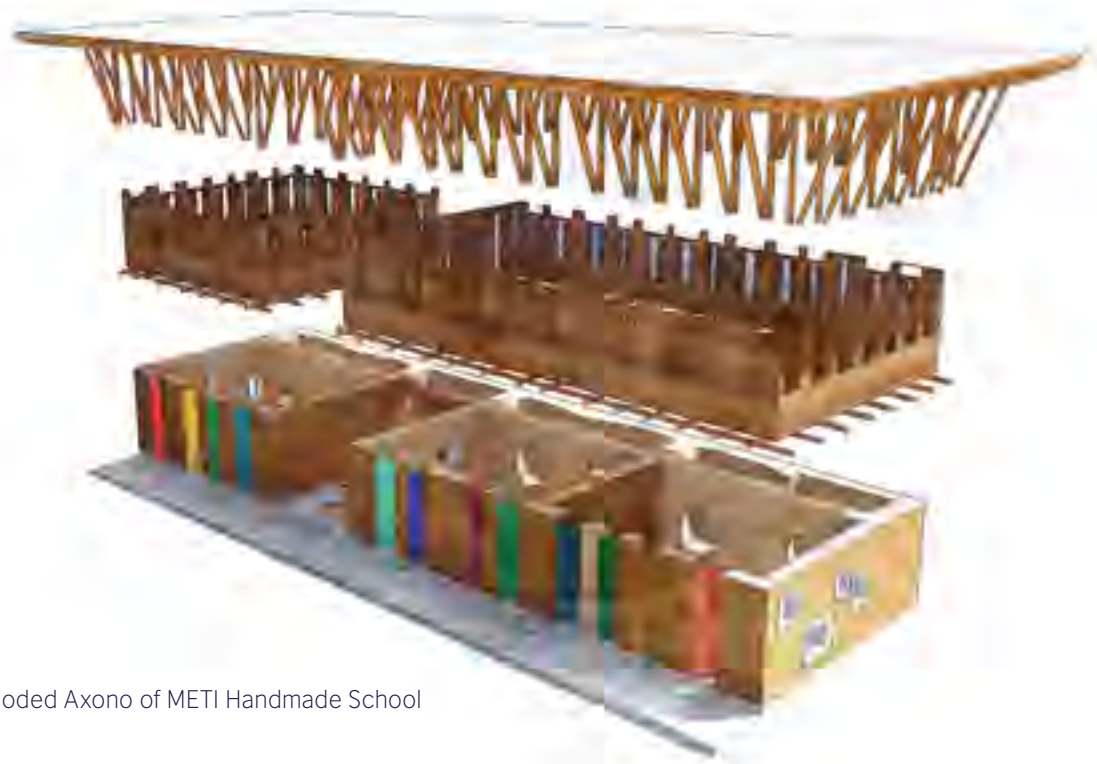
4. Layered Bamboo Floor–Ceiling System
Three bamboo layers tied with jute rope and earthen infill provide structural stability and thermal insulation.

5. Ventilated Lightweight Roof
A corrugated metal roof on bamboo rafters with a breathable textile ceiling creates ventilation and improves indoor thermal comfort.

Elevation of METI Handmade School



Roof Structure



Exploded Axono of METI Handmade School

Key Strategies and Innovations

Embedded Architectural Practice
Living and working within the village repositioned architects as facilitators and learners, grounding design decisions in everyday practices, local knowledge, and educational goals.

Upgraded Vernacular Construction and Durability
Traditional earth and bamboo construction was enhanced through brick foundations, damp proofing, bamboo ring beams, and layered assemblies, extending structural lifespan and performance using familiar, affordable methods.

Child-Centred Spatial Pedagogy
Differentiated spatial atmospheres support multiple learning speeds and modalities. Cave-like spaces, open halls, and cross-ventilated rooms translate educational pedagogy into built form.

Local Materials and Low-Tech Fabrication
Earth, bamboo, straw, and lime finishes reduce embodied energy, enable local repair, and keep material value chains within the community.

On-Site Training and Livelihood Creation
Hands-on training for local workers, alongside participation by students and teachers, established a skills base for replication and improved rural housing practices beyond the school.

Dimensions of Sustainability

Geographic Representation
Situated in Dinajpur within the Rangpur Division, METI broadens the portfolio's regional coverage by showcasing a northern rural initiative and its material cultures.

Typological and Scalar Diversity
As a community school, METI diversifies the portfolio beyond housing and process-led urban upgrading. Its small scale and handmade construction show how making a school can bring a community together while demonstrating replicable details for wider rural building.

Climate and Environmental Responsiveness
Thick earthen walls provide thermal mass and comfort. Bamboo framing and large openings enable cross-ventilation and daylighting. Passive strategies reduce reliance on artificial cooling and lighting, and finishes are breathable and low-toxicity.

Social and Cultural Relevance
The building revalidates local craft, centers children's well-being, and embeds rituals and shared making. Cave spaces, textile ceilings, and bamboo screens create a familiar yet inspiring learning environment.

Creative Economy and Local Capacity

Local sourcing and on-site training circulate the budget within the village, generate skilled employment, and elevate earthen and bamboo construction as a contemporary craft with market value.

Alignment with the Sustainable Development Goals

SDG 4 - Quality Education: Provides inclusive, child-friendly spaces that enhance learning environments.

SDG 8 - Decent Work and Economic Growth: Creates skilled jobs for local builders and craftspeople.

SDG 11 - Sustainable Cities and CommunitiesP: Demonstrates how schools can be sustainable, community-driven assets.

SDG 12 - Responsible Consumption and Production: Uses local, low-cost, natural materials to minimize resource consumption.

Arcadia Education Project, South Kanarchor.

Further Case Study: Arcadia Education Project

Architect: Saif Ul Haque Sthapati

Location: South Kanarchor

Year: 2016

Key Strategies and Innovations

Amphibious Design
School sits on the ground in dry season and floats during floods.

Flood Resilience
Riverside site submerged in up to three meters of monsoon water for one-third of the year.

Stabilization & Anchoring
Sandbag retaining walls filled with local materials; bamboo posts sunk 2 meters into the ground.

Modular Construction
Interconnected rectangular units made with three types of bamboo.

Floating Substructure
Uses 30-gallon steel drums framed with bamboo for buoyancy.

Floating School, Various Locations.
© https://currystonefoundation.org/

Further Case Study: Floating Schools

Initiated by: Mohammed Rezwan, Shidhulai Swanirvar Sangstha (SSS)

Location: Various locations (flood-prone regions of Bangladesh)

Year: 2002

Key Strategies and Innovations

Mobile, Boat-Based Design
Ensures uninterrupted education in flood-prone areas.

Multi-Purpose Fleet
26 boats serve as schools, libraries, health clinics, and training centers.

Accessibility
Reaches children at home during floods or waterlogging.

Local & Affordable Materials
Built using cost-effective, locally sourced resources.

Solar-Powered
Supports classes, digital learning, lighting, and device charging.

Community & Skills Development
Offers sustainable farming and health training.

Gender & Social Empowerment
Hosts Young Women's Rights Associations to empower girls and prevent child marriage.

Resilience & Innovation
Promotes educational continuity, gender equality, and community innovation in disaster-affected regions.

DESI Training Center, Rudrapur, Dinajpur.

Further Case Study: DESI Training Center

Architect: Anna Heringer

Location: Rudrapur, Dinajpur

Year: 2008

Key Strategies and Innovations

Vocational Focus
School specialized in electrical training.

Comprehensive Facilities
Classrooms, offices, instructor residences, and modern sanitation units.

100% Solar-Powered
Solar panels supply all energy needs, including a solar thermal system for warm water.

Water System
Solar-powered pumps deliver water from well to storage tank.

Innovative Sanitation
Modern two-chamber septic tanks integrated into earth/mud houses—the first of its kind in Bangladesh.

Sustainable & Adaptive Design
Shows how traditional mud and bamboo construction can meet modern lifestyle and sustainability needs.

Floating Farms, Pirojpur.

Theme 3: Advancing Food Production

Primary Case Study: Floating Farms (*Dhap/Baira*)

Location: Gopalganj, Barisal, Pirojpur, and other flood-prone regions

Year: Ongoing (recognized by FAO in 2015)

The rise of water, whether as monsoonal flooding, tidal flooding or waterlogging, poses a threat to livelihood, especially food production, in areas historically vulnerable to the dynamics of water. People in such areas have faced this crisis for hundreds of years, and have devised innovative solutions through floating farms, or *dhap* or *baira*. While the phenomenon of inundation and overflow long precedes today's climatic conditions, people in those critical areas have readapted the ancient techniques to face the new crisis when dry lands become scarce. The technique involves erecting a floating raft made up of water hyacinth which becomes a bed or base to grow different vegetables and fruits, such as bitter gourds, radishes, cucumbers, gourds and papayas. While in many cases saplings are grown and sold, full grown plants are also cultivated on those floating rafts. Access to those vegetal rafts is by boat. The technique is now being recognized globally, as featured in many journalistic and documentary reportings, and even as a Globally Important Agricultural Heritage System by the UN FAO.

Narrative

Large parts of southern Bangladesh, particularly the districts of Gopalganj, Barisal, and Pirojpur lie within the low-lying floodplains of the Padma-Meghna delta. Here, land is both fertile and fragile, submerged for several months each year due to monsoon rains, tidal surges, and river overflow. As rising sea levels and erratic rainfall increasingly disrupt traditional agriculture, local farmers have turned to an ancestral solution: cultivating crops on floating beds that rise and fall with the water.

Floating farming, a 200-year-old indigenous hydroponic technique, provides food security when dry land is unavailable. Farmers build elongated rafts from the buoyant stems of invasive water hyacinths, layering them with straw, aquatic weeds, and compost. The decomposing biomass creates a rich, spongy substrate for vegetable cultivation. On these natural rafts, farmers grow seedlings or full-grown crops such as gourds, spinach, turmeric, and ginger.

Accessed by narrow wooden boats, the floating beds form a vast patchwork of green islands across the floodplain. The system requires no artificial irrigation or pesticides and recycles an invasive plant species that would otherwise clog waterways. A single raft, typically six to twenty meters long, lasts for three to four months before being replaced, and the decomposed remains are used as organic fertilizer.

Farmers like Mohammad Mostafa and Mohammad Ibrahim from Pirojpur describe the practice as both a heritage and a necessity. “The land is under water for a longer time now. This ancient technique has helped us to earn a living,” said Mostafa, whose family now grows bitter gourd and cucumber seedlings on rafts that float year-round.

What began as an adaptive survival strategy has evolved into a community-based system of innovation. Women play a central role in seedball preparation and raft maintenance, despite the labor’s physical difficulty. Local markets and floating bazaars now trade in both vegetables and seedlings grown on these rafts, connecting farmers to regional supply chains. The expansion of floating farms across hundreds of hectares has supported thousands of smallholder families, providing resilience, nutrition, and a renewed sense of agency in confronting climate uncertainty.

Transformative Process: Cultivating Resilience on Water

Reviving Ancestral Knowledge

The practice of *baira* cultivation reflects generations of ecological understanding and adaptation. Communities revived the technique as an urgent response to prolonged flooding and salinity intrusion, turning an ancient form of hydroponics into a contemporary strategy for survival. What once began as a seasonal practice has now evolved into a year-round livelihood, sustained through collective memory and experimentation.

Top: Aerial view of floating farms, Pirojpur
Bottom: Aerial view of floating farms, Pirojpur

What began as an adaptive survival strategy has evolved into a community-based system of innovation. Women play a central role in seedball preparation and raft maintenance, despite the labor's physical difficulty.

Top and Bottom: Seed Preparation of floating farms, Pirojpur

Collaborative Adaptation and Technical Support

From 2007 onward, organizations such as the International Union for Conservation of Nature (IUCN), CARE International, and the Government of Bangladesh partnered with local farmers to enhance traditional methods. These collaborations introduced more durable bamboo frameworks, improved compost layering, diversified crops, and supported the scaling up of floating gardens across new regions. The partnerships bridged local knowledge with scientific insight, enhancing productivity and resilience while preserving the cultural roots of the practice.

Communities revived the technique as an urgent response to prolonged flooding and salinity intrusion, turning an ancient form of hydroponics into a contemporary strategy for survival.

Ecological Design and Resource Efficiency

The use of water hyacinth—an abundant invasive species—as the principal construction material demonstrates ecological intelligence. Farmers transformed an environmental nuisance into a productive asset. By reusing and regenerating natural materials, they not only reduced ecological damage but also restored wetland ecosystems, contributing to cleaner water and healthier habitats for aquatic species.

Gender and Community Participation

Women play a crucial role in the cultivation process. They prepare seedballs, layer organic compost, and maintain the floating beds, often working long hours to sustain family livelihoods. Their participation ensures household food security and strengthens the social fabric of these farming communities. In many villages, women's contributions have led to collective ownership of the floating gardens, reshaping local gender dynamics and creating new avenues for empowerment.

Knowledge Transmission and Collective Learning

Floating farming continues to evolve through shared experience and experimentation. Farmers exchange ideas at floating markets and local gatherings, passing skills and innovations from one generation to the next. This ongoing cycle of learning has allowed communities to refine their techniques, extend crop diversity, and respond flexibly to changing climatic conditions. What persists is a shared understanding that resilience is not a fixed state, but a living practice continually renewed by people and water.

Field Insights

Voices from the Ground

The voices from the floodplains reveal how floating farming is not just an adaptive technique but a way of life passed down through generations. For farmers like Md. Shamsul Haque Howlader, cultivating crops on water is both heritage and survival, a practice that sustains families, livelihoods, and the rhythm of an entire landscape.

A Lifelong Practice

Haque reflected on decades of farming that have supported his family and community. For him, the practice is inseparable from life itself.

"Through this work, I've supported my family, fed them, and married off my children. This is the work that keeps us alive."

Floating farming continues a lineage of knowledge inherited from his father and grandfather, a generational continuity of living with water rather than against it.

“My father taught me, and I’ll teach my children. Since our fathers and grandfathers worked like this, we can’t just stop now.”

The Process of Floating Cultivation

The method combines simplicity with deep ecological knowledge. Farmers gather water hyacinth, an invasive plant, and turn it into fertile floating beds strong enough to walk on. On these rafts, they plant, water, and harvest seedlings in repeated cycles.

“We make layers of hyacinth, dry them well so they don’t sink, and plant the seedlings on top. From each bed, we can grow six cycles of crops and recover the cost within two.”

When the growing season ends, the floating beds are stacked one over another, forming a fertile layer that enriches the land. The decomposed hyacinth itself becomes the base for growing vegetables throughout the year, linking aquatic and land farming into one continuous system.

“When the season ends, we stack the beds together. The hyacinth turns into rich soil, and vegetables grow all year round on that fertile base.”

A Community Sustained by Water

In the lowlands of Pirojpur, floating farms are a collective response to a changing environment. The beds are tied to bamboo poles, arranged side by side, and accessed by small boats. Around them, families live and work in tune with the tides.

“On both sides of the Baluya River, people survive depending entirely on this method.”

The system sustains small-scale enterprise and local trade. Farmers sell seedlings and vegetables directly to buyers who arrive by boat from nearby towns.

“We sell it right here. The buyers come to us; we don’t need to go anywhere.”

Shared Learning and Seasonal Renewal

The practice is cyclical, deeply tied to the water’s rise and fall. Farmers shift between floating seedbeds and rice cultivation as the seasons change, ensuring food and income throughout the year.

“For six months we have the floating beds. When the rice seedlings are ready, floating farming starts again. There’s always yield and income.”

As floods grow longer and more unpredictable, the farmers’ creativity and shared knowledge embody a living model of resilience. Through inherited wisdom and daily innovation, they sustain both land and life, proving that adaptability itself can be a tradition.

“Through this work, I’ve supported my family, fed them, and married off my children. This is the work that keeps us alive.”

— Farmer Md. Shamsul Haque Howlader

Right: Seed Preparation under the shed of floating farms, Pirojpur

Water inundation on floating farms, Pirojpur during high tide conditions

Floating farms, Pirojpur

Floating Farms (*Dhap / Baira*):

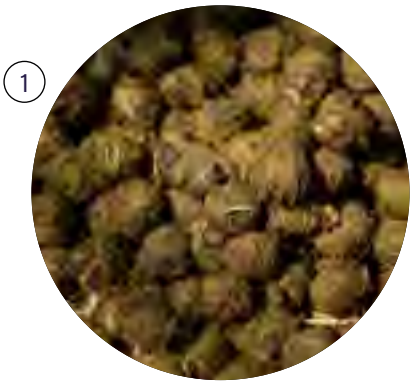
Seasonal Food Production Cycle

1. Seed Preparation (5–7 days)
Seeds are raised in protected nurseries on land before being transferred to floating beds.

2. Floating Bed Formation (15–30 days)
Water hyacinth and aquatic plants are layered into rafts, partially decomposed, and secured with bamboo poles.

3. Flood-Season Cultivation
Vegetables grow directly on floating beds that rise and fall with floodwaters, enabling multiple harvest cycles.

4. Post-Flood and Dry-Season Cultivation
Used beds are stacked on land as raised beds for year-round vegetable production, while dry land plots are also cultivated.



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Key Strategies and Innovations

Hydroponic Farming on Floating Platforms
The use of layered aquatic vegetation and composted biomass allows farming without soil, making agriculture possible in waterlogged environments.

Resource Circularity
Decomposed rafts serve as organic fertilizer, ensuring a closed-loop system that recycles natural nutrients.

Ecological Management
By reusing water hyacinth, the system addresses invasive species management while providing habitat for fish and aquatic biodiversity.

Low-cost, Low-tech Adaptation
The simplicity of construction and reliance on natural materials make floating farming accessible to low-income households without external energy or machinery.

Community Ownership and Scalability
The cooperative nature of raft farming allows easy replication, enabling communities to scale the system based on local needs and capacities.

Dimensions of Sustainability

Geographic Representation
Originating in Gopalganj, Barisal, and Pirojpur, the practice represents the adaptive ingenuity of southern Bangladesh's floodplain communities, responding directly to the challenges of living with water.

Typological and Scalar Diversity
As a landscape-based agricultural innovation rather than a built structure, floating farming broadens the scope of sustainability by linking architecture, ecology, and community-scale food systems.

Climate and Environmental Responsiveness
The system responds directly to monsoonal flooding and salinity intrusion, converting waterlogged environments into productive agricultural zones while enhancing wetland biodiversity.

Social and Cultural Relevance
Floating farms embody centuries-old knowledge, sustaining communities both nutritionally and culturally. They strengthen communal ties, gender inclusion, and intergenerational learning.

Creative Economy
The system supports a network of farmers, seed vendors, and local markets, expanding green livelihoods while reinforcing Bangladesh's position as a global example of climate adaptation through traditional wisdom.

Alignment with the SDGs

SDG 1 – No Poverty: Enhances income security for farming households.

SDG 2 – Zero Hunger: Increases food production during flood seasons and improves nutrition.

SDG 8 – Decent Work and Economic Growth: Sustains agricultural livelihoods and rural economies.

SDG 9 – Industry, Innovation and Infrastructure: Revives and adapts indigenous farming systems as resilient infrastructure.

SDG 11 – Sustainable Cities and Communities: Strengthens rural resilience and settlement sustainability.

SDG 12 – Responsible Consumption and Production: Encourages organic, resource-efficient agricultural cycles.

SDG 13 – Climate Action: Offers direct adaptation to flooding and rising water levels.

SDG 15 – Life on Land: Promotes sustainable use of wetland ecosystems and biodiversity conservation.

SDG 17 – Partnerships for the Goals: Showcases successful collaboration among local communities, government, and global organizations.

Urban Rooftop Gardening, Various Locations in Dhaka

Further Case Study: Urban Rooftop Gardening

Location: Various locations across Bangladesh

Year: Ongoing (Policy shift from 2018 onward)

Key Strategies and Innovations

Grassroots Movement
Rapidly growing, especially in urban centers like Dhaka.

Scale & Reach
~6,638 rooftop gardens in Dhaka (April 2022) and nearly 500,000 nationwide.

Policy Recognition
Included in Bangladesh's National Agriculture Policy in 2018.

Objectives
Promotes self-sufficiency, urban food security, and environmental awareness.

Incentives
10% holding tax rebate introduced in 2021 to encourage participation.

Floating Cage Fish Farming, Canals in Comilla
© https://www.dailypost.net/

Further Case Study: Floating Cage Fish Farming

Location: Meghna River and other rivers/canals in Cumilla, Chandpur, and various inland river systems

Key Strategies and Innovations

Rapid Expansion
Introduced in the 1990s, cage culture is now practiced in nearly 6,000 cages across rivers and canals, including pioneering areas like Chandpur and Cumilla.

High Productivity
A 200 sq. ft. cage can yield 700 tilapia, compared to 150 in a pond of the same size. Fish grow faster in rivers due to higher water temperatures in winter.

Policy Development
The Fisheries and Livestock Ministry is drafting a policy to formalize user rights, regulate cage placement, and support organized expansion.

Economic Potential
Cage farming allows farmers to maximize production on flowing water, increasing profits and providing livelihoods, especially where land for ponds is scarce.

Global Context
Cage culture is practiced widely in Asia, Europe, and North America, showing its viability as a high-yield aquaculture system.

Sorjan Farming, Coastal Areas
© https://www.ews-kt.com/sorjan-farming_bangladesh/

Further Case Study: *Sorjan* Farming: A Climate-Smart Approach

Developer/Implementer: EWS-KT and local farming communities

Location: Coastal areas

Key Strategies and Innovations

Flood-Resilient Raised Beds
~1.2 m wide, 60–90 cm high, 30° slope protects crops from seasonal flooding.

Multi-Functional Water Channels
Serve as flood control, irrigation, and fish farming zones (7–8 months/year).

Soil Fertility Management
Annual soil replenishment from channels enhances long-term productivity.

Year-Round Cropping
Relay cropping system supports vegetables like cabbage, cauliflower, eggplant, chili, tomato, coriander, red amaranth, and basella.

Coastal Resilience
Builds capacity against floods and salinity in vulnerable areas.

Efficient Water Use
Promotes rainwater storage and irrigation practices.

Livelihood & Nutrition Benefits
Diversified income from vegetables and aquaculture while improving local nutrition.

Karupannya Green Field Factory, Rangpur, Bangladesh.

Theme 4: Making Sustainable Building Forms

Primary Case Study: Karupannya Green Field Factory

Architects: Nakshabid Architects

Location: Rangpur, Bangladesh

Year: 2016

The Green Field Factory of Karupannya Rangpur Limited, designed by Nakshabid Architects, sets a benchmark for sustainable and socially responsible industrial architecture in Bangladesh. Conceived as a workplace that feels like home, the factory integrates natural elements such as light, air, water, and vegetation to enhance the wellbeing of its 5,000 workers, 80 percent of whom are women. Using waste garments as the main raw material, the factory embodies circular economy principles through reuse, recycling, and environmental stewardship. Passive cooling, rainwater harvesting, and lush greenery make the building both energy-efficient and climate-responsive, proving that industrial design can nurture both people and the planet.

Narrative

Located in Robertsonganj, Rangpur, the Karupannya Green Field Factory redefines what an industrial complex can be. In a country where factories are often associated with hardship and monotony, this project presents an alternative, one that humanizes the workplace while embodying ecological responsibility. The factory was envisioned as a living ecosystem that engages with nature and culture simultaneously.

Karupannya Rangpur Limited began in 1991 with only 15 craftspeople producing handwoven rugs, known as satranji. Over the decades, it has grown into a major exporter to the European Union, United States, and Asia. With this new facility, Karupannya sought to express its ethos of social development and eco-friendliness. For the architects, the challenge was to design an energy-efficient building that could provide comfort for thousands of workers in the humid tropical climate without relying on mechanical air conditioning.

The resulting design relies on the four natural elements: sun, air, water, and vegetation to create an integrated system of environmental balance. The masterplan organizes production zones, utilities, and communal spaces around large cooling ponds and landscaped courtyards. The architecture responds to local climatic conditions with vertical gardens, natural ventilation, and water-based cooling systems that maintain temperatures four to five degrees cooler than the outside air. The project bridges industrial efficiency with ecological harmony and social inclusion.

Process of Transformation: From Factory to Ecosystem

Human-Centered Vision and Design Philosophy

Karupannya's leadership and Nakshabid Architects shared a vision of transforming the traditional factory into a humane and restorative environment. The factory would symbolize not just production but empowerment, particularly for women. Art and nature were integrated as design elements that elevate the daily experiences of workers. Sculptures such as *Bonolota*, representing women's strength and creativity, stand at the entrance as reminders of dignity and collective pride.

Integrating Nature as Infrastructure

From its inception, the design relied on natural systems as infrastructure. Four large water bodies at the southern edge function as evaporative coolers, rainwater collectors, and de-ironization basins. As air passes over the water, it cools and flows through central courtyards, creating a natural air-conditioning effect. Roof openings and atriums allow hot air to escape, maintaining continuous air circulation. This system eliminates the need for mechanical cooling and reduces energy use by almost 40 percent.

Architecture of Light, Air, and Green

The building is enveloped in vertical gardens and layered balconies shaded with local vegetation. The green façade filters sunlight, improves air quality, and reduces solar gain. Multiple full-height atriums bring daylight deep into the interior, minimizing reliance on artificial lighting.

Top: Karupannya Green Field Factory, Rangpur

Bottom: Central Atrium of Karupannya Green Field Factory, Rangpur

The factory was envisioned as a living ecosystem that engages with nature and culture simultaneously.

These passive design features merge environmental performance with visual beauty, turning the factory into a landscape of comfort and serenity.

Spaces of Care and Community

Recognizing that workers spend most of their day in the factory, the architects designed inclusive facilities to support their wellbeing. The complex includes a medical center, daycare, prayer rooms, grocery shop, canteen, and ATM. The Nandini Rooftop Park, built atop the daycare center, provides shaded spaces for rest and social interaction. Courtyards, lily ponds, and green podiums offer moments of calm between shifts, transforming the work environment into a living community.

Empowering Women through Design and Work

More than 80 percent of Karupannya's employees are women, many from conservative rural backgrounds. Through stable employment, supportive spaces, and cultural recognition, the factory has helped reshape gender norms in the region. The integration of public art and nature reinforces a sense of pride and ownership. As one worker expressed, "This place feels like our own home, a place where we can breathe, work, and live with dignity."

A Symbol of Ethical Industry

Beyond architecture, the project demonstrates that industrial production can be ethical, circular, and environmentally restorative. Waste garments become raw materials for rugs, while natural processes manage water and air quality. The factory's LEED Platinum certification underscores its technical and environmental excellence, but its true success lies in its human impact: the creation of a workplace that uplifts life and community.

Field Insights: Voices from the Ground

A Shared Vision of Transformation

Architect Bayejid Mahbub described the evolution of Karupannya as a journey shaped by experimentation, shared values, and a commitment to human-centered industry. What began as a modest weaving shed gradually transformed into a pioneering green factory.

"The owner's vision shifted from a political ideology to a human one, a factory where workers could feel ownership and pride."

"The idea was to build a factory that breathes, a space where light, air, and water work together like a living system."

This partnership between client and architect challenged conventional industrial models in Bangladesh and showed that well-being and productivity can reinforce one another.

Nature as a Living System

Speaking about the ecological foundation of the project, Bayejid Mahbub explained how nature was treated as functional infrastructure rather than decoration.

“The owner’s vision shifted from a political ideology to a human one — a factory where workers could feel ownership and pride.”

— Bayejid Mahbub

“Over a hundred thousand trees and four hundred species were planted, inspired by natural self-maintaining forests rather than formal gardens.”

“The sound of water is pleasant and it also hides the noise of machines and helps people feel calm.”

Water bodies cool the air, filter groundwater, and create a soothing atmosphere. Natural ventilation and daylighting reduce the need for mechanical cooling, resulting in a workplace that breathes with its environment.

Art, Culture, and Women’s Empowerment

Artist Saidul Haque Juise emphasized that emotion and culture guided the project from the beginning. Seeing women at work on site shaped his understanding of what the factory should represent.

“When workers come from difficult lives and enter a green, art-filled building, their mood changes. They carry that feeling of joy and pride back home.”

“Women’s empowerment is the soul of this factory. *Bonolota* stands for their strength, patience, and creativity.”

His sculpture *Bonolota*, combined with installations such as the Rokeya Stage and Nandini Park, anchors the cultural identity of the factory. These spaces celebrate resilience, creativity, and community life.

Worker Perspectives

Workers described how the factory’s design and welfare facilities shape a respectful and nurturing work culture.

Production worker Mohammad Mokbul Hossain shared his experience:

“The environment here is exceptional. Indoors it stays cool without air conditioning. Fans are enough and the air always feels fresh.”

“Men and women work together like family. There is discipline and also harmony.”

Another worker, Sufia Juli, reflected on the comfort and care provided by the factory:

“The factory is beautiful and green. We have gardens, a fountain, and a medical center where we can rest if we feel unwell.”

“There is a grocery shop, a daycare, and prayer rooms. The bathrooms are clean and maintained. We are cared for and it feels safe and respectful.”

A third worker described the sense of belonging the place creates:

“Even on holidays, we can come and sit in the gardens. It feels like freedom.”

These voices highlight how architectural decisions and welfare systems together foster dignity and community.

Water Treatment Atrium of Karupannya Green Field Factory, Rangpur

Ethics, Ecosystem, and Everyday Life

From an operational perspective, Shiddhartha Lahiri, member of the Karupannya management team, explained how sustainability is woven into the daily functioning of the factory.

“Our goal is not only profit but a balance between environment, economy, and people. The factory generates energy, recycles water, and supports life around it.”

Systems for water recycling, renewable energy, biomass boilers, landscape restoration, and cultural programming work in parallel to make the factory a living demonstration of ethical industry.

A Living Model of Industry

The deeper purpose of the project is reflected in the words of a worker at Karupannya, who said:

“This place feels like our own home, a place where we can breathe, work, and live with dignity.”

Through the integration of ecology, culture, and human well-being, Karupannya presents an alternative vision for industry where craftsmanship, nature, and dignity coexist.

Top: Garden and Staircase of Karupannya Green Field Factory, Rangpur

Bottom: Discussion at the Rooftop of Karupannya Green Field Factory, Rangpur

“Over a hundred thousand trees and four hundred species were planted, inspired by natural self-maintaining forests rather than formal gardens.”

— Bayejid Mahbub

Roof Garden of Karupannya Green Field Factory, Rangpur

Sustainable Building Form & Working Atmosphere

1. Form Shaped by Climate and Airflow
The building's elongated, porous form responds to climate by guiding airflow through courtyards and water bodies.

2. Daylight-Driven Deep Plan Configuration
Full-height atriums introduce natural light into large floor plates, reducing dependence on artificial lighting.

3. Green Envelope as Climate Infrastructure
Vertical gardens, balconies, and vegetated screens filter sunlight and lower heat gain.

4. Shaded Verandas and Transitional Edges
Continuous open-edge verandas reduce direct solar exposure and create cooler transition zones.

5. Landscape as Architectural Form
Ponds, courtyards, and green podiums shape the microclimate and function as extensions of the built form.

Perspective View of Karupannya Green Field Factory

Environmental Massing & Construction Logic

Integrated Water–Air–Form System
The building mass is organized around internal water bodies that function as evaporative cooling basins, shaping airflow and lowering mechanical cooling demand.

Atrium and Roof–Led Natural Ventilation
Tall atriums combined with distributed roof openings act as vertical ventilation shafts, expelling hot air across multiple floors.

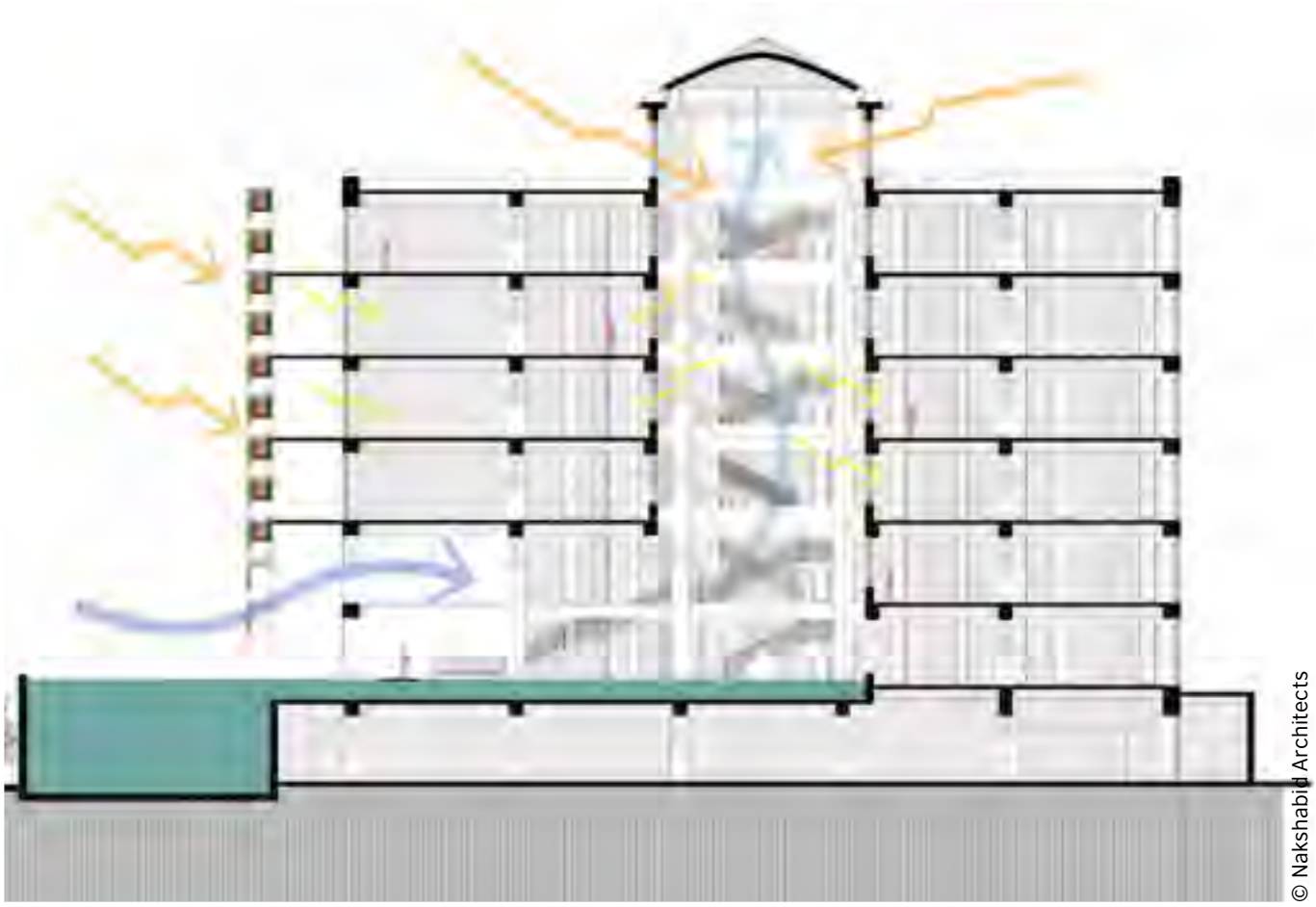
Courtyard-Centered Porous Massing
Courtyards divide large floor plates into smaller, breathable clusters, improving airflow and daylight penetration throughout the building.

Ventilated Roof Configuration
Roof ventilation gaps release accumulated heat, reinforcing stack ventilation across large production halls.

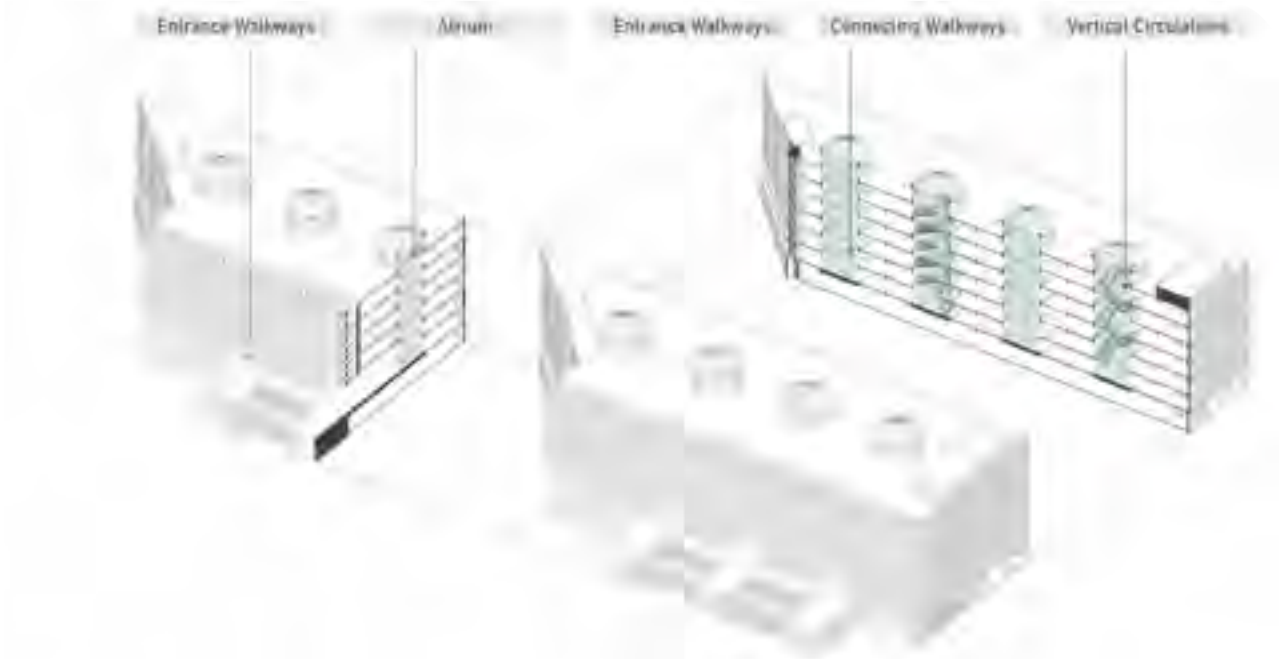
Eco-Form Supporting Circular Systems
The massing integrates rainwater management and wastewater treatment within the building footprint.

Exploded building massing illustrating floor-wise organization and environmental layering

Exploded Axono of Karupannya Green Field Factory



Section showing passive cooling, stack ventilation, and airflow driven by atriums, water bodies, and roof openings



Axonometric Section of Karupannya Green Field Factory

Key Strategies and Innovations

Climate-Responsive and Passive Cooling Design
Four large water bodies at the southern edge act as natural air-cooling systems through evaporation. Combined with vertical gardens, open facades, and roof vents, they maintain comfortable indoor temperatures without mechanical systems.

Water Management and Circular Systems
Rainwater is harvested and stored in the cooling ponds. Groundwater naturally de-ironizes through oxidation, eliminating the need for chemical treatment. All wastewater is treated in an Effluent Treatment Plant and reused in the production cycle.

Energy Efficiency and Daylighting
Full-height atriums and shaded verandas bring daylight into deep interior spaces, reducing electricity consumption. The factory saves nearly 40 percent energy compared to conventional industrial buildings.

Ecological Integration and Vertical Greenery
Lush façades with native plants reduce heat gain, support biodiversity, and enhance air quality. Landscaping around the building, including ponds, courtyards, and rooftop gardens, creates a microclimate that benefits both workers and the environment.

Worker-Centered and Inclusive Facilities
Amenities such as the Nandini Park, medical center, canteen, and daycare reflect a holistic approach to wellbeing. By offering spaces for rest, play, and gathering, the factory fosters emotional and social health alongside physical comfort.

Cultural and Artistic Expression
Thousands of clay sculptures embedded in walls and staircases, along with the prominent *Bonolota* sculpture, link the industrial space to local craft traditions. This artistic integration enhances identity and worker pride.

Dimensions of Sustainability

Geographic Representation
Located in Rangpur, representing the northern region of Bangladesh, the project broadens geographic diversity by highlighting sustainable industrial development in a regional context.

Typological and Scalar Diversity
As a medium-scale industrial facility, it contributes typological diversity to sustainable architecture in Bangladesh, demonstrating how production spaces can integrate ecology and human wellbeing.

Climate and Environmental Responsiveness
The design employs passive cooling, rainwater harvesting, and vertical greenery to reduce energy demand and enhance environmental quality.

Social and Cultural Relevance

The project empowers women, promotes social equity, and integrates local culture through art and craft. The workplace becomes a site of dignity, participation, and community cohesion.

Creative Economy

Karupannya exemplifies circular economy principles by using waste textiles as raw materials and nurturing local craftsmanship, linking sustainability to livelihood generation.

Alignment with the SDGs

SDG 3 – Good Health and Well-Being: Worker facilities and green environments enhance physical and mental health.

SDG 8 – Decent Work and Economic Growth: Provides safe, inclusive, and empowering employment opportunities.

SDG 9 – Industry, Innovation and Infrastructure: Demonstrates innovative sustainable design for industrial spaces.

SDG 11 – Sustainable Cities and Communities: Sets a precedent for worker-centered, eco-friendly urban-industrial development.

SDG 12 – Responsible Consumption and Production: Embodies circular economy through material reuse and efficient resource cycles.

SDG 13 – Climate Action: Reduces carbon footprint through passive design, renewable energy, and green infrastructure.

Dusai Resort and Spa, Moulovibazar, Sylhet.
© https://vitti.com.bd/

Further Case Study: Dusai Resort and Spa

Architect/Developer: Vitti Sthapati Brindo Ltd.

Location: Moulvibazar, Sylhet

Year: 2010–2013

Key Strategies and Innovations

Cultural Inspiration
Design influenced by indigenous Khasiya tribal village housing, blending with the hilly landscape.

Sensitive Construction
Concrete frames anchor villas on slopes without disturbing natural contours; existing trees preserved.

Hybrid Design Approach
Combines traditional tea estate bungalow styles with modern concrete framing for structural stability and aesthetic harmony.

Comprehensive Facilities
Includes villas, dining areas, swimming pool, spa, conference facilities, and sports amenities.

Mohila Samity Complex, Dhaka
© https://www.archnet.org/

Further Case Study: Mohila Samity Complex

Architect: Ehsan Khan Architects

Location: Dhaka

Year: 2015

Key Strategies and Innovations

Cultural Continuity
Replaces the historic women's welfare association building while preserving its legacy as a hub for empowerment and theatre.

Multi-Functional Spaces
Six-storey complex integrates auditoriums, offices, conference halls, and a primary school to serve diverse community needs.

Urban Connectivity
Ground floor designed as an open gathering space that extends the sidewalk and strengthens the street's public life.

Accessible Circulation
Ramps, bridges, and voids ensure gentle vertical movement and promote inclusivity.

Sustainable Form & Materiality
Façade combines brick masonry, concrete fins, and curtain walls to balance solidity, natural ventilation, and urban openness.

BRAC University, Dhaka

Further Case Study: BRAC University

Architect: WOHA Architects

Location: Dhaka

Year: 2021

Key Strategies and Innovations

Climate Responsive & Energy Efficient Design

The building form integrates passive cooling, natural ventilation, daylight optimization, and shaded façade systems to reduce energy consumption and improve environmental performance.

Green Infrastructure & Water Sustainability

Courtyards, roof gardens, and landscaped transitional spaces are combined with rainwater harvesting and water recycling strategies to create an ecologically responsive campus environment.

Flexible & Human-Centric Spaces

Adaptive learning environments, pedestrian-friendly circulation, and socially interactive spaces support long-term usability, wellbeing, and collaborative campus life.

Sustainable Materials & Smart Systems

Locally sourced materials and smart building management systems ensure environmental responsibility, operational efficiency, and reduced carbon impact.

Aerial View of Munshiganj Prefabricated House, Munshiganj

Theme 5: Applying Modularity

Primary Case Study: Munshiganj Prefabricated Houses

Location: Bikrampur, Munshiganj

Described as a “flood-proof” house, the now iconic house of Munshiganj is a simple but effective method for housing in regions of flood and erosion. Originally devised by unknown builders as a modular house made of wooden framework with corrugated metal modular panels, the house could be easily dismantled during precarious conditions and rebuilt on a safer site. If needed, the house owner could return to the original site with their house frame. The modularity of the framework and panels allowed easy assembly and disassembly when needed, as well as convenient portability. The origin of such houses began in the Bikrampur–Munshiganj area in response to the unpredictable behavior of the Padma River. The features of the houses, its modularity and clean elements, are also seen in certain house types of Sylhet from the colonial era. The house is now a distinctive style, marketed for its easily recognizable features, and has spawned elaborate versions using more expensive woods and materials.

Narrative

Munshiganj, a historic district located within the dynamic deltaic landscape of central Bangladesh, has long been defined by its intimate relationship with the rivers Padma and Meghna. Riverbank erosion, floods, and land instability have shaped both its geography and its culture of living. The prefabricated wooden houses of Munshiganj emerged from this constant struggle with impermanence, an ingenious vernacular response that embraces mobility, resilience, and craft.

These portable, prefabricated houses, built primarily in the Louhajong area, are assembled from modular wooden frames and corrugated metal panels that can be dismantled and moved within hours. Traditionally, families could disassemble their homes when floods threatened and reassemble them in safer locations, often transporting the entire structure by boat. This mobility, born of necessity, became a defining cultural trait of the region's architecture.

Over time, this once-pragmatic solution has evolved into a flourishing craft and industry. In Ghor Dour Bazar, a marketplace near the banks of the Padma, artisans and manufacturers build and display these ready-made houses. What began as a survival strategy has become an expression of local pride, design innovation, and economic vitality.

Today, rows of brightly painted wooden houses stand behind the shopfronts, some simple, others intricate, some one-storied, others two or even three. Craftsmen produce the houses using durable hardwoods such as Nigeria Loha (ironwood) or Koroi, combining traditional joinery with modern ornamentation. The houses are lightweight, relocatable, and thermally comfortable, offering a compelling alternative to conventional brick and concrete dwellings.

A standard house measures around 15 by 8 feet, with costs ranging between BDT 3,00,000 and 4,00,000 for basic models. Larger, customized houses with carved facades and decorative elements can reach prices of up to BDT 25,00,000. Despite the cost, demand has expanded rapidly as artisans and manufacturers now showcase their work through YouTube and Facebook, reaching clients from Gazipur to Teknaf.The Munshiganj house thus occupies a rare intersection of vernacular tradition and contemporary enterprise. It is both heritage and innovation, an architecture that moves, adapts, and endures.

Evolving Tradition: From Necessity to Craft Industry

The modular house emerged from generations of ecological adaptation in the active floodplains of Munshiganj. Facing recurring displacement caused by erosion and rising waters, residents developed an architecture centred on mobility. Walls, floors, partitions, and roof panels can be dismantled within hours, transported by truck or boat, and rebuilt with minimal loss. What appears permanent in daily use is, in reality, a fully demountable system designed for uncertain terrain.

Top and Bottom: Elevation of Munshiganj Prefabricated House, Munshiganj

The portable modular house emerged from a deep understanding of the region's ecology. Faced with the recurring displacement caused by river erosion, inhabitants developed an architecture that prioritized mobility.

Top and Bottom: Interior Space of Munshiganj Prefabricated House, Munshiganj

Modularity and Construction Logic

The structural system uses prefabricated wooden frames and metal panels joined through standardized nut and bolt connections. Posts, wall panels, floor boards, and roof frames are designed as repeatable units. This configuration allows repair, replacement, and customization without damaging components. Because the structure avoids permanent joints, parts can be reused many times, reducing waste and long term maintenance.

Typical ready made houses use around fourteen posts for a length of roughly twenty one feet. Larger houses require additional posts, usually sixteen for around twenty three feet and eighteen for around twenty seven feet. Internal supports are not needed for spans up to sixteen feet, keeping interiors open and flexible.

“We build many types of houses — one-story, two-story, and cottages. The smallest is 18 by 10 feet, and the largest can be up to 40 feet long. If needed, we can dismantle and move the whole house within hours.”

— Moazzem Hossain Dhali, Builder

Material Choices and Variations

Durability depends heavily on material selection. Nigeria Loha wood is favoured for its hardness, moisture resistance, and longevity, often lasting around seventy years. Local mahogany and eucalyptus offer more affordable alternatives, lasting around thirty to forty years. Koroi is commonly used for floor planks and structural boards.

Posts typically combine a cement base and a Loha wood shaft. The cement base lifts the wood off the ground, protecting it from termites and soil moisture and significantly extending its lifespan.

Roofing sheets are selected based on cost and performance. Thicker tin sheets such as twenty millimeter, twenty six millimeter, thirty two millimeter, and forty two millimeter varieties are preferred, while very thin sheets near seventeen millimeter are avoided. Japanese tin is popular for its lower price, while Abul Khair sheets are preferred for strength and longevity. Roof tin generally lasts around thirty years, while wall tin can last around forty years. Loha wood components can last several decades, and local woods perform well when periodically sealed with oil.

Aesthetic Evolution and Craftsmanship

Contemporary versions of the Munshiganj house often include detailed woodwork with patterns such as *ruiton*, *tala*, and *nimti*. These motifs appear on verandas, balustrades, and gable ends, giving each house a distinctive character and carrying forward regional craft traditions even as designs evolve to meet modern preferences.

Social Enterprise and Digital Expansion

A new generation of builders has expanded the typology beyond Munshiganj. Through social media marketing, artisans now receive orders from districts including Jamalpur, Shariatpur, Noakhali, Comilla, Chittagong, and parts of southern Bangladesh. Online videos of construction, dismantling, and reassembly have transformed this once localized practice into a nationally recognised craft industry.

Top: Workers of Munshiganj Prefabricated House, Munshiganj

Bottom: Shadows of the metal work of Munshiganj Prefabricated House, Munshiganj

Cultural Meaning and Everyday Life
Although rooted in practicality, these houses now carry deep cultural meaning. Their mobility allows families to protect their primary asset, the home itself, in flood or erosion zones. Naturally ventilated interiors, raised floors, and shaded verandas create comfortable living spaces in the humid climate. In Munshiganj, this architecture shaped by impermanence has become a symbol of pride and resilience.

Field Insights: Voices from the Ground
Insights from builder Moazzem Hossain Dhali, owner of Dhali Enterprise in Louhajong, reveal the precision and adaptability embedded in the Munshiganj house.

Craft, Continuity, and Innovation
Dhali constructs single and double storied houses ranging from eighteen by ten feet to custom built forty foot structures.
“We build many types of houses. One story, two story, and cottages. The smallest is eighteen by ten feet, and the largest can be up to forty feet long. If needed, the whole house can be dismantled and moved within hours.”

The strength of the system lies in its joinery.
“All parts are joined with nuts and bolts. Anyone can take the house apart themselves, even in rain or flood. It can be rebuilt exactly the same way anywhere else.”
Small houses usually take around seven days to build. Medium sized units with verandas require roughly fifteen days, and double storied houses take about twenty days.

Material Knowledge and Durability
Dhali emphasizes the importance of choosing materials based on budget and lifespan.
“Loha wood lasts seventy years. Local wood lasts about thirty. Cement is used only at the base to stop termites and protect the ground.”
Clients choose between more affordable Japanese tin and stronger Abul Khair sheets.
“A house made with Loha wood and Abul Khair tin can last for generations. These are not temporary shelters. They are real homes.”
Price differences shape decisions. A Japanese sheet of around thirty five millimeter thickness may cost around one hundred eight taka per square foot, while an Abul Khair sheet of around twenty six millimeter thickness may cost around one hundred twenty eight taka per square foot.

Mobility and Flood Resilience

Dhali explains that houses can be dismantled even during heavy rain. Each panel is removed part by part without breaking any component. At the new site, posts are positioned first, followed by wall panels and roof installation. Because the system is modular, the house can be rebuilt exactly as before.

Craftsmanship and Customization

Clients often request personalized designs.
“Any design a customer brings, we can build. Some ask for carved verandas, others want patterns like ruiton or tala. Every house has its own character.”
Length, width, height, veranda layout, and ornamentation can all be modified while maintaining the same modular framework.

Economic Empowerment and Enterprise

Digital platforms now connect rural artisans with clients nationwide.
“Our houses are seen across the country. We have sent double storied houses to Jamalpur, Shariatpur, and Chittagong. Orders come through phone calls and Facebook.
The industry now supports carpenters, wood traders, transport workers, fabricators, and small business owners.” — Homeowner, Munshiganj

Through their skill, adaptability, and ingenuity, local builders like Moazzem Dhali prove that sustainable architecture need not rely on high technology. It can emerge from the wisdom of hands — built to move, to endure, and to belong.

Top: Bazar of Munshiganj Prefabricated House, Munshiganj

Bottom: Household in the Landscape of Munshiganj Prefabricated House, Munshiganj

Modular Construction and Portable Housing System

1. Prefabricated Modular Components
Standardized timber frames and panels allow quick assembly and dismantling.

2.Nut-and-Bolt Assembly
Mechanical joints enable the house to be dismantled, transported, and reassembled quickly.

3. Lightweight Structure
Timber frame construction allows relocation by boat or truck during floods or erosion.

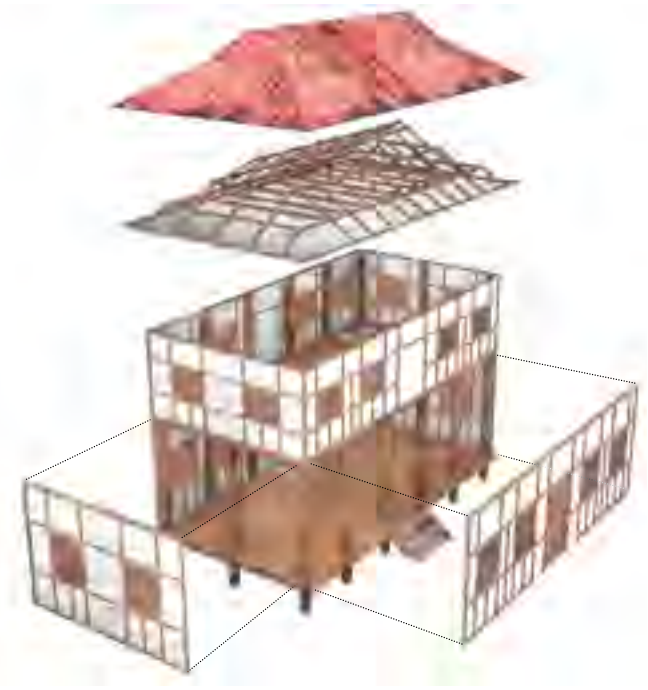
4. Standard Floor and Roof Modules
Repeatable beams and trusses allow fast construction and easy expansion.

5. Climate-Responsive Design
Raised floors, shaded verandas, and ventilated panels improve thermal comfort.

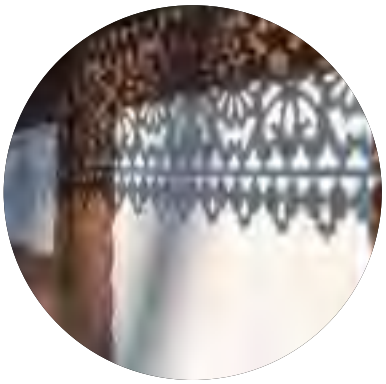
6. Scalable Modular System
The same system supports one-, two-, or three-storey configurations.

7. Repairable Components
Individual parts can be replaced without disturbing the whole structure.

8. Craft-Based Material Identity
Local motifs like *ruiton*, *tala*, and *nimti* integrate cultural expression into modular panels.



Exploded Axono of Munshiganj Prefabricated Houses



Perspective View of Munshiganj Prefabricated Houses

Key Strategies and Innovations

Prefabricated Modularity
Each house consists of standardized components that can be assembled, dismantled, and relocated, enabling rapid and flexible construction.

Resource Efficiency and Reuse
The modular system allows material recycling and reduces construction waste, lowering environmental impact.

Climate-Responsive Design
Elevated floors and natural ventilation mitigate heat and humidity, while portability addresses the recurring threat of floods and erosion.

Craft and Cultural Continuity
The integration of handcrafted wooden details and vernacular motifs sustains traditional craftsmanship and aesthetic heritage.

Local Economy and Skill Development
The thriving house-building industry supports artisans, carpenters, and small manufacturers, fostering economic resilience in the region.

Dimensions of Sustainability

Geographic Representation
Situated in Munshiganj within the Dhaka Division, the project represents central Bangladesh's flood-adaptive housing culture, adding to the regional diversity of sustainable practices.

Typological and Scalar Diversity
As a modular, prefabricated housing model, it expands typological diversity by introducing a scalable, relocatable housing typology suited to displacement-prone areas.

Climate and Environmental Responsiveness
Its modular construction minimizes material waste and environmental impact while enabling climate resilience through mobility and ventilation

Social and Cultural Relevance
By providing affordable and adaptable housing, the model ensures security and dignity for displaced and low-income families while maintaining cultural identity through form and detail.

Creative Economy
The house has become a driver of the creative rural economy, linking local artisanship with digital platforms, expanding markets, and encouraging innovation within traditional frameworks.

Alignment with the SDGs

SDG 3 – Good Health and Well-Being: Ensures secure, comfortable, and well-ventilated living environments for vulnerable populations.

SDG 8 – Decent Work and Economic Growth: Generates livelihoods and skilled jobs in the prefabrication and craft sectors.

SDG 9 – Industry, Innovation and Infrastructure: Demonstrates modular construction as an innovative, adaptive housing model.

SDG 11 – Sustainable Cities and Communities: Offers affordable, mobile housing adaptable to diverse climatic and social contexts.

SDG 12 – Responsible Consumption and Production: Promotes material reuse and minimizes waste through modular efficiency.

SDG 13 – Climate Action: Provides adaptive housing solutions for flood-prone and erosion-affected communities.

Khudi Bari, Various Locations in Bangladesh
© marinatabassumarchitects.com/khudi-bari/

Further Case Study: Khudi Bari

Architect: Marina Tabassum

Location: Various locations, Bangladesh

Key Strategies and Innovations

Modular & Flexible
Structural bamboo with steel joints allows quick assembly, disassembly, and scaling.

Two-Level Design
Maximizes space while providing safe refuge during floods.

Local & Low-Cost
Built with locally sourced materials for affordability (~$450 per unit including labor) and reduced carbon footprint.

For the Vulnerable
Climate-resilient housing tailored for marginalized, landless populations in river sand beds.

Scalable System
Adapted for larger uses, such as community centers in Rohingya refugee camps.

Backed by Support
Developed with funding from the Swiss Agency for Development and Cooperation (SDC).

Low-Cost Resilient *Char* House, Paldangi, Faridpur.
©Iwan Baan

Further Case Study: Low-Cost Resilient *Char* House

Architects: Ahammad-al-Muhaymin with Shekh Nuru

Location: Paldangi, Faridpur

Year: 2016

Key Strategies and Innovations

Site-Specific Design
Tailored for river shoal (*char*) areas highly exposed to floods and land instability.

Community Focus
Serves economically marginalized groups vulnerable to climate displacement.

Local & Affordable Materials
Built with bamboo, earth, and corrugated iron sheets for thermal comfort and cost efficiency.

Blended Knowledge
Integrates traditional practices with modern adaptation strategies.

Climate Responsiveness
Bamboo buttresses act as trellises, reducing heat gain while supporting vegetation.

Anchored Construction
Improves stability on shifting, erosion-prone land.

Living Prototype
Designed to collect user feedback for future adaptation and incremental improvements.

Resilience Building
Encourages low-tech, community-driven development for long-term adaptability.

Left: Jol O Jongoler Kabbo, Pubail, Gazipur

Theme 6:
Planning for Climate Resilience

Primary Case Study:
Jol O Jongoler Kabbo (Pilot Bari)

Architects: Khondaker Hasibul Kabir / Co.Creation Architects

Location: Pubail, Gazipur

Developed as a retreat on a site with critical natural conditions in which architecture, agriculture, and day-to-day activities are in tune with diurnal and annual climatic rhythms. For working with the site, the philosophy in decision-making was that a “constant learning process of protecting a small jungle, wetland, a habitat for beings other than humans” would take place. In developing the site, it was divided into three zones. Nature as a jungle was the first zone where human interactions were restricted. “Nature comes naturally” was the guiding idea for that area, where “not doing” proved more effective than doing. A human zone, bashati, was created where human activities were prioritized over nature. For construction, local craftsmen were engaged who built with rapidly grown renewable building materials.

Narrative

Located in Pubail, Gazipur, this 90-bigha site began as a dense wetland overgrown with vegetation. Instead of transforming it into a conventional development, the architect envisioned a model of ecological balance. The site was approached as a learning ground, where every decision, whether to plant, dig, or build, would respond to the rhythms of nature.

The guiding principle was simple yet profound: not doing is sometimes more powerful than doing. Areas of forest were left untouched to allow the natural ecosystem to regenerate. Water systems were connected through small canals, creating new habitats for fish, birds, and aquatic plants. The resulting landscape blurs boundaries between architecture and ecology, between human activity and the larger cycles of the environment.

Construction evolved gradually through collaboration between the architect and a resident team of local workers. Buildings emerged through conversation, observation, and experimentation rather than fixed plans. The process cultivated not only structures but also relationships between people, place, and the natural environment.

Over time, Jol O Jongoler Kabbo became a living laboratory of sustainability, where food is grown, fish are cultivated, and guests experience a form of hospitality grounded in ecological respect. The site is maintained by a close-knit group of residents who see themselves as caretakers of a shared landscape rather than employees of a resort.

Transformative Journey: Living with Water and Forest

1. Ecological Vision and Site Protection

The project began by observing rather than altering the land. When the architect first arrived, the site was a dense wetland filled with natural vegetation. Instead of clearing it, the approach focused on protecting its ecological character. The team preserved natural zones such as forested areas, ponds, and canals, recognizing them as integral to the site's identity. Over time, these spaces evolved into thriving habitats for birds, fish, and native plants. This first phase established the project's core philosophy: to live within nature's rhythms rather than impose control over them.

2. Collaborative Making and Incremental Growth

Construction followed an open-ended, learning-based approach. Local craftsmen and residents worked collectively, building through experimentation and mutual trust. Structures emerged through discussion and adaptation rather than formal plans. Mistakes were treated as opportunities for refinement, resulting in a process that valued participation and hands-on learning. The architecture grew organically, blending seamlessly with its landscape and reflecting the patience and skill of those who built it.

Top: Lush Green Landscape of Jol O Jongoler Kabbo, Pubail, Gazipur

Bottom: Endless waterbody (Beel) of Jol O Jongoler Kabbo, Pubail, Gazipur

Construction followed an open-ended, learning-based approach. Local craftsmen and residents worked collectively, building through experimentation and mutual trust

Top and Bottom: Accomodations of Jol O Jongoler Kabbo, Pubail, Gazipur

3. Collective Living and Shared Responsibility
Life at Jol O Jongoler Kabbo operates on a model of shared responsibility. The team of caretakers manages every aspect of the site, from construction and maintenance to farming, cooking, and hosting guests. This horizontal system replaces formal management hierarchies with cooperation and mutual understanding. Through daily collaboration, the community sustains an atmosphere of equality and collective purpose, turning everyday routines into acts of stewardship.

4. Food Self-Sufficiency and Seasonal Adaptation
The project integrates agriculture and aquaculture as essential parts of living with the landscape. Rice, vegetables, and fish are cultivated within the site's natural cycles. During monsoon months, when canals and ponds swell, fishing becomes the main source of sustenance and income. In the dry season, cultivation resumes on reclaimed soil. The produce supports both residents and visitors, creating a closed-loop system of production and consumption that reinforces self-sufficiency and ecological awareness.

5. Repair, Maintenance, and Material Renewal
The structures, primarily made of bamboo and jute, are designed to be temporary and regenerative. Regular maintenance and seasonal rebuilding are part of the project's life cycle. Damaged elements are repaired using materials sourced from the surrounding environment, ensuring continuity and minimal waste. This cyclical process of decay and renewal mirrors the ecological rhythms of the wetland, emphasizing resilience through adaptability rather than permanence.

6. Cultural Integration and Evolving Ecology
The retreat has grown into a space that integrates cultural expression with ecological awareness. Traditional folk music and communal gatherings create a bridge between visitors and the surrounding landscape, offering a sensory connection to local culture. Over the years, the site's ecology has continued to evolve as trees mature, canals shift, and wildlife adapts, reminding all who live and visit that this place is a living system in constant transformation.

Field Insights: Voices from the Ground
At Jol O Jongoler Kabbo, life unfolds in rhythm with the landscape. Those who live and work here speak of a place where labor, learning, and care merge into a single way of being — a living experiment in coexistence between humans and nature.

Learning through Doing
Building here is not a matter of following blueprints but of continuous discovery.

"We've been here for twelve years. When this place began, it was full of jungle. It started with just one house, and slowly it began to grow."

Each structure emerged through observation, conversation, and trial.

"We've been here for twelve years. When this place began, it was full of jungle. It started with just one house, and slowly it began to grow."

Top: Cooking Area of Jol O Jongoler Kabbo, Pubail, Gazipur

Bottom: Community People Engaged in Construction of Jol O Jongoler Kabbo, Pubail, Gazipur

“We were given the courage to build. Whenever we made mistakes, we broke things down and rebuilt them. That’s how everything was completed.”

Mistakes are welcomed as part of the process.

“No one stops us from trying. Even if we make errors, there’s no scolding. We always discuss before doing any work.”

Through this rhythm of action and reflection, building becomes a quiet form of education — an act of patience, dialogue, and collective learning

“When the canals dry up, we cultivate rice and vegetables. During winter, we grow everything ourselves, so we don’t need to bring food from outside.”

Shared Responsibility

Daily life here runs without hierarchy. Everyone contributes, whether through construction, cooking, farming, or welcoming guests.

“If we feel a house would look good somewhere, we just build it. We do everything together — no manager, no supervisor. We work like a football team.”

The number of residents shifts with the seasons — more during the busy winter months, fewer in the quiet monsoon. Work expands and contracts like the land itself, sustained by mutual trust and understanding.

“Earlier we were eighteen, now we’re ten including the cook. When more guests arrive, we bring in extra people.”

This cooperative rhythm turns maintenance into a shared act of care rather than duty.

Living with the Landscape

The residents live by the pulse of water and soil.

“When the canals dry up, we cultivate rice and vegetables. During winter, we grow everything ourselves, so we don’t need to bring food from outside.”

The harvest sustains both the community and its visitors.

“We harvest around a hundred to a hundred and twenty maunds of rice — enough for us and for the guests.”

Even the management of materials follows natural logic.

“We soak the bamboo in water to keep insects away. Many trees were damaged by lightning, but the big ones — mango, jam, and lychee — still stand.”

These practices create a circular relationship with the land — one that adapts to seasons and renews itself through work.

Respect for Nature and Restraint

The forest is left untouched, a sanctuary for birds, animals, and silence.

“We don’t go into the forest. If we go, the animals and birds get disturbed. So we stay out.”

This restraint reflects the project’s central philosophy — that sometimes not doing is the most meaningful act of design. By stepping back, they allow life to thrive freely, unshaped by human interference.

Cycles of Work and Renewal

Life here follows the shifting tides of the year.

“During the four winter months, we get regular pay. When there’s no salary later, we manage by selling fish from our canals — there’s plenty of fish here.”

Repair and rebuilding are constant.

“Some houses are removed because they get damaged. We repair them again, but now we are told to maintain what we already have.”

In this ongoing cycle of construction, cultivation, and care, the community sustains both architecture and ecosystem, living proof that resilience lies in balance — not expansion.

Top: Accommodations with Lush Green Landscape of Jol O Jongoler Kabbo, Pubail, Gazipur

Bottom: Endless waterbody (Beel) of Jol O Jongoler Kabbo, Pubail, Gazipur

Aerial View Jol O Jongoler Kabbo (Pilot Bari)

Ecological Landscape and Climate-Responsive Living

Living with Wetland Cycles

The settlement embraces natural hydrology through ponds, canals and water channels that rise and fall with the monsoon. Seasonal water rhythms guide daily life, shaping movement, farming and fishing patterns while maintaining a climate-resilient environment.

A Three-Zone Ecological Framework

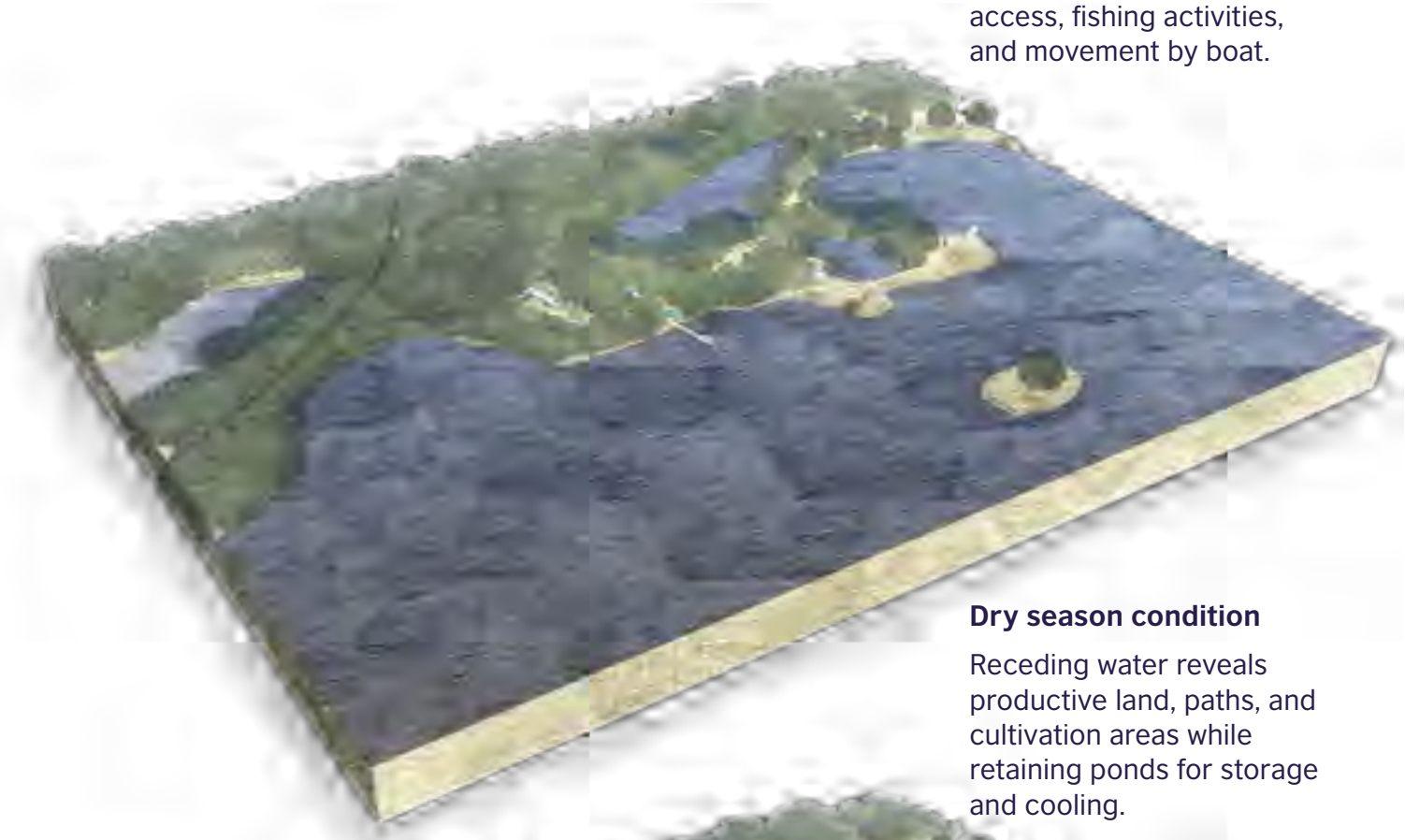
The land is organized into three complementary zones: a protected forest area, a human activity zone and productive food landscapes. Together these zones enable balanced coexistence between biodiversity and community needs.

Nature-Led Spatial Decisions

Forests, open soils and wetlands remain largely undisturbed, functioning as natural climate infrastructure that regulates humidity, reduces heat gain and supports ecological regeneration.

Wet season condition

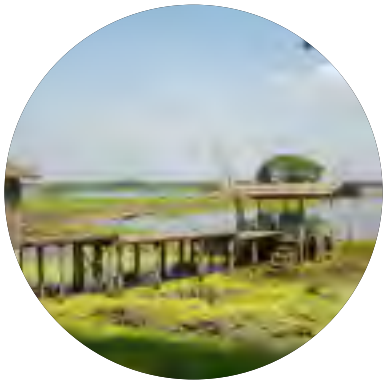
Expanded water bodies and active channels structure access, fishing activities, and movement by boat.



Dry season condition

Receding water reveals productive land, paths, and cultivation areas while retaining ponds for storage and cooling.

Building Processes and Material Practices

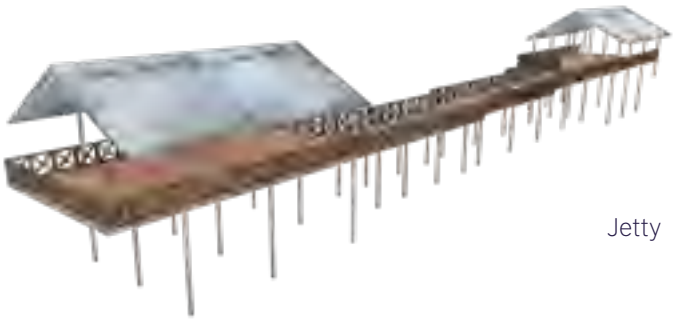


Incremental Community Construction
Buildings evolve gradually through collective decisions, adapting to land, vegetation, and water changes.

Local Climate-Responsive Materials
Bamboo, jute, and earth create breathable structures, prepared using seasonal practices.

Cyclical Repair and Maintenance
Structures are continuously repaired and renewed using local materials, enabling long-term adaptability.

10 Chala Roof



Jetty

House Module

Pavilion

Top: Pavilions with Jetty of Jol O Jongoler Kabbo, Pubail, Gazipur
Bottom: Pavilions of Jol O Jongoler Kabbo, Pubail, Gazipur

Key Strategies and Innovations

Ecological Zoning and Protection
Dividing the site into natural, human, and productive zones preserves the integrity of ecosystems while allowing sustainable human use.

Participatory and Iterative Building Process
A collective, trial-based method of making ensures adaptability, learning, and community authorship.

Use of Local and Renewable Materials
Bamboo, jute, and earth are used for lightweight, climate-responsive structures that age naturally and can be easily repaired.

Self-Sufficient Food Systems
Rice, vegetables, and fish cultivation sustain residents and visitors, minimizing reliance on external resources.

Cultural Continuity and Experience
Local music, hospitality, and everyday practices foster an intimate connection between people and place.

Dimensions of Sustainability

Geographic Representation
Located in Pubail, Gazipur (Dhaka Division), the project represents peri-urban ecological resilience and demonstrates how architecture can coexist with water-based ecosystems.

Typological and Scalar Diversity
As an eco-retreat and living landscape, the project expands the typological scope of sustainable architecture beyond buildings to include land, water, and cultural systems.

Climate and Environmental Responsiveness
The design minimizes impact by adapting to hydrological rhythms, using low-energy materials, and protecting biodiversity.

Social and Cultural Relevance
Through collective living and local engagement, the project nurtures environmental awareness and preserves traditional knowledge.

Creative Economy and Local Capacity
Provides employment in construction, agriculture, and tourism while building long-term skills in sustainable resource management.

Alignment with the Sustainable Development Goals

SDG 8 – Decent Work and Economic Growth: Creates livelihoods through construction, farming, and hospitality.

SDG 11 – Sustainable Cities and Communities: Demonstrates a model for low-impact, community-oriented living.

SDG 12 – Responsible Consumption and Production: Encourages sustainable resource use and on-site production.

SDG 13 – Climate Action: Adapts to seasonal flooding and reduces environmental disruption.

SDG 15 – Life on Land: Protects natural habitats and fosters biodiversity within a human environment.

Raised Settlements, Jamuna River Network, Northern Bangladesh
© https://news.mongabay.com/

Further Case Study: Raised Settlements

Archirect: Kashef Chowdhury / URABNA

Location: Jamuna River Network, Northern Bangladesh

Year: 2013

Key Strategies and Innovations

Nature-Inspired Layout
Design follows the comet-like form of river islands, with a teardrop-shaped settlement and integrated pond.

Flood-Resilient Design
Addresses seasonal flooding of river islands that submerge for ~3 months during monsoon.

Community-Centered Approach
Instead of raising individual houses, residents collectively build a raised plinth above the highest flood level.

Food-for-Work Exchange
Villagers earn temporary income by working on their own plinth construction.

Improved Living Conditions
Raised platform ensures safer shelter with access to healthcare and sanitation.

Miyawaki Micro- Forest, Mirsharai, Chattogram

Further Case Study: Miyawaki Micro-Forest

Initiator: Private ecological initiative

Location: Mirsharai, Chattogram

Year: 2022–2025

Key Strategies and Innovations

Rapid Ecological Restoration (Miyawaki Method)
The project applied the Miyawaki method, which plants dense clusters of native trees to accelerate growth and restore forest ecosystems. The micro-forest was established on 4,400 sq. ft. of degraded land affected by nearby brick kilns.

Native Biodiversity
Over 120 native plant species from nearby hills were selected to reflect the area's natural ecology and support wildlife habitats.

Soil Preparation
Organic materials such as straw, leaves, and wood chips were used to enrich the soil, avoiding chemical inputs.

Carbon and Climate Benefits
The dense forest structure enhances carbon absorption while contributing to local cooling and climate mitigation.

Urban and Coastal Potential
Its compact footprint makes the model suitable for limited urban land and climate-vulnerable coastal areas.

Targeted Impact
Demonstrates a replicable model for community-led micro-forests that restore biodiversity and strengthen climate resilience.

Zinda park, Library Building, Purbachal, Dhaka
© sthapattya-o-nirman.com

Further Case Study: Zinda Park

Architect: Sayedul Hasan Rana

Location: Purbachal

Year: 2012

Key Strategies and Innovations

Ecological Integration
150 acres with 5 artificial lakes and 25,000+ trees, enhancing biodiversity, flood management, and microclimate.It closely resembles the local landscape system.

Community-Led Development
Villagers contributed labor, funding, and stewardship, fostering ownership and resilience.

Resilient Infrastructure
Schools, library, mosque, cafeteria, playgrounds, and cottages for year-round educational, cultural, and recreational use.

Water & Flood Management
Lakes and ponds act as reservoirs, support fisheries, and moderate floods.

Sustainable Mobility & Design
Car-free circulation, shaded walkways, and bamboo culverts reduce environmental impact.

Economic Sustainability
Fishing, tourism, and local enterprises provide diversified income.

Participatory Planning
Co-created with villagers, promoting adaptive resource management.

Urban–Rural Resilience Model
Green buffer near Dhaka demonstrating climate-responsive, community-focused planning.

Coral Marine Habitat and Restoration, St. Martin Island

Further Case Study: Coral Marine Habitat and Restoration

Partners: Bangladesh Navy, IUCN

Location: St. Martin's Island

Key Strategies and Innovations

Coral Restoration
Uses 3D-printed concrete reef balls to support coral regrowth.

Tourism Impact Reduction
Artificial reefs protect natural coral from visitor-related damage.

Marine Protection
Community-enforced No-Take Zones safeguard fish stocks and biodiversity.

Zinda Community Village Home, Rupganj, Narayonganj

Theme 7:
Reviving Indigenous Practices

Primary Case Study:
Zinda Community Village Home

Location: Rupganj, Narayanganj

Year: 2019

The restoration and maintenance of traditionally built structures can be an impactful demonstration of sustainable practice. The Zinda Community Village Home, located within the larger Zinda Park community, embodies this principle through its continued use of traditional construction methods and materials such as mud, straw, rice husk, bamboo, and handmade bricks. Built nearly a century ago and carefully maintained by successive generations, it stands as a living example of climate-responsive, low-impact architecture that fosters both ecological balance and social cohesion.

By preserving indigenous techniques and integrating only modest adaptive repairs, the home retains a deep continuity between people, place, and craft. Its ongoing care represents an everyday form of sustainability rooted in heritage, restraint, and respect for the environment.

Narrative

Located in Rupganj, Narayanganj, within the eco-conscious community of Zinda Park, the Zinda Community Village Home is a traditionally built earthen dwelling approximately 75 to 80 years old, forming part of a lineage of houses first constructed around a century ago. Built by local craftsmen, the house uses clay mixed with rice husk or straw, applied in successive layers after resting to form thick, breathable walls. A finishing layer of finely sifted rice husk creates a smooth and durable surface.

The house is organized around open courtyards and shaded verandas that support daily household activities while allowing natural light and cross-ventilation. Thick earthen walls help maintain thermal comfort throughout the year, remaining cool in summer and warm in winter without reliance on mechanical systems. Small, carefully positioned openings support airflow while limiting heat gain.

Maintenance follows long-established household practices. Every two to three years, fresh clay is prepared and reapplied as a surface layer to renew the walls. Some structural elements have been temporarily replaced over time, with plans to return to traditional materials where possible.

Within the same homestead, the family also occupies a newer house with modern facilities, connected to the earthen dwelling through a shared courtyard cluster. The traditional house continues to be used and maintained alongside the newer structure, reflecting a layered pattern of living rather than replacement.

Set within a landscape of ponds, trees, and gardens, the house benefits from water, shade, and vegetation that contribute to microclimatic regulation and everyday subsistence. As part of the wider community of Zinda Park, the dwelling remains embedded within a settlement shaped by shared spaces, environmental care, and cooperative management.

Living Heritage: Sustaining an Earthen Tradition

Remembering and Recommitting

A lineage spanning nearly a century underpins the family's continued commitment to maintaining the earthen house. Rather than replacing the structure, the family has chosen to sustain it through regular care, preserving a direct connection to ancestral knowledge, materials, and land. This continuity allows traditional practices to remain active within everyday life.

Materials and Making

The house reflects a careful understanding of local material systems. Walls built from clay mixed with rice husk or straw allow the structure to breathe and regulate indoor humidity. Construction methods rely on layered walls, shaded verandas, courtyards, and limited openings, which together support thermal comfort and natural ventilation in a humid climate.

Top: Kacharighor of Zinda Community Village Home, Rupganj, Narayonganj

Bottom: Corridor of Kacharighor of Zinda Community Village Home, Rupganj, Narayonganj

A lineage spanning nearly a century inspires the family's commitment to preservation.

Top: Kitchen outside Zinda Community Village Home, Rupganj, Narayanganj

Bottom: Interior space of kitchen of Zinda Community Village Home, Rupganj, Narayanganj

While small updates improve safety and comfort, the essence of the house remains unchanged. New interventions are carefully integrated, following the principle that adaptation should enhance longevity without compromising identity or cultural memory.

Care and Renewal

Maintenance follows cyclical, low-cost practices embedded in routine household activity. Periodic re-plastering with fresh clay restores the surface and extends the life of the structure. Where elements have deteriorated over time, repairs are carried out incrementally. In some instances, original wooden posts were temporarily replaced with concrete columns, with plans to return to traditional timber as part of ongoing maintenance. Adaptation is guided by necessity and care, allowing the house to remain usable while preserving its original form and construction logic. These practices prioritize reuse and continuity rather than replacement, minimizing material waste.

Household, Courtyard, and Landscape

The central *uthan* functions as both a social and climatic core, supporting daily chores, gatherings, and seasonal activities, while also linking the traditional earthen house with the newer dwelling within the homestead. Surrounding ponds, gardens, and trees contribute to food production, shade, and microclimatic regulation, forming an interdependent relationship between the household and its landscape.

Community Setting and Governance

Situated within the cooperative framework of Zinda Park, the house is embedded in a wider settlement that values shared stewardship of cultural and ecological resources. Community-led governance, collective management of land and water, and reinvestment in education and environmental care create conditions in which traditional houses continue to be maintained, used, and respected within a contemporary context.

Field Insights: Voices from the Ground

The family's reflections reveal a deep emotional and practical attachment to their earthen home, grounded in care, continuity, and contentment

Embedded Craft and Comfort

"We used to think it was just necessity, but now we see it is something valuable. In winter the inside stays warm, in summer it stays cool. Cement and sand have chemicals, but this has none. It's completely healthy."

Maintenance as Heritage

"Every two or three years, we mix fresh clay and coat the surface. It's like repainting, but with earth. Some of these houses are a hundred years old, and they can last forever if maintained."

Continuity and Belonging

"I want to keep what my father and grandfather built. It feels good, and everyone likes it too. When we took our mother to a concrete house, she wanted to come back. She feels most comfortable here."

Selective Adaptation

"We replaced the wooden pillars with cement before, but now we want to go back to wood again. The old wood was stronger, it lasted for centuries."

Interior space of Mud Houses of Zinda Community Village Home, Rupganj, Narayanganj

The spatial layout centers around an open uthan (courtyard), which brings in daylight, promotes cross-ventilation, and serves as a gathering space for family and community life.

Community Resonance

“People from Dhaka are very happy seeing earthen houses. We never realized before, it was just necessity for us. Now we want to preserve it proudly.”

These voices show that the Zinda Community Village Home is not only an architectural artifact but a living relationship between people, place, and material. It represents a way of life where repair, restraint, and respect for nature form the essence of sustainability.

Mud Houses of Zinda Community Village Home, Rupganj, Narayanganj

Indigenous Spatial Logic and Living Architecture

Climate-Responsive Earthen Envelope

Thick earthen walls provide thermal mass that moderates indoor temperatures and humidity, allowing interiors to remain comfortable throughout seasonal changes without reliance on mechanical systems.

Courtyard as Spatial and Social Core

The central courtyard organizes domestic life by bringing daylight into the interior, supporting cross-ventilation, and accommodating everyday activities, rituals, and seasonal use.

Shaded Verandas as Transitional Space

Deep verandas form semi-outdoor zones that filter sunlight, temper airflow, and mediate between interior rooms, the courtyard, and the surrounding landscape.

Controlled Openings for Light and Air

Openings are modest in size and carefully positioned, enabling daylight and natural ventilation while maintaining privacy and the thermal performance of the earthen walls.

Home Embedded within Landscape Systems

Ponds, trees, and gardens surrounding the house contribute to a localized microclimate, supporting shade, water retention, and biodiversity while reinforcing the connection between dwelling and environment.

Material Knowledge and Cyclical Maintenance

Construction relies on layered clay mixed with rice husk or straw, prepared and rested before application to achieve strength and breathability. Surfaces are periodically renewed through locally sourced materials, allowing the building to age, adapt, and remain resilient over time.

Top: Courtyard of Zinda Community Village Home, Rupganj, Narayanganjj

Bottom: Semi Open Verandah of Mud Houses of Zinda Community Village Home, Rupganj, Narayanganj

Perspective View of Zinda Community Village Home

Aerial View of Zinda Community Village Home

Key Strategies and Innovations

Traditional Earthen Construction

The house is built using a time-tested technique that mixes clay with rice husk and applies it in successive layers. This creates walls that are both strong and breathable, maintaining natural insulation throughout the year. The method reflects deep knowledge of local materials and ensures comfort without the need for artificial cooling or heating.

Courtyard-Based Planning

The spatial layout centers around an open *uthan* (courtyard), which brings in daylight, promotes cross-ventilation, and serves as a gathering space for family and community life. This traditional arrangement connects architecture with social well-being, making the courtyard the climatic and cultural core of the home.

Cyclical Maintenance and Renewal

Sustainability here is not a one-time achievement but a continuous practice. Every few years, the family re-plasters the walls with fresh clay, reinforcing the structure and restoring its finish. This low-cost and cyclical maintenance process keeps the house durable, reduces material waste, and preserves its original character over generations.

Integration with Natural Landscape

The house exists as part of a larger ecological system of ponds, trees, and gardens. These elements help regulate temperature, recharge groundwater, support food production, and foster biodiversity. The design demonstrates how built and natural environments can coexist in mutual support.

Community and Cultural Stewardship

Located within Zinda Park, a cooperative community grounded in environmental and cultural values, the home benefits from shared stewardship and collective knowledge. This setting ensures that the traditional practices sustaining the house are supported by community engagement, education, and mutual care.

Dimensions of Sustainability

Geographic Representation

Located in Rupganj in the Dhaka Division, the home represents peri-urban transitions where rural vernacular architecture is under threat from rapid urbanization. Its preservation demonstrates how indigenous knowledge systems adapt within changing contexts.

Typological and Scalar Diversity

As a family and community hub, the house integrates residential, social, and productive functions, reflecting the layered spatiality of traditional Bengali homesteads.

Climate and Environmental Responsiveness

Earthen construction provides natural insulation, moisture regulation, and ventilation, minimizing dependence on artificial energy sources and promoting resilience to climatic extremes.

Social and Cultural Relevance

The home sustains intergenerational bonds and cultural practices through shared spaces and community rituals, reinforcing identity and belonging.

Creative Economy and Local Capacity

The project sustains livelihoods for local craftsmen skilled in vernacular techniques, ensuring that knowledge transmission continues across generations

Alignment with the Sustainable Development Goals

SDG 1 – No Poverty: Ensures affordable, self-built housing using locally available materials, reducing dependency on costly industrial construction.

SDG 8 – Decent Work and Economic Growth: Creates livelihood opportunities for local artisans and laborers through traditional building and maintenance.

SDG 11 – Sustainable Cities and Communities: Promotes inclusive, culturally rooted, and environmentally sensitive rural settlements.

SDG 12 – Responsible Consumption and Production: Uses renewable, locally sourced materials and encourages cyclical repair practices.

SDG 13 – Climate Action: Enhances adaptive capacity and reduces emissions through passive cooling, renewable materials, and ecosystem stewardship.

Traditional Santal Houses, The Santals Settlements, Rajshahi Division.

Further Case Study: The Santals Settlement

Location: Mainly in the northern districts of Rajshahi Division; historically also in Pabna, Jashore, Khulna, and Chattogram.

Key Strategies and Innovations

Settlement Patterns
Houses and communal spaces are organized according to kinship ties and clan systems (*gotras*), with a spatial hierarchy guided by traditional *panchayat* governance.

Household Layout & Courtyards
Homes are arranged around open, clean courtyards, supporting daily activities, light, ventilation, and social interaction.

Local & Vernacular Design
Dwellings are built with mud walls, thatched roofs, and indigenous materials, reflecting environmental adaptation and climate resilience.

Decorative & Functional Elements
Earthen wall paintings and simple furniture showcase local craftsmanship and cultural expression while maintaining functional use of space.

Climate-Responsive Design
Compact forms, raised plinths, and roof structures help manage heat, ventilation, and flood resilience in the northern Bangladesh climate.

Traditional homesteads of Garo Community, The Garo Settlements, Sylhet

Further Case Study: The Garo Settlement

Location: Mainly in the districts of Mymensingh, Netrokona, Sherpur, Tangail, Jamalpur, Sunamganj, Sylhet, and Gazipur.

Key Strategies and Innovations

Settlement Patterns
Villages are organized along clan and matrilineal lines, influencing the placement of houses, courtyards, and communal spaces.

Household Layout & Courtyards
Homes are arranged around open courtyards that serve functional purposes like cooking, social interaction, and light/ventilation.

Local & Vernacular Design
Houses are built with locally available materials and techniques, featuring timber or bamboo frames, thatched or tiled roofs, mud walls, and elevated plinths for flood protection.

Climate-Responsive Design
Open layouts, elevated floors, and ventilated roofs support natural cooling, drainage, and adaptation to the subtropical.

Homemade Family Houses, Rudrapur, Dinajpur

Further Case Study: HOMEmade Family Houses

Architect: Studio Anna Heringer

Location: Rudrapur, Dinajpur

Year: 2008

Key Strategies and Innovations

Local Craftsmanship & Knowledge Transfer
Built with hands-on workshops involving local artisans and students, strengthening traditional skills in mud and bamboo construction.

Sustainable Materials
Mud, bamboo, straw, and coconut-fiber ropes used to reduce environmental impact and cost.

Two-Story Vernacular Design
Doubles living space while conserving land for agriculture, maintaining cultural layouts like separate kitchens and bathrooms.

Climate-Responsive Features
Roof thermal mass, insulation, and cross-ventilation ensure comfort throughout the year.

Durability & Resilience
Innovations like ferro-cement damp-proof layers, bamboo “speed breakers,” and straw-mixed walls protect against pests, moisture, and erosion.

On-Site Adaptive Design
Flexible, iterative planning developed with community input using clay and sketches, ensuring context-specific solutions.

Replicable Model
Serves as a template for sustainable rural housing, empowering local builders to carry indigenous construction techniques forward.

Amber Denim Loom shed, Gazipur, Dhaka

Theme 8: Applying Adaptive Reuse

Primary Case Study: Amber Denim Loom Shed

Architects: Archeground / Jubair Hasan

Location: Gazipur, Dhaka

Year: 2015

The Shed Building is part of a factory campus in Gazipur. Inspired by the vernacular rural house, the Shed represents the recreation of the rural pavilion typology in a contemporary building type. Built on a low-cost budget, the layout has been kept as open as possible under one large canopy to house several loom machines, a buyers' lounge, a dining area for workers, toilets, and a prayer space. The operating cost of the building was kept minimal by introducing a cooling water body, bamboo screen, high ceiling, and other vernacular elements. These were installed to reduce electricity costs by eliminating the need for air conditioning and artificial lighting, while making the space naturally cool and comfortable to work in. Unused gas pipes were used as structural columns and local bamboo was collected for the construction carried out mostly by untrained workers of the factory.

Narrative

The Amber Denim Loom Shed reimagines the idea of the industrial building through the lens of vernacular wisdom and adaptive reuse. Located within the Amber Denim Factory compound in Rajendrapur, Gazipur, the project reflects the essence of rural Bangladeshi architecture, where practicality, climate awareness, and local materials define everyday spaces. Designed by Archeground under architect Jubair Hasan, the Loom Shed demonstrates how the vocabulary of the traditional pavilion can be translated into a modern industrial structure that is both economical and environmentally responsive.

Amber Denim Ltd., one of Bangladesh's largest denim exporters, commissioned the project to accommodate a small-scale loom unit for specialized weaving. The design intent was not to produce a monumental industrial structure but to create a human-scale workspace that is simple, breathable, and efficient. The architects approached this by learning from the logic of the rural *Do-chala* form, characterized by its lightweight structure, sloped roof, and open plan.

Set within an artificial pond, the Loom Shed merges land, water, and structure into a unified landscape. Upcycled gas pipes form the primary framework, while bamboo screens and handmade concrete roof tiles create a tactile, layered envelope. The project's minimal resource use and strong environmental performance result from a deep understanding of the local climate and material culture. Through its making, it restores the connection between work, craft, and nature.

Crafting the Loom Pavilion: From Material Reuse to Spatial Renewal

Learning from Vernacular Roots

The design takes direct inspiration from Bangladesh's rural architecture, where land, water, and shade coexist in harmony. Traditional houses built by untrained local builders provided lessons in simplicity, material honesty, and climatic intelligence. The Loom Shed translates these lessons into an industrial context, combining vernacular sensibility with contemporary function.

Adaptive Reuse as Design Strategy

Unused gas pipes, originally purchased for other purposes, became the primary structural columns. By reusing existing industrial material, the architects minimized embodied energy while demonstrating adaptive reuse within an industrial setting. The simplicity of the welded steel and bamboo system allowed factory workers themselves to contribute, making construction a shared learning experience.

Building on Water

The entire structure is placed on an artificial water body that moderates temperature and humidity. The water cools air entering the building and helps maintain the flexibility of yarns used in weaving. The reflective surface also enhances the visual calm of the workspace, blurring the boundary between architecture and landscape.

Top: Structure System of Amber Denim Loom shed, Gazipur, Dhaka © Aga Khan Trust for Culture / Sandro di Carlo Darsa

Bottom: Relationship with Waterbody of Amber Denim Loom shed, Gazipur, Dhaka © Archeground

Unused gas pipes, originally purchased for other purposes, became the primary structural columns. By reusing existing industrial material, the architects minimized embodied energy while demonstrating adaptive reuse within an industrial setting.

Ground Floor Plan of Amber Denim Loom Shed

Vertical Section Floor of Amber Denim Loom Shed

Craft and Construction Process

The building's physical form is a long, rectangular pavilion of 80 meters by 30 meters. The open plan houses all functional areas under a single roof, with partitions made from treated bamboo. Handmade concrete roof tiles produced on-site, provide thermal mass and durability. These tiles, once a common feature of rural roofs, were revived for this project, sustaining traditional craftsmanship that was vanishing from industrial construction.

More than a workspace, the Loom Shed creates an environment of dignity and calm. The interplay of light, air, and water connects workers to the natural rhythms of their surroundings.

Passive Cooling and Light

The shed's bamboo walls and high ceilings enable cross-ventilation, while sunlight filters softly through the screens, producing ever-changing patterns of light and shadow. Reflections from the surrounding water further animate the space, transforming work into a sensory experience. The result is a factory that operates efficiently without air-conditioning, with interior temperatures several degrees cooler than outdoors.

Spatial Simplicity and Comfort

The plan prioritizes ease of use, durability, and maintenance. Concrete floors with neat cement finishes, bamboo screens, and exposed roof tiles are used in ways that allow natural aging and easy repair. The open deck and veranda-like edges provide shaded zones for informal gathering and rest, reinforcing a sense of community among workers.

A Pavilion for People and Place

More than a workspace, the Loom Shed creates an environment of dignity and calm. The interplay of light, air, and water connects workers to the natural rhythms of their surroundings. By drawing upon collective craft and ecological sensitivity, the project transforms a factory building into a poetic and sustainable landscape of labor.

Field Insights: Voices from the Ground

The architect's reflections on the Amber Denim Loom Shed reveal a design philosophy deeply rooted in Bangladesh's land, culture, and people. Rather than treating sustainability as a technical pursuit, he frames it as an act of understanding — of listening to place, material, and human rhythm.

Designing with the Country in Mind

From the outset, the architect saw the project as an opportunity to express Bangladesh's identity through architecture.

"Whenever I design a building, I try to use materials that represent this country, not only in construction but also in the arrangement, the plan, and the overall design. Sustainability comes naturally if you truly understand a place, its surroundings, its culture, and its context."

For him, environmental design begins with awareness. The understanding of Bangladesh's climate, light, and air guides the building process.

"I don't see sustainability as something complicated. If we understand Bangladesh and work accordingly, it will automatically become sustainable."

From Weaving Houses to Weaving Spaces

The Loom Shed's design evolved from the memory of traditional weaving houses known as *taat-ghars*.

"This was a textile mill, a semi-automated space where fabric would be woven. My first thought was, isn't this like a *taat-ghar*? Then why not mirror that idea in the design?"

He traced the weaving industry's roots in Sirajganj, Narayanganj, and Tangail, regions where rivers and humidity shaped the craft itself.

"Those areas developed weaving industries because the rivers created moisture in the air. That humidity helps in weaving textiles. So I thought, why not do it naturally?"

The factory's ponds recreate this natural balance. They cool the air, maintain humidity for fabric production, and link industrial function with ecological logic.

"I designed two water bodies, just like village ponds near which weavers traditionally worked. The evaporation from those ponds creates natural moisture that aids in weaving."

People as Co-Owners

Beyond climate and form, the project sought to redefine relationships between workers, architecture, and ownership.

"In my building, there are no doors or windows. It is entirely like a pavilion. The idea came from another thought: who really works in a factory? The owner invests, yes, but the 200 people who work there every day, I see them as the true owners."

His design intention was to remove barriers, both physical and social.

"After work, at five in the afternoon, the space should still belong to them as a place to sit, relax, or gather. The same chairs are used by foreign buyers and local workers, symbolizing equality."

This egalitarian spirit transforms a factory into a community space where dignity, rest, and social connection are built into the architecture

Building by Hand, Building with Care

The project's making was guided by simplicity, reuse, and human labor.

"I could use expensive materials, but I always think about where Bangladesh stands economically. The client had a lot of unused gas pipes, so I said, I'll use them. Reusing them made economic and environmental sense."

"Almost everything in this building, like the handmade clay roof tiles, was made on-site and installed by hand. The bamboo screens were handwoven. We avoided synthetic materials and used biodegradable ones that merge with nature."

— Jubair Hasan

Top: Adjacent Landscape System of Amber Denim Loom shed, Gazipur, Dhaka.

Bottom: Interior Space of Amber Denim Loom shed, Gazipur, Dhaka.

Construction was done entirely by hand, emphasizing craftsmanship over machinery.

“Almost everything in this building, like the handmade clay roof tiles, was made on-site and installed by hand. The bamboo screens were handwoven. We avoided synthetic materials and used biodegradable ones that merge with nature.”

For the architect, this tactile process connects to the spirit of Bangladesh’s textile heritage.

“I often compare handmade work to *nakshi kantha*. Handmade things may have imperfections, but they carry emotion, artistry, and a human touch. My architecture is like that, alive, human, and sincere.”

Ecology Beyond Humans

The Loom Shed’s openness extends its hospitality to all living beings.

“I see birds flying, butterflies moving around, and I always believe we are not the only owners of this place. By keeping the spaces open and airy, it’s not just humans who benefit. I’m sure other living creatures do too.”

This approach transforms the factory from an isolated production unit into a shared landscape where humans and nature coexist.

Interior Space of Amber Denim Loom shed, Gazipur, Dhaka. © Archeground

Adaptive Reuse and Material Systems

Upcycled Gas Pipe Columns
Repurposed factory gas pipes serve as structural columns, reducing waste and embodied carbon.

Bamboo Screens and Partitions
Local bamboo forms breathable screens and partitions, improving airflow and daylight.

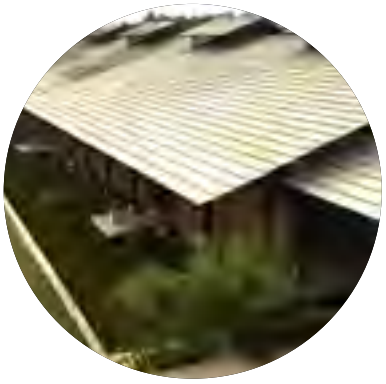
Handmade Concrete Roof Tiles
On-site cast tiles provide thermal mass and revive traditional craft.

Passive Cooling and Water–Climate System

Cooling Water Body
An artificial pond beneath the shed cools incoming air and improves indoor comfort.

Cross Ventilation
Perforated bamboo facades and an open plan enable continuous airflow.

High Roof Volume
A tall roof allows hot air to rise and escape, reducing heat buildup.



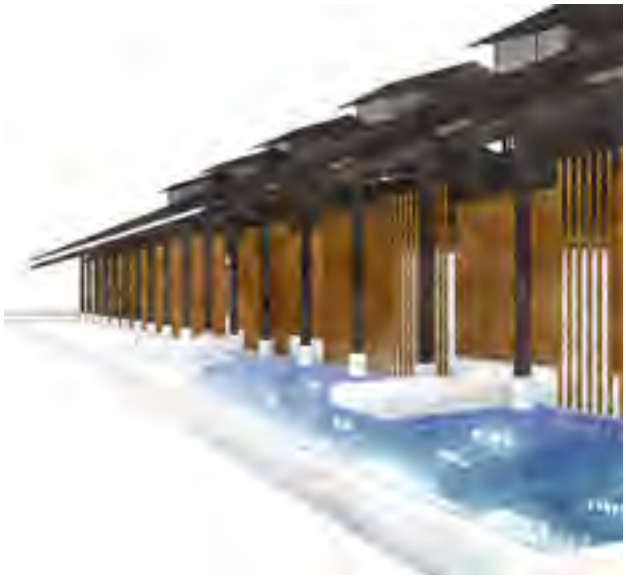
Elevation of Amber Denim Loom Shed

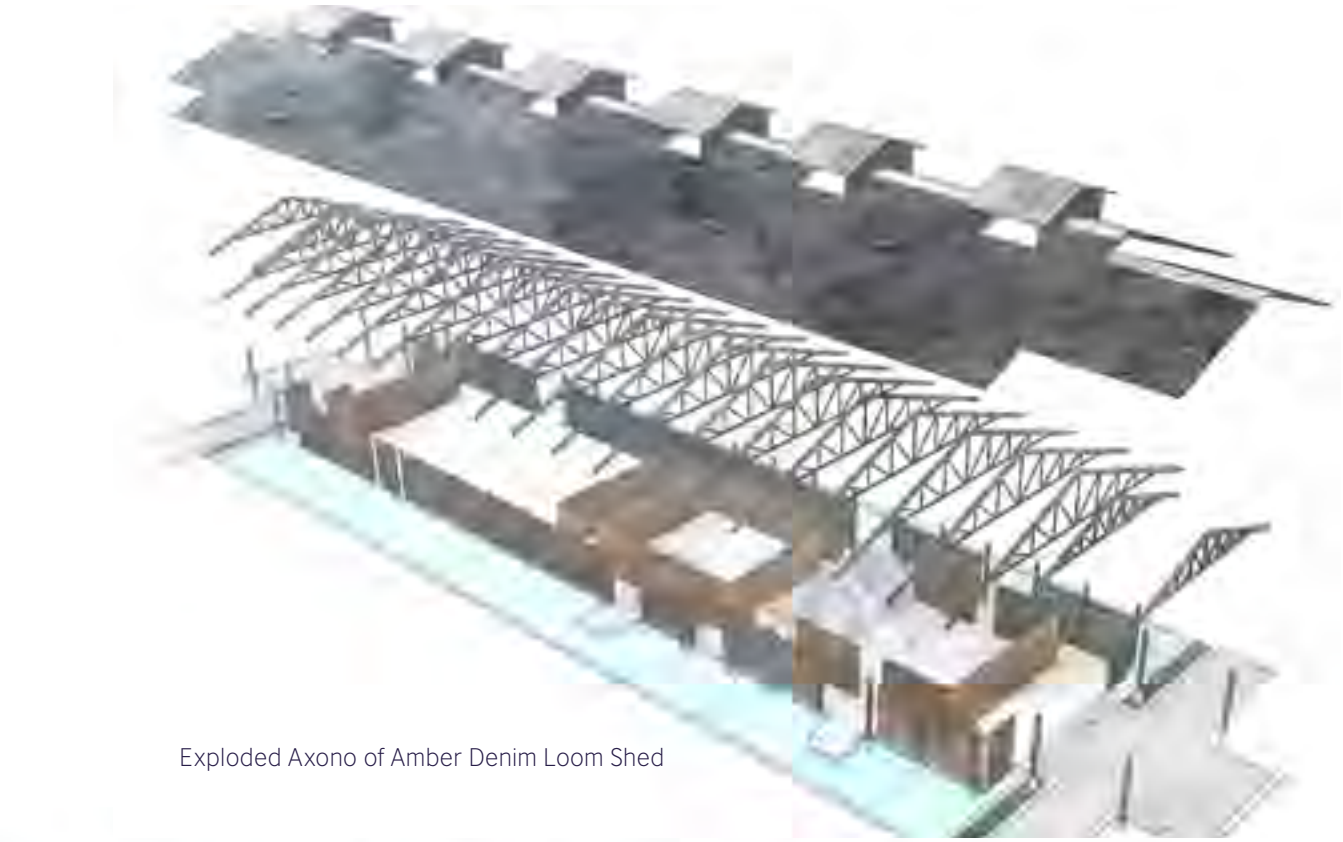
Vernacular Typology and Spatial Logic

Do Chala Inspiration
Sloped roof and open form reinterpret rural typologies in a contemporary industrial setting.

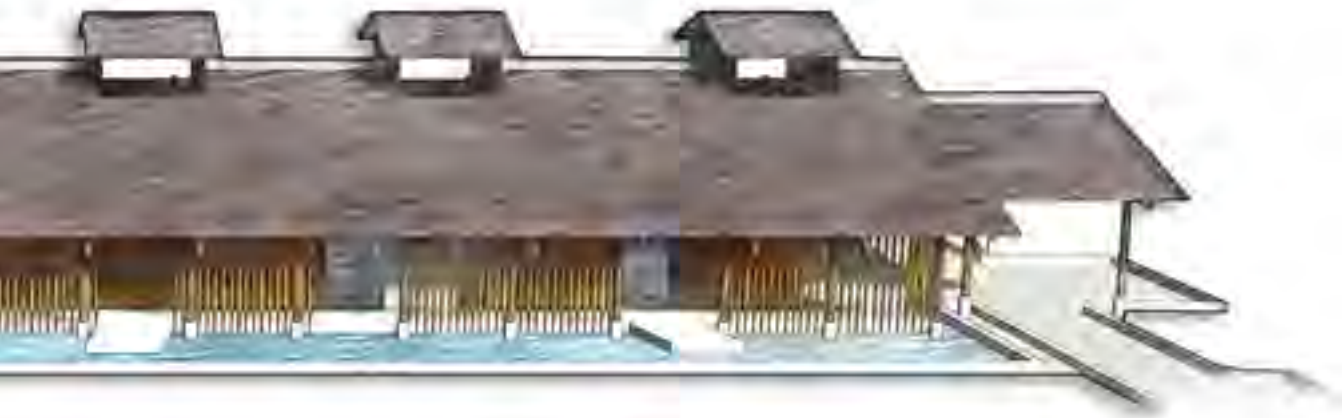
Single Roof Open Plan
All functions are housed under one continuous canopy for efficiency and flexibility.

Veranda-Like Edges
Shaded edges create transitional spaces for rest, interaction, and comfort.





Exploded Axono of Amber Denim Loom Shed



Key Strategies and Innovations

Adaptive Reuse and Resource Efficiency
Upcycled gas pipes were repurposed as structural columns, demonstrating resource-conscious design and minimizing embodied carbon.

Integration of Vernacular Techniques
Local bamboo and handmade concrete roof tiles reinterpret rural building knowledge within a modern industrial context.

Passive Environmental Design
The combination of high ceilings, bamboo screens, open layout, and surrounding water bodies ensures continuous airflow, natural light, and humidity control without mechanical cooling.

Worker Participation and Knowledge Sharing
Untrained factory workers were directly involved in the construction, bridging formal architectural design and local craftsmanship.

Low Maintenance and Longevity
Durable materials such as concrete, bamboo, and cement finishes were used to ensure longevity, easy repair, and minimal operational cost.

Revival of Lost Craft Traditions
On-site fabrication of handmade concrete roof tiles preserved disappearing craftsmanship, aligning industrial construction with heritage preservation.

Dimensions of Sustainability

Geographic Representation
Located in Gazipur within the Dhaka Division, the project represents peri-urban industrial architecture that harmonizes production with local ecology and community participation.

Typological and Scalar Diversity
As a medium-scale industrial facility, the project demonstrates how workplace architecture can embody cultural memory while addressing modern functional requirements.

Climate and Environmental Responsiveness
Passive cooling, daylight optimization, and the use of recycled and local materials reduce operational energy and environmental footprint.

Social and Cultural Relevance
By involving workers in construction and incorporating local techniques, the project strengthens community ownership and sustains vernacular craftsmanship.

Creative Economy
The Loom Shed enhances skill development, supports local artisans, and promotes sustainable industrial practices that merge creativity with production.

Alignment with the SDGs

SDG 8 – Decent Work and Economic Growth: Supports local labor participation and skill development in sustainable industrial practices.

SDG 9 – Industry, Innovation and Infrastructure: Demonstrates innovative, resource-efficient industrial design.

SDG 11 – Sustainable Cities and Communities: Provides a worker-friendly, climate-responsive factory environment.

SDG 12 – Responsible Consumption and Production: Reuses materials and optimizes resources to minimize waste.

SDG 13 – Climate Action: Reduces energy consumption through passive and low-carbon design strategies.

SDG 17 – Partnerships for the Goals: Built through collaboration among architects, clients, and workers, fostering shared knowledge and responsibility.

Design Studio of Atelier Robin Architects, Hazaribagh, Dhaka.
© Prantography

Further Case Study: Design Studio

Architect: Atelier Robin Architects / Salauddin Ahmed

Location: Hazaribagh, Dhaka

Year: 2024

Key Strategies and Innovations

Adaptive Reuse
Studio set in a former tannery building in Hazaribagh, repurposing a 6,000 sq. ft. rawhide drying floor.

Preserved Structure
Original ceiling retained; custom door fitted to existing height without alteration.

Climate-Responsive Finish
Entire floor painted white to reflect light, reduce heat, and minimize need for air conditioning.

Minimal Interventions
Exposed wiring concealed in white-painted pipes, blending into a clean aesthetic.

Design Philosophy
Balances adaptive reuse, minimalism, functionality, and sustainability.

Floating Hospital, Friendship NGO.
©https://tibotaratari.wordpress.com/

Further Case Study: Floating Hospital

Organization: Friendship NGO

Location: Various riverine and *char* areas across Bangladesh

Year: Since 1999 (ongoing)

Climate Resilience
Designed to operate in flood-prone and riverine regions, the floating hospital adapts to seasonal water fluctuations and climate vulnerabilities of rural Bangladesh.

Accessibility & Social Equity
Brings healthcare services directly to remote char and riverside communities where permanent medical infrastructure is limited or inaccessible.

Adaptive Reuse & Low-Impact Construction
The vessel-based healthcare model minimizes extensive land development and allows flexible deployment according to community needs.

Water-Based Mobility
Uses river networks as connective infrastructure, reducing dependence on poor road systems and enabling outreach across dispersed settlements.

Resource Efficiency
Compact spatial planning encourages efficient use of energy, water, medical facilities, and operational resources within limited space.

Community-Centered Healthcare
Integrates medical services with local realities, fostering trust, awareness, and long-term community engagement.

Environmental Contextuality
The architecture responds to the ecological and hydrological conditions of Bangladesh's deltaic landscape rather than imposing static urban models.

Replicable Humanitarian Model
Demonstrates a scalable approach for sustainable healthcare delivery in climate-vulnerable and geographically isolated regions globally.

Pani Community Centre, Rajarhat, Kurigram District, Rangpur.

Further Case Study: Pani Community Centre

Location: Rajarhat, Kurigram, Rangpur

Architect: SchilderScholte Architects

Year: 2014

Key Strategies and Innovations

Material Reuse & Local Resources
Built with bamboo, hand-shaped bricks, mango wood, reused steel, and recycled corrugated panels, reducing waste and supporting local economies.

Low-Energy Construction
Minimal electricity or fossil fuel use; labor-intensive, community-driven process enhances local skills.

Climate-Responsive Design
East–west orientation, elevated bamboo roof, and strategic openings optimize cross-ventilation and natural cooling, aided by surrounding vegetation and ponds.

Functional Layout
Two volumes under a unifying roof create shaded interspaces, plazas, and gathering areas efficiently.

Rainwater Harvesting & Shading
Roof eaves protect from sun and rain, directing water for reuse.

Cultural Relevance & Modernization
Combines traditional techniques with modern brickwork; showcases bamboo structurally and aesthetically.

Community Empowerment
Educational and social hub; includes workshop linked to local livelihoods.

Biomimicry & Color Strategy
Interior colors repel insects and reference local landscapes.

Swapner Bari (Amphibious House) Uttarkhan, Dhaka

Theme 9: Practicing Material and Craft Innovations

Primary Case Study: Swapner Bari (Amphibious House)

Initiator / Organization: Dr. Nandan Mukherjee,

University of Dundee, BRAC University (C3ER), and Resilience Solutions

Location: Uttarkhan, Dhaka

Year: Prototype developed 2017; scaling from 2025

Emerging from the pursuit of material innovation and sustainable living, Swapner Bari, the House of Dreams, redefines climate-adaptive housing in Bangladesh. Designed by Dr. Nandan Mukherjee and his team, this amphibious home rises with floodwaters and settles gently as they recede. Built from compressed earth bricks and treated bamboo within a buoyant, stable frame, it fuses traditional craft with contemporary engineering. Powered by solar and wind energy and sustained through aquaponics and rainwater harvesting, the house forms a self-sufficient ecosystem that remains cool, bright, and secure year-round.

Located beside the Balu River in Dhaka, Swapner Bari offers a vision of regenerative, affordable, and dignified living where homes evolve not merely to survive floods but to thrive in harmony with nature.

Narrative

In a country increasingly exposed to floods, rising water levels, and extreme heat, Swapner Bari stands as a pioneering model of climate-resilient living rooted in local materials, scientific innovation, and community aspirations. Conceived by sustainability designer Dr. Nandan Mukherjee, Lead for Climate Change Adaptation at the UNESCO Centre for Water Law, Policy and Science, University of Dundee, the project addresses Bangladesh's twin challenges of climate vulnerability and urban housing insecurity.

Developed in partnership with the University of Dundee, BRAC University's C3ER, and Resilience Solutions, the design was shaped through field discussions with flood-affected families. Residents associated dignity and security with *paka* (brick-built) houses, a cultural insight that guided the creation of a permanent-looking yet adaptive home combining aspiration and resilience.

Beneath its modest exterior lies a buoyant foundation that lifts the structure safely with floodwater. The walls are made from compressed earth bricks that are 75 percent less carbon-intensive yet stronger than fired bricks, while treated bamboo provides structure, shading, and ventilation. Renewable energy, water harvesting, and aquaponics transform the dwelling into a circular ecosystem that supports life even when external systems fail.

Recognized with the UN RISK Award for Coastal Resilience (2019), Swapner Bari exemplifies how design can merge science, empathy, and culture to create architecture that not only protects life but enriches it.

Transformative Journey: Building a Sustainable Living Prototype

Designing for Integrated Resilience

Conceived as a living system rather than a static object, the house integrates energy, water, food, and shelter within one adaptive ecosystem. It embodies the belief that resilience means not just surviving floods or heatwaves but enabling households to live gracefully within them.

Experimentation with Materials and Systems

The buoyant platform rests on seventeen sealed flotation boxes that let the house rise safely and settle as water recedes. Compressed earth bricks are machine-pressed, eliminating firing emissions while improving strength and affordability. Bamboo, treated with natural salts and resins for durability, provides tensile strength, ventilation, and beauty. This union of soil, craft, and science reflects an empathetic design philosophy grounded in local knowledge.

Developing a Self-Sustaining Ecosystem

The ground floor doubles as a livelihood hub with aquaponics for fish and vegetables, small poultry units, and vertical farming. Rainwater tanks store 17,000 litres, while solar panels and micro wind turbines generate clean energy. Together they form a closed-loop system that ensures food, water, and energy security year-round.

Top and Bottom: Swapner Bari (Amphibious House) Uttarkhan, Dhaka

The buoyant platform rests on seventeen sealed flotation boxes that let the house rise safely and settle as water recedes. Compressed earth bricks are machine-pressed, eliminating firing emissions while improving strength and affordability.

Roofing Structural details of Swapner Bari (Amphibious House) Uttarkhan, Dhaka

“I am a person of the soil. One of my greatest passions is earth. Sustainability is simple when you truly understand a place, its culture, and its context.”

— Dr. Nandan Mukherjee

Human-Centered Design Approach

Shaped by years of fieldwork across river basins, the design honors people’s wish for permanence and beauty. Residents desired solid homes that remain safe during floods; thus, the house merges the stability of brick with the flexibility of amphibious structure. Passive ventilation keeps interiors naturally cool, maintaining 26 °C indoors even when it is 41 °C outside through cross-ventilation, shaded openings, and stack-effect airflow inspired by vernacular design.

From Lived Experience to Method

Dr. Mukherjee’s philosophy grew from lived encounters with flood-affected families and the realization that infrastructure alone cannot save lives. For him, sustainability unites emotion and evidence, structure and empathy. Swapner Bari embodies this conviction, ensuring light, food, and safety even when disaster arrives.

Scaling Toward a Sustainable Future

Following the prototype’s success, local production units for compressed-earth blocks, bamboo treatment, and modular floating systems are being developed to scale the model across Bangladesh. The goal is to transform resilience from concept into everyday practice through homes that float, breathe, and endure as examples of community-based sustainability.

Field Insights: Voices from the Ground

The amphibious house is more than an engineering experiment. It is an emotional response shaped by lived experience, scientific inquiry, and deep empathy for communities at risk. As articulated by Dr. Nandan Mukherjee, the project reflects a lifelong engagement with land, water, and the realities of climate vulnerability in Bangladesh.

Identity and Purpose

“I am a person of the soil. One of my greatest passions is earth. Sustainability is simple when you truly understand a place, its culture, and its context.”
For Mukherjee, sustainability is not a borrowed concept but a return to the essence of being Bangladeshi, where land, water, and people coexist as one living system.

From Research to Responsibility

Years of fieldwork on river erosion, migration, and climate disasters revealed that survival cannot depend on infrastructure alone.
“Structural fixes are not enough. During floods there is isolation, darkness, no electricity, and no food. The house itself must keep people safe, lit, and supplied.”
His work gradually shifted from documenting vulnerability to designing practical systems that allow families to remain in place without compromising safety or dignity.

The Amphibious Idea

The project emerged from a simple but radical question. How can a home rise with the flood while remaining rooted to its land?
“People do not want to abandon their homes. So we imagined a house that floats during a flood but does not drift away.”
This idea marked the beginning of Swapner Bari, a dwelling that embodies both permanence and mobility.

Material Logic and Local Craft

Bamboo and earth were reimagined not as poor materials, but as intelligent and high performance resources.
“Bamboo’s tensile strength is remarkable. If we treat it well, it endures. Compressed earth can be stronger than fired brick with far less carbon.”
Material experimentation became a form of empowerment, demonstrating that sustainability can emerge from indigenous knowledge and local craft practices.

Beyond Shelter to Livelihood

Resilience in this design extends beyond protection from floods. It also supports income generation and self reliance.
“A house that earns can pay its own installment. With an incubator and small farming, families can generate income at home.”
The lower level integrates aquaponics, vertical gardens, and poultry systems, transforming the house into a productive ecosystem

Affordability and Scale

The prototype challenged the assumption that sustainable housing must be expensive.
“Our houses cost less per square foot than tin, yet perform better.”
The goal is to create a permanent, dignified home that people aspire to live in. It is not a temporary solution defined by poverty, but one shaped by possibility.

Lessons in Politics and Place

The first floating house gained international recognition but was later demolished due to local conflicts and power struggles.
“We did all the participatory work but did not fully understand village politics. Designing for people also means protecting the project’s place within those dynamics.”
This experience expanded his understanding of resilience as not only physical, but also social and political.

Top: Roofing Structural details of Swapner Bari (Amphibious House) Uttarkhan, Dhaka

Bottom: Interior Space of Swapner Bari (Amphibious House) Uttarkhan, Dhaka

Comfort without Machines

Passive design principles rooted in vernacular wisdom ensure comfort with minimal energy use.
“Even at forty one degrees outside, the inside stays near twenty six without air conditioning. Hot air exits at the top, cool air enters low, and the stair core draws air through the house.”
The building performs as a living system, breathing through climate, material, and spatial logic.

Reflection: From Loss to Living Architecture

What began as a response to a personal loss became a deeper commitment to architecture that protects life. Each element of Swapner Bari, including its buoyant base, solar systems, and integrated food production, reflects a belief that design must heal, nurture, and empower.
“A poor family’s dream is not a poor house. It must be strong, beautiful, and net zero.”

Continuing the Journey

Swapner Bari is evolving from a prototype into a replicable model for climate adaptive living. Community based production of compressed earth blocks and modular floating systems is being explored to support wider implementation.
“Climate resilience must not remain a concept. It must become a household practice.”

For Dr. Nandan Mukherjee, the journey continues. He is building homes that float, breathe, and sustain life, ensuring that architecture itself becomes an act of care for both people and planet.

Bottom: Window Detail of Swapner Bari (Amphibious House) Uttarkhan, Dhaka

Material & Craft Innovations

1. Net Zero Compressed Earth Bricks
Machine pressed soil blocks produced without burning, eliminating the need for coal and wood.

Their modular interlocking form allows quick, precise assembly and reduces the use of concrete mortar in construction.

Low carbon, strong, cost effective, and environmentally safe, these blocks provide a dignified, permanent aesthetic while significantly lowering the environmental footprint of masonry work.

2. Treated Bamboo Structural System
Locally sourced bamboo strengthened through natural salt and resin treatments.

Durable, long lasting, and rooted in vernacular craftsmanship while enhancing ecological performance.

3. Amphibious Foundation with Guiding System
Sealed flotation boxes allow the house to rise during floods and settle as water recedes.

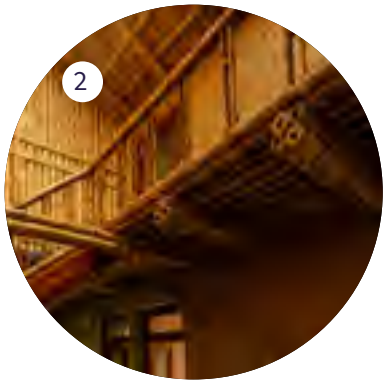
Corner guideposts maintain stability and alignment, forming an adaptive and resilient construction method.

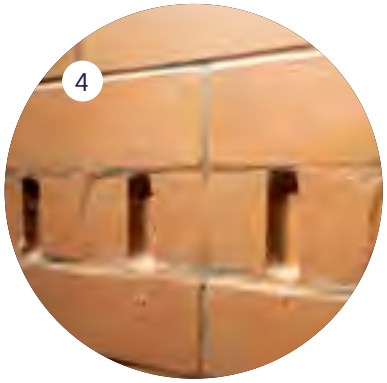
4. Organic Clay Paint
Made from natural clay and minerals without harmful chemicals or volatile organic compounds.

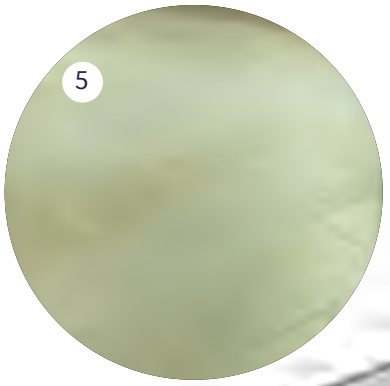
Improves indoor air quality, reduces environmental pollution, and creates a non toxic matte finish.

5. Black Carbon Tiles
Handmade tiles produced by reusing waste carbon as a material resource.

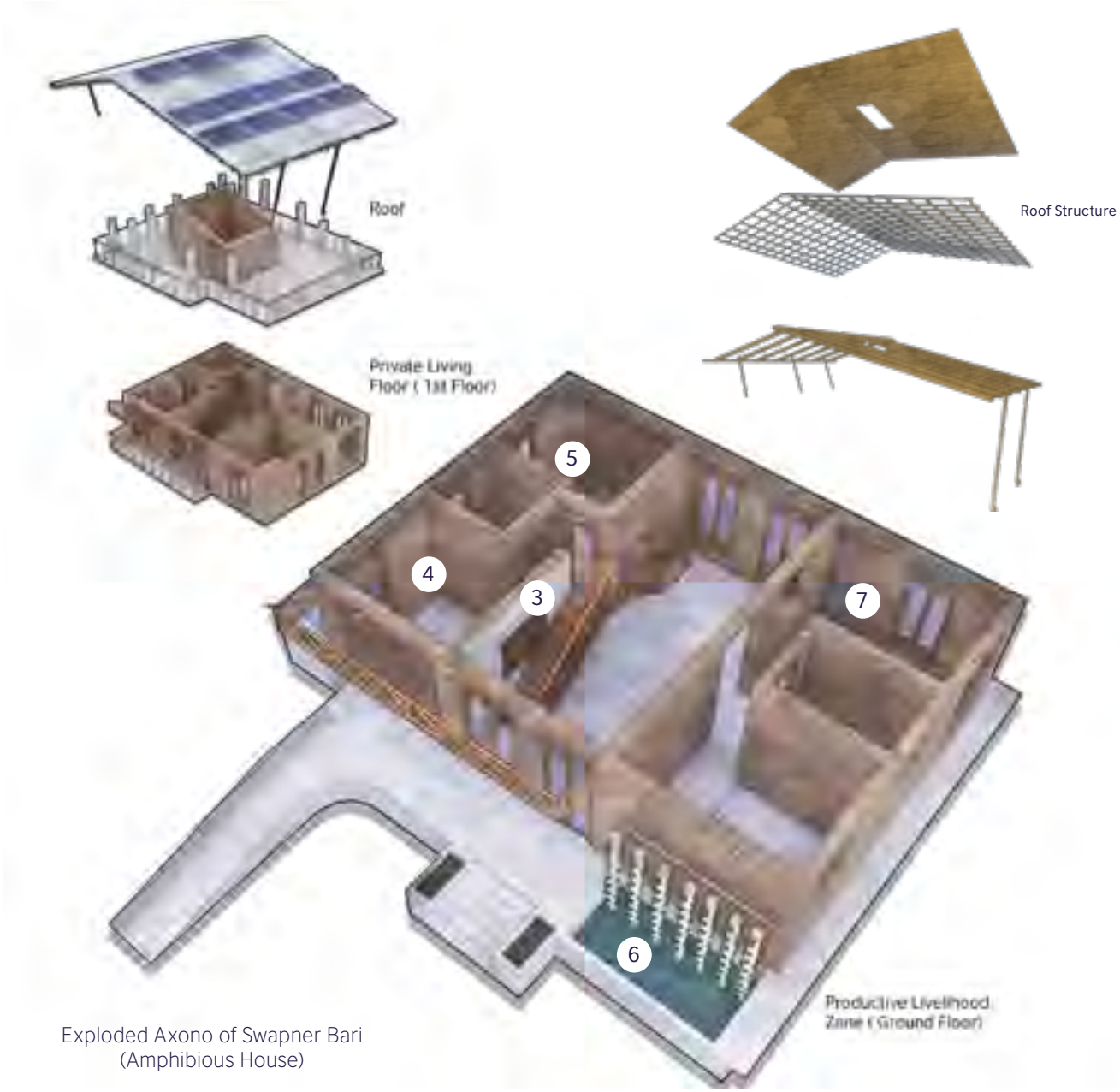
Reduce emission intensive ceramic production and encourage circular, resource efficient construction.







Perspective View of Swapner Bari
(Amphibious House)



Exploded Axono of Swapner Bari
(Amphibious House)

Self-Sufficient & Sustainable Living Model

1. Renewable Energy Independence
Solar panels and micro wind turbines provide reliable power for lighting and essential needs, keeping the home functional during floods or grid failures.

2. Rainwater Harvesting and Safe Storage
Integrated tanks collect and store up to 17,000 liters of rainwater for drinking, washing, and irrigation, reducing pressure on groundwater.

3. Passive Cooling and Natural Daylighting
Cross-ventilation, shaded verandas, bamboo screens, large windows, and a central light well maintain cool interiors and provide ample daylight, lowering energy use.

4. Nursery and Seedling Production
Shaded, ventilated areas support seedlings, herbs, and saplings that families can sell or use at home as a low-cost income source.

5. Sustainable Poultry Production
A compact poultry unit with an energy-efficient incubator allows families to hatch chicks and earn income from selling day-old chicks.

6. Aquaponics-Based Food Production
A combined fish-and-vegetable system supplies fresh fish and greens year-round and recycles water through a nutrient-rich loop.

7. Food Processing and Micro-Enterprise
A flexible workspace supports drying, packaging, and small crafts, creating additional livelihood opportunities, especially for women and youth.

8. Biodigester and Circular Resource Systems
A household biodigester treats toilet waste, producing biogas for daily use and nutrient-rich slurry for plants.

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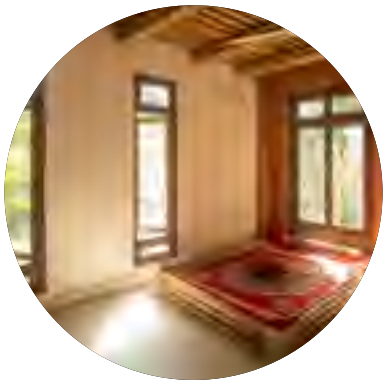

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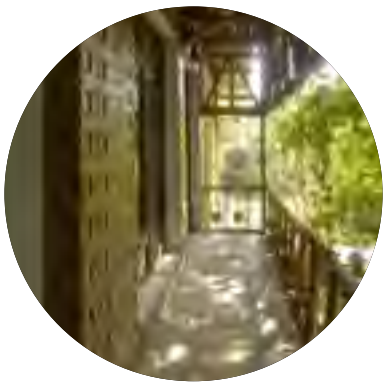

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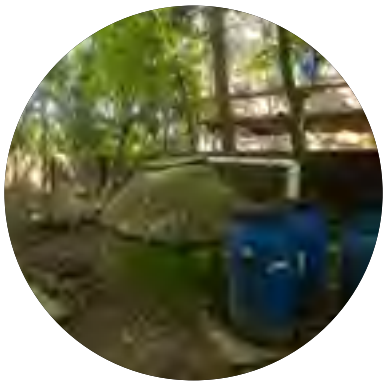

Key Strategies and Innovations

Material Innovation and Carbon Reduction
Compressed earth bricks emit 75 percent less carbon than conventional bricks while offering superior strength, affordability, and comfort.

Amphibious Structural Design
A buoyant base allows the home to rise with floodwaters, while corner guideposts ensure stability and prevent drift.

Renewable Energy and Water Systems
Solar panels, wind turbines, and rainwater harvesting make the house self-reliant year-round.

Integrated Food Production
Aquaponics and indoor farming transform housing into a productive micro-ecosystem.

Passive Cooling and Daylighting
Shaded verandas, bamboo screens, and natural ventilation maintain thermal comfort without mechanical cooling.

Local Skill Development
Training in brick-making, bamboo treatment, and modular assembly builds local capacity and green economies.

Dimensions of Sustainability

Geographic Representation
Located in Uttarkhan, Dhaka, near the Balu River, the project represents a model of urban resilience in flood-prone areas of central Bangladesh

Typological and Scalar Diversity
It is a medium-scale housing prototype that integrates dwelling, livelihood, and resource systems, demonstrating an adaptable model that can be replicated in similar contexts.

Climate and Environmental Responsiveness
By employing low-carbon materials, renewable energy, and buoyant foundations, the project responds effectively to both flooding and rising heat stress.

Social and Cultural Relevance
The design fulfills the community aspiration for durable “paka” houses while incorporating ecological intelligence rooted in local building traditions.

Creative Economy and Local Capacity
The project encourages rural–urban craft integration through decentralized brick and bamboo production, creating local employment opportunities and promoting green innovation.

Alignment with the Sustainable Development Goals

SDG 7 – Affordable and Clean Energy: Powered by solar and wind energy.

SDG 8 – Decent Work and Economic Growth: Generates livelihoods through local material production.

SDG 9 – Industry, Innovation and Infrastructure: Pioneers amphibious, low-carbon construction technology.

SDG 11 – Sustainable Cities and Communities: Models resilient and affordable housing for flood-prone areas.

SDG 12 – Responsible Consumption and Production: Reduces emissions and waste through sustainable materials.

SDG 13 – Climate Action: Offers a replicable model for adaptation to floods and heat stress.

Ukhiya School, Cox's Bazar
© Kashef Chowdhury

Further Case Study: Ukhia Schools

Architect: Kashef Chowdhury / URBANA

Location: Cox's Bazaar

Year: 2018

Key Strategies and Innovations

Refugee-Focused Design
Built specifically for Rohingya camps near the Myanmar border.

Biodegradable Materials
Bamboo used due to restrictions on cement, brick, and steel.

Traditional Joinery
Ropes and strings replace nails or clamps; roof made from local thatch to withstand heavy rainfall.

Rapid Construction
Design completed in three days, construction finished in one month.

Skilled Craftsmanship
Experienced boat-making artisans employed for bamboo tying and fixing.

Collaborative Approach
Friendship Culture and Preservation team worked alongside refugee community members.

Bottle House, Kuakata
© Kashef Chowdhury

Further Case Study: Botol Bari | Bottle House

Implemented by: Local women with support from ActionAid

Location: Kuakata

Year: 2020

Key Strategies and Innovations

Innovative Use of Plastic Waste
Walls made from discarded plastic bottles, fishing nets, mud, and cement within a bamboo framework.

Climate-Resilient Design
One-foot-thick walls provide insulation, keeping interiors cool in extreme heat and resilient against cyclones.

Community-Led Construction & Empowerment
Built by local women, fostering skill development, economic participation, and resilience.

Sustainable & Affordable
Incorporates rainwater harvesting, local materials, and costs approximately $7,000 USD; adaptable to other communities.

Environmental Impact
Reduces plastic pollution while creating durable housing and functional community spaces.

Plastic Bottle House, Cumilla

Further Case Study: Plastic Bottle House

Built by: Shafiqul Islam

Location: Cumilla

Year: 2019

Key Strategies and Innovations

Recycled Materials
Built primarily from ~80,000 abandoned plastic bottles, with over 20,000 reserved for future use.

Cost-Effective
Construction costs ~30% less than conventional brick-and-cement houses.

Structural & Safety Features
Sand-filled bottles provide stability, insulation, earthquake resistance, and fire safety.

Thermal Comfort
Naturally stays cool in summer and warm in winter due to sand-filled bottles.

Eco-Friendly Approach
Promotes recycling and reduces environmental waste while creating functional housing

Shabuj Shakti (Green Strength) Biogas Plant, Various Locations.
© tbsnews.net

Theme 10: Creating Innovation in Water and Energy

Primary Case Study: Shobuj Shakti (Green Strength) Biogas Plant

Organization: ATEC Biodigesters, with

USAID (Feed the Future) and ACDI/VOCA support

Location: Various Locations

Year: 2025

Key Strategies and Innovations

Anaerobic Digestion
Processes organic waste (animal or human excreta mixed with water) in an airtight polyethylene biodigester to produce methane-rich biogas and nutrient-rich slurry for fertilizer.

Compact & Durable
Made of high-density polyethylene; portable, flood-resistant, and requires only a 5–6 ft pit for installation.

Affordable & Rural-Friendly
Cheaper than traditional brick-built plants and suitable for rural households.

Dual Benefits
Provides clean, renewable energy for cooking and organic fertilizer for farming.

Easy Maintenance
Simple to install, operate, and maintain.

Project Lightgiver, Various Locations.

Further Case Study: Project LightGiver (Litre of Light Bangladesh)

Organization: EcoVation

Location: Various rural areas across Bangladesh

Year: 2014

Key Strategies and Innovations

Ultra-Low-Cost Daylighting
Inspired by the Litre of Light movement; uses plastic bottles filled with chlorinated water inserted into tin roofs to refract sunlight.

No Electronics Needed
Provides natural indoor illumination during the day without electricity.

Affordable & Accessible
Each unit costs under Tk 100, making it scalable for off-grid households.

Environmental & Health Benefits
Reduces fossil fuel and kerosene use, improving indoor air quality and fire safety.

Community-Oriented Innovation
Easy for local communities to install, promoting inclusive energy solutions and climate action.

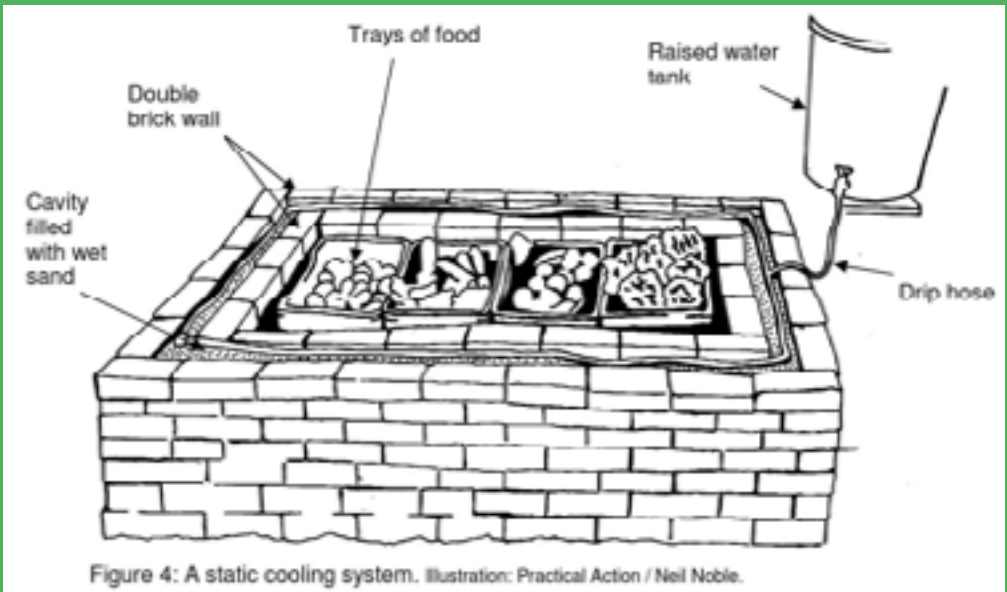

Figure 4: A static cooling system. Illustration: Practical Action / Neil Noble.

Natural Cooling Chamber, Various Locations.

Further Case Study: Natural Cooling Chamber / Fridge

Location: Various Locations

Year: 2025

Key Strategies and Innovations

Traditional Inspiration
Modeled on rural mud pitcher cooling techniques.

Evaporative Cooling
Unplastered brick chamber surrounded by moisture-retaining silt; slow-drip system cools without electricity.

Low-Cost & Local
Built with locally available materials for 10,000–15,000 BDT.

Climate-Specific Efficiency
Effective in hot, dry conditions for preserving vegetables, fruits, dairy, and medicines.

Eco-Friendly
Reduces carbon footprint and energy use.

Limitations
Less effective in humid areas and requires continuous water supply.

Generating Electricity Using River Current, Barguna Bangladesh.

Further Case Study: Generating Electricity using River Current

Innovator/Developer: Monirul Islam

Location: Purakata village, Barguna Sadar Upazila, Barguna

Year: 2025

Key Strategies and Innovations

River-Based Energy
Harnesses the natural flow of the Payra River near a sluice gate to generate electricity without fuel or external power.

Reliable Power Supply
Rotating mechanism provides 15–18 hours of uninterrupted electricity daily, powering over 50 village lights.

Low-Cost Innovation
Developed in three months with a modest investment of Tk 70,000; scalable to other rural flowing-water sites.

Precise Engineering
Mechanical placement and measurements within the sluice chamber ensure optimal functioning.

Sustainable & Eco-Friendly
Reduces dependency on imported fuel and minimizes environmental impact

Cross-Cutting Analysis: Ten Lessons from the Ten Themes

The ten themes presented in the Sustainable Architecture Practices portfolio reveal a landscape of innovation deeply rooted in Bangladesh's diverse ecologies, cultures, and communities. Although each project emerges from a distinct context, rural, urban, industrial, agricultural, peri-urban, or riverine, they are bound by shared responses to climate, social life, material culture, and resource constraints. Taken together, the themes point to an architectural practice that is grounded, regenerative, and profoundly local. This chapter synthesizes the lessons that recur, diverge, and evolve across the portfolio, highlighting how these practices open new possibilities for sustainable living in Bangladesh.

1. Sustainability as a Cultural Practice, Not a Technical Product
Across the themes, sustainability is understood not as a technological add-on or imported solution, but as an extension of lived cultural knowledge. Practices such as floating agriculture, earthen construction, bamboo building, courtyard-based homesteads, and river-adaptive structures emerge from generations of living with water, heat, and scarcity. Sustainability here is experiential and embodied. Learned through seasons, soil, touch, and habit. Buildings remain cool because materials long familiar to these landscapes mediate heat naturally; spaces breathe because their makers intuitively understand air movement. The central lesson is clear: sustainability grows from culture, not from technology alone.

2. Material Intelligence and the Return to the Earth
A renewed respect for material origins and life cycles runs through nearly every theme. Locally sourced earth, bamboo, timber, recycled metal, aquatic vegetation, and handmade components form low-carbon, low-waste construction systems that are both intelligent and ecological. Three patterns recur across contexts: the revival of traditional materials adapted to contemporary needs; the reinvention of construction systems to reduce energy and emissions; and the creative reuse of discarded or underutilized resources. Material innovation is driven less by novelty than by ethics,using what is available, minimizing waste, and sustaining local skills and craftsmanship.

3. Climate Responsiveness as a Design Ethic
Climate-responsive design functions as a shared ethic across the portfolio, even as its expressions vary by place. Passive cooling is achieved through thick earthen walls, shaded courtyards, high roof volumes, cross-ventilation, and water-based cooling. In flood-prone and riverine settings, buildings adapt by floating, lifting, or relocating with seasonal water levels. Daylighting strategies rely on porous facades, filtered openings, and simple skylight systems to reduce energy use. Together, these approaches reaffirm climate responsiveness as a form of environmental literacy, an inherited capacity to read air, sun, water, and shade that remains deeply relevant today.

4. Community as Co-Designer, Co-Builder, and Co-Owner
A defining lesson across the themes is that sustainable architecture flourishes when communities act as active creators rather than passive recipients. Construction, maintenance, and everyday use are shaped through collective effort involving residents, craftsmen, workers, farmers, and users. In these contexts, architecture becomes a shared act that bridges technical knowledge and lived experience. Ownership emerges not only through legal arrangements, but through the intimacy of making, repairing, and caring for space over time.

5. Process Over Product: The Value of Incremental Development
Many initiatives evolve through site-based learning, dialogue, and experimentation rather than fixed master plans. Design decisions are refined through observation, prototyping, and adaptation to changing needs and conditions. This emphasis on process resists rigidity and allows architecture to remain open, flexible, and responsive qualities essential for resilience in uncertain environmental and social contexts. Sustainability, in this sense, thrives when buildings are designed to change.

6. Integration of Livelihood, Food, and Shelter
Across the portfolio, architecture is rarely separated from systems of livelihood and sustenance. Food production, income generation, and domestic life are integrated with housing, landscapes, and workplaces. Agricultural cycles, fishing, craft production, and worker welfare are spatially embedded within built environments. This reflects a distinctly Bangladeshi understanding of sustainability,one in which architecture must actively support everyday survival and economic resilience rather than exist as an isolated object.

7. Water as Architect and Agency
Water consistently appears not as a threat to be excluded, but as an active co-author of design. It supports cultivation, cools interiors, shapes landscapes, enables mobility, generates energy, and sustains ecological balance. Across contexts, water dictates form, movement, and occupation. The cross-cutting insight is unequivocal: water is not an obstacle, but a medium of design, economy, and life.

8. Low Cost, Low Tech, High Ingenuity
Many of the most impactful strategies across the themes are simple, accessible, and intuitive. Everyday materials and techniques, repurposed

containers, natural ventilation devices, water-based cooling, lightweight screens, and modular components, achieve significant environmental and social benefits. These practices challenge the assumption that innovation must be technologically complex. In the Bangladeshi context, innovation often emerges through frugality, contextual intelligence, and deep environmental understanding.

9. Reframing the Relationship Between Industry and Ecology
The portfolio also demonstrates that industrial and productive spaces can function as ecological and social infrastructures. Work environments are designed to provide light, air, water, dignity, and care while remaining economically viable. These examples expand the scope of sustainable architecture by showing that production spaces can nurture human wellbeing and environmental balance rather than undermine them.

10. A Shared Vision of Regeneration
Across all ten themes, sustainability is framed not merely as survival or resistance, but as regeneration. The projects restore ecosystems, revive crafts, regenerate soil and water systems, strengthen livelihoods, and reaffirm cultural memory. Buildings operate as living systems, landscapes become teachers, and communities emerge as the primary innovators of sustainable practice.

Collectively, the themes demonstrate that Bangladesh already possesses the knowledge, skills, and cultural grounding needed to lead in sustainable architectural practice. The lessons synthesized here point toward a development pathway that is ecological, equitable, and rooted in place. This cross-cutting analysis sets the foundation for the chapters that follow, which translate these insights into policy directions, practitioner guidance, and strategies for scaling sustainable futures.

Recommendations: Translating Lessons into Action

The cross-cutting lessons from the ten themes point toward a clear direction for advancing sustainable architecture in Bangladesh. These recommendations translate the shared insights into practical actions for policy makers, practitioners, educators, and development partners. Together, they aim to strengthen locally grounded, climate-responsive, and socially inclusive architectural practice.

1. Strengthen Policy and Governance Frameworks

Sustainable architectural practices rooted in local knowledge and low-impact materials should be formally recognized within national and local policies. Planning regulations and building codes need to move beyond restrictive material lists and instead adopt performance-based standards that allow earth, bamboo, amphibious systems, and modular construction where they meet safety and durability requirements. Urban and regional planning guidelines should integrate water-sensitive and landscape-led design, particularly in flood-prone and deltaic regions. Policies should also support incremental and adaptive development processes, acknowledging that buildings and settlements often evolve over time rather than emerging as fixed, one-time interventions.

2. Reorient Architectural and Planning Practice

Architectural practice should treat climate responsiveness and material intelligence as central design responsibilities rather than optional sustainability features. Designers are encouraged to work with local climates, materials, and skills from the earliest stages of a project. Participatory and process-based approaches should be prioritized, allowing projects to adapt through use, seasonal change, and community feedback. Housing, workplaces, and public spaces should be designed to integrate livelihoods, food systems, and everyday activities, reinforcing the close relationship between shelter and survival. Water should be approached as a design partner, shaping form, movement, and use rather than being addressed only as a hazard.

3. Invest in Education and Capacity Building

Long-term transformation requires strengthening education and training systems. Architectural and planning curricula should embed climate literacy, vernacular construction knowledge, and hands-on material experimentation. Greater collaboration is needed between architects,

engineers, craftsmen, and communities through design-build studios, apprenticeships, and field-based learning. Documentation of local sustainable practices should be expanded and shared as living knowledge resources that inform contemporary design, rather than treated solely as heritage records.

4. Align Financing and Procurement with Local Realities
Financing and procurement systems play a critical role in enabling or constraining sustainable practice. Donors and development agencies should support low-cost, low-tech, and incremental solutions, even when they fall outside conventional infrastructure models. Procurement guidelines should be adapted to allow the use of local materials, community labor, and phased construction. Greater emphasis should be placed on pilot projects and living laboratories that test climate-adaptive and regenerative approaches before large-scale replication. Project success should be evaluated using social, ecological, and livelihood outcomes alongside physical delivery.

5. Support Community Leadership and Stewardship
Communities should be recognized as long-term partners in design, construction, and maintenance. Strengthening local institutions and stewardship systems can help sustain shared water bodies, landscapes, and communal spaces. Opportunities for knowledge exchange between communities facing similar environmental challenges should be encouraged, enabling locally tested solutions to travel across regions through peer learning rather than top-down replication.

Together, these recommendations build on existing strengths within Bangladesh's architectural culture. They call for development pathways that are flexible, inclusive, and rooted in place, where sustainability is not imported but cultivated through everyday practice. Implemented collectively, they provide a practical foundation for scaling regenerative and climate-resilient futures.

Conclusion

The Sustainable Architecture Practices (SAP) research initiative set out to identify and document how sustainability is being practiced across Bangladesh through architecture and spatial design. The projects presented in this report show that sustainability is not only a theoretical concept but an ongoing practice shaped by local knowledge, environmental conditions, and community initiatives.

Across different contexts, the case studies demonstrate how architecture can respond to climate, water, materials, and social needs in practical ways. From climate-responsive building forms and flood-adaptive housing to innovative agricultural systems and the revival of indigenous construction methods, these projects illustrate that sustainable solutions often emerge from a deep understanding of place. Many of these approaches rely on simple strategies such as natural ventilation, local materials, and community participation, proving that effective sustainability does not always depend on complex technologies.

The research also highlights that sustainable architecture in Bangladesh is closely connected to everyday life and livelihoods. Buildings and landscapes often support agriculture, craft production, education, and local economies while strengthening social relationships and collective stewardship. These examples suggest that sustainability is most effective when design engages with people, culture, and ecological systems together.

Looking forward, the findings of this report underline the importance of strengthening policies, education, and professional practices that support locally grounded and climate-responsive design. By documenting these diverse initiatives, the report aims to contribute to a broader understanding of how architecture in Bangladesh can continue to evolve toward a more resilient, inclusive, and ecologically balanced future.

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Sustainable Architecture Practice, Bangladesh

This report was commissioned by the British Council to map existing sustainable architecture practices and identify key areas of innovation in Bangladesh.

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The Bengal Institute conducted this research and produced this report. Based in Dhaka, Bangladesh, the Bengal Institute is a unique, transdisciplinary forum for the study and design of the environment. As a place for advancing the understanding of the lived environment, the Bengal Institute presents a platform for developing ideas and programs to improve the qualities of architecture, landscapes and settlements. In generating a critical, creative and humanistic dialogue, the Institute proposes an integrated approach to the arrangement and rearrangement of the environment.

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Architecture plays a critical role in advancing the practices of sustainability. While sustainable practice in architecture is a fairly well-trodden topic, we can still rehearse a few things that are ongoing. I can list the following topics critical to sustainable practices in architecture: energy efficiency, carbon reduction, health and wellness, ecological security, social equity, community enhancement and creative economy.

— Kazi Khaleed Ashraf

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