

## Holistic Eco-Villages for Flood Rehabilitation, Pakistan

Heritage Foundation of Pakistan supports communities to become resilient and self-sufficient by enabling them to build and repair low-cost flood-resistant homes. The project works in flood-prone and rural, impoverished areas that receive little government resource and where floods in 2022 left 33 million people destitute. Through a 'barefoot entrepreneur' approach, the project works to build homes, develop skills, defend against climate-related disasters and create sustainable livelihoods for long-term self-sufficiency.



**Submitting organisation:** Heritage Foundation of Pakistan

**Type of organisation:** non-profit

**Key elements of the project:**

- **Quick and affordable resilient housing**

The project built **6,300 homes** and housed **44,000 people**. Homes take about one week to build, cost around **\$150 USD** per unit and are easy to repair.

- **Low environmental impact**

The project uses low tech methods and locally sourced natural materials for minimum embodied energy.

- **Local accountability and empowerment**

Funds are given directly to local 'mother committees' that are custodians for village maintenance. Barefoot entrepreneurs are paid directly to support projects, stimulating the local job market, reducing projects overheads and empowering women.

### What inspires us ...

This holistic project combines improved architecture with community empowerment, specifically through training and leadership positions for women. The focus is on open-source knowledge and easily accessible materials to tackle the urgent issue of resilience against natural disasters, which will become more and more pressing in the future. The project builds on previously awarded initiatives, showing adaption, broadening scale and increased impact.

## Introduction

This project, from former Gold World Habitat Award winner **Heritage Foundation of Pakistan**, helps communities to access safe and secure homes through the building of simple, environmentally-responsible and affordable houses that are resilient to natural disasters and easy to repair. Through the process of building houses, communities learn new skills and develop self-sufficiency. This project draws on the Foundation's extensive experience of improving housing and strengthening communities' independence through its poverty alleviation and 'barefoot entrepreneur' approaches.

The project supports families living in poverty and at risk of displacement from natural disasters, to withstand the effects of the climate crisis and dwindling access to humanitarian aid. It enables them to build and re-build better homes, make *chulah* stoves, harness solar energy, improve sanitation, food security and flood mitigation, and create sustainable livelihoods for long-term self-sufficiency. To date, **6,300 homes** have been built and **44,000 people** have benefitted from the project.

## Context

When it comes to the impact of the climate crisis, Pakistan is one of the world's most vulnerable countries. It suffers from recurring natural disasters that are expected to worsen over the long-term. In 2022, major floods affected the Sindh district, resulting in one third of the country being under water and 33 million people left destitute. According to a joint study by the World Bank and the Asian Development Bank, Pakistan suffered \$32 billion USD in damages and economic losses and will need \$16 billion USD to rebuild and rehabilitate it.

The Sindh region is amongst the poorest in Pakistan: 37% of the population live in poverty and almost half live in rural areas. Residents already lost what little they had in the severe floods of 2010 but were faced with even more tragedy 12 years later. By this time, traditional construction with wood had ceased to be a viable option due to deforestation. Consequently, steel replaced timber, but the dangers of this came to light in the flood of 2022 when houses collapsed under the weight of waterlogged roofs and foundations were compromised causing dangerous injuries.

The traditional response from international organisations is to build brick and mortar homes which are seen as more resilient, but this also has its problems, not least the cost. The region operates under a feudal system, with many residents not having (or being able to achieve) ownership of the land they live on. Although the possibility of eviction is generally quite low, the system favours certain types of structures over others: remote landlords have less tolerance for construction perceived as permanent, preferring housing that uses traditional construction methods which is seen as temporary.

Heritage Foundation of Pakistan's approach presents a viable alternative to colonised aid and a solution to the multitude of challenges, by building self-reliance within communities.

After the 2010 flood, it was generally agreed among international and national humanitarian organisations that due to large scale displacements, families need simple one-room houses. These are the norm in rural Sindh, and are only used for sleeping, whilst all other activities take place outside. An initiative called the 'One Room Shelter Programme' was established. The Heritage Foundation of Pakistan, as technical partner of the International Organization

for Migration, helped build 40,000 zero carbon one room units using earth, lime, and bamboo. It became the largest zero carbon shelter programme in the world and is the basis for the project being assessed.

## Project Description

Many of the houses developed after the 2010 floods did not survive the 2022 floods because the scale and the depth of the catastrophe was far greater. This worsening pattern is set to continue, and it has become clear that trying to build houses to withstand ever greater flooding is unrealistic. Instead of trying to fight a losing battle, the project aims to build resilience in people by enabling them to rebuild themselves using techniques taught to them.

The rehabilitation effort aims to achieve zero poverty through disaster preparedness and mitigation strategies which prevent displacement, achieve safety and self-reliance. This includes building homes but, importantly, it also addresses associated components: toilets, cooking stoves, access to water and solar lights.

The homes developed through the programme are small huts, similar to traditional homes but with structural improvements that make them more resilient - built entirely with prefabricated bamboo panels, which are tied together securely. Evidence from bamboo structures built in 2014 shows that these could withstand 2022 massive flooding. The homes are quick to build and affordable, and the skills and materials needed are found in the community. Without this intervention, people would be housed in homes of comparable size but poorer quality, made with scarce or unsuitable materials (such as timber and steel).

Homes are built in about one week by each household with support from barefoot entrepreneurs, with bamboo panels that are prefabricated by trained village artisans. The panels are erected on a raised plinth of earth/lime bricks and lime concrete foundations. Reed matting, roof thatching and finishing are provided by households, mostly by women, who use their creativity to personalize each unit. Barefoot entrepreneurs provide support for this for a small fee of around \$0.50 to \$1.2 USD.

The project started in September 2022 and is ongoing. To date, **6,300 homes** have been built and **44,000 people** have become self-reliant and self-sufficient.

## Organisation implementing the project

Heritage Foundation of Pakistan has been working to build community resilience for 20 years. The Foundation's 'humanitarian architecture' has been conducted in all provinces of Pakistan to deal with recurring floods and earthquakes. Through the process they have developed zero carbon/zero waste approaches, that reduce the use of concrete, steel and other industrialized materials. Instead, their climate resilient structures use a combination of bamboo, lime and earth.



After the 2010 floods in Upper Sindh, the design was extended by creating buildings on stilts, proving the feasibility of building two-storey structures made of bamboo. Over 400 households have been able to withstand several floods since. All of this experience feeds into the current project.

The Foundation has been engaged in heritage conservation in Karachi since 2019. It has undertaken projects to decarbonize and green the city's streets by converting them into landscaped walking streets, incorporating street forests, porous pavements, removing multiple sources of pollution to achieve a healthy environment.

World Habitat is familiar with the organisation. In 2014 it was a [finalist](#) with the former approach to resilient reconstruction, which this project evolved from. In 2018 it won a Gold Award for its [chulah stoves](#) which improved the livelihoods and health of women in Pakistan. Through its work with World Habitat, it has developed training centres in remote villages for the last nine years. As a result, 450,000 households (over 3 million people) are using the *chulah* stoves to date.

## Aims and Objectives

The aim of the project is to provide low-cost safe housing to some of the most vulnerable families affected by floods, but also to ensure their self-sufficiency through sanitation, water access, food security, disaster mitigation and livelihoods development. The project did not take the approach of direct post disaster reconstruction; instead, it facilitated a mass community self-build programme.

The communities involved in this project are remote, have few resources and often have a poor understanding of the structural vulnerabilities of buildings. The project extends to partnering villages as resources and capacity allow, and everyone in the village is invited to take part (and they usually do). The Foundation makes no distinctions on the basis of race or ethnicity, but most of the communities supported belong to the minority Hindu community.

The approach of the Heritage Foundation of Pakistan aims to change perceptions of the current humanitarian aid model, replacing international colonial charity with 'humanistic humanitarianism' which is based on benevolence, empathy, solidarity, generosity and compassion. Its philosophy of 'Barefoot Entrepreneurs' aims to end the cycle of dependence and replace it with a culture of self-reliance. Charity gives way to a barefoot knowledge sharing mechanism which lifts people out of a state of apathy and replaces it with pride and dignity.

To date, through this and earlier programmes the organisation has supported 650,000 households to become food secure and it hopes to reach one million by 2025.

## Key Features

**Direct Assistance.** In an attempt to change in thinking to humanitarian aid, and to empower residents, Heritage Foundation of Pakistan requests that sponsors provide assistance directly through Mothers' Committees, avoiding intermediary costs. This mechanism boosts the morale and confidence of

rural women. The mothers are mostly non-literate but have now learnt to sign cheques and act with greater responsibility. Mothers Committees are responsible for distributing materials among households and for payments to vendors and suppliers.

The Committees also make arrangements for knowledge sharing and training to households to achieve the following stages within six months:

- **Stage I:** Rights-based components: one room house, one *chulah* stove, shared eco-toilet (one for two households), shared water handpump (one for eight households), shared solar light (one system for 12 households).
- **Stage II:** Food security by growing vegetables, rearing chickens, fishing and dehydrating fish and farm produce.
- **Stage III:** Flood mitigation through barriers of community forests, swales, and aquifer trenches.
- **Stage IV:** Training of barefoot entrepreneurs fulfilling local unmet needs.

**Structural resilience.** The homes are made of prefabricated bamboo panels. The design is based on a traditional hut known as *chauhra* which normally gets washed away. Although the buildings look like *chauhras* they are octagonal in shape (and around 12 feet in diameter), with studier walls and use different materials: bamboo has replaced traditional timber and more recently, steel. The plastering now includes lime, increasing water resistance. The improved model has increased resistance as it slows water entry, and better recoverability as it incurs minimal damage and can be repaired quickly and easily post-flood. It includes an elevated threshold, uses locally available materials, and has room for storage. Unlike the traditional hut, the new version is based on tying the entire structure together to make it disaster-resilient:

1. The octagon shaped is inspired by the traditional construction of circular *chauhras*, a form adopted in rural areas of many countries in Global South, due to its strength in withstanding disasters.
2. The bamboo prefabricated panels, made by trained artisans, are strong and resilient. The technique of cross bracing is drawn from old *dhijji* construction found in the North of Pakistan. This consists of cross bracing in wood and was found to withstand the 2005 earthquake. Instead of wood it uses bamboo which is more widely available, and by connecting all pieces together it withstands any movement.
3. The panels are anchored into lime concrete pads by using a length of L-shaped steel that firmly ties the structure to its foundations.
4. The light conical roofs, which replicate the traditional form, are made of bamboo and designed to be much stronger than the traditional timber roofs. The roof joists are anchored into prefabricated wall panels with bolts.
5. The filling of the panels and roof varies according to locally available materials. In the case of the present construction, the walls consist of matting made of reeds woven by women. The walls are treated with stabilized lime-earth renders while the roof carries thatch panels. These materials provide sufficient insulation while the thatch roof panels allow for air to move throughout.

**Disaster preparedness:** each cluster of three to four families also has a double storey 'look out' building which provides extra refuge on the upper level and also acts as storage space for belongings.

**Land tenure.** In the area of Sindh where this project takes place, around 50% of the households own their plot of land. The project makes no distinction between those who own the land title and those who don't. These are all extremely poor communities that have been left destitute in the aftermath of the disaster. For many households it will never be possible to obtain the title. However, they have never come across any eviction cases. Because of the vernacular architectural expression, the homes built through the project are perceived as *katcha* or impermanent structures - one of the reasons why they pose no threat to landowners.

The **barefoot model**, which is the backbone to this project, has been developed and expanded from the Foundation's award winning [Chulah programme](#). It is based on community collaboration, mutual support for training needs and the development of a local market where barefoot entrepreneurs conduct local improvements and are paid a fee by households. The principles of the barefoot model are:

1. Maximizing the potential of the existing 'Barefoot Ecosystem' - applying three Zeros: Zero Cost (to the donor)/Zero Carbon/Zero Waste methodologies leading to Zero Poverty.
2. Focus on social and ecological justice through humanistic architecture fostering pride, dignity, and well-being, and preventing depletion of the planet's resources.
3. Delivery of unmet needs through Barefoot Entrepreneurs with a particular focus on women.
4. Low tech, low-impact non-engineered structures for shrinking the ecological footprint in construction, using green skills and sustainable, locally sourced materials.

## Innovation

The model is unique in the way that develops self-reliance. As the numbers of displaced people around the world increases, less funding is available for humanitarian aid. Furthermore, overhead costs and corruption mean that the amounts available for those affected are insufficient. The Foundation's approach relies on people's own human resources and natural resources that are abundant in rural areas, enabling the design of low cost, affordable and sustainable green methodologies.

The Barefoot Entrepreneur model for peer-to-peer knowledge transfer has not been conducted elsewhere on this scale. The local trained workforce is able to reach out and help households to use the right building techniques, putting food security and flood mitigation solutions in place.

Water resistant and lighter weight materials such as lime and bamboo were introduced to structures, creating savings in cost and embodied carbon over standard reconstruction approaches.

The project promotes that zero poverty can be reached through the application of methods for flood mitigation and protection, an idea not widely adopted in post-disaster relief. It creates resilient communities by linking prevention of displacement after a catastrophe, to the safety of lives, belongings, and livestock through economical, affordable methods. This project differs from the earlier submissions to the Awards from the Heritage Foundation of Pakistan, in that the technology and methodology have evolved thanks to experience on the ground, and it has a stronger housing and sustainability focus.

## Funding

The total cost of the project to date is \$945,000 USD for the construction of 6,300 housing units. Each home costs about \$150 USD to build – this includes not only the one room structure but also the associated systems: sanitation, water, lighting, skills development, disaster mitigation measures.

The funding for the project has been secured from 14 private sponsors. These are philanthropists who wished to provide help after the 2022 disaster. Some live in Pakistan while others are part of the Pakistani diaspora. They all believed in a sustainable alternative and agreed to follow the project's approach to give funds directly to communities and deposit funds in Mothers Committees' bank accounts. No federal or state funds support this project.

The project aims to pursue a self-sustaining model instead of seeking funding from outside sources. The Foundation has paid for pilots of various kinds from its own reserves. As the funding is provided directly to affected households through Mothers Committees, the Foundation covers the cost of its supervising staff. Since all the Barefoot entrepreneurs are paid small fees by those who receive guidance, there is no funding needed for that purpose.

## Impact

### Financial

The programme relies on peer-to-peer knowledge transfer to help destitute villages gradually achieve a holistic model. Teams of barefoot entrepreneurs guide the process and after 15 days households are on their way to begin fending for themselves and are able to become food secure within a couple of months.

Barefoot entrepreneurs are paid a small fee by each household and are able to earn a substantial amount because of the large numbers of households they help. Residents do not pay for their housing but contribute with their work and pay a small fee for the services of the barefoot entrepreneur that supports their construction.

Household incomes increase as people are trained as barefoot entrepreneurs and start selling their services and products in nearby villages. The specialisation of entrepreneurs is based on the unmet needs of the poor and the huge need that exists. Examples include the production of mud/lime bricks, roofing and reed matting, and fish and poultry husbandry.

## Social

Since the project started, there has been heavy rainfall resulting in surrounding villages suffering displacement. The holistic eco- villages however remained secure and have been able to provide refuge to others. Residents feel confident and secure enough to offer hospitality to visitors as they have done on several occasions, including over 70 university climate volunteers, both from abroad and local universities.

The programme includes food security measures, involving planting orchards and vegetable gardens, and poultry and fish farming. Residents become healthier as their nutrition improves.

Mothers' committees are now also using resources to build village school rooms. Out of 60 villages, 30% of the villages have built school rooms with their own savings.

## Environmental

The approach is based on low-impact, low tech methods and locally sourced natural materials, to drastically reduce embodied energy.

The Heritage Foundation of Pakistan has been innovating with materials since the 2005 Kashmir earthquake, where the organisation recycled materials such as stone, mud and wood from collapsed houses, adding lime and traditional cross-bracing (*dhajji*) to create stronger buildings. Another local material, bamboo, was later tested and proven in housing displaced populations in the Mardan region. The use of these materials was then further developed during post-flood reconstruction in the Swat region in 2010, using multiple bamboo joists and cross-bracing to carry heavy roofs, withstanding subsequent flooding and several feet of snow.

The project's motto is 'Zero Carbon/Zero Waste leading to Zero Poverty'. The project attempts to make use of all available resources in the area, in order to implement the most economical, affordable, locally sourced methods. The measures include:

- Construction of zero carbon structures for houses, eco-toilets, earthen platforms for safety, earthen *chulah* stoves, low energy lime which absorbs carbon from the air and bamboo which acts as a carbon sink, making all structures entirely carbon neutral.
- Introduction of community forests and other plantations for carbon capturing and to prevent soil erosion.
- Creating aquifer trenches and swales to replenish the aquifer for greater fertility.
- Use of waste materials including debris of collapsed structures, human and livestock waste, agricultural and farm waste, food waste, and miscellaneous waste. For example, using left over fabric scraps as material for quilting, old sacks for potato farming and flood protection, old chemical drums for inexpensive water suction mechanisms from canals, and old oil drums as bases for floating structures.



## Learning, evaluation, and recognition

### Learning

Traditionally, funds for humanitarian work have been channelled through non-governmental organisations as intermediaries. This has made it difficult for many sponsors to contribute to this direct grant system, even if proven to be more efficient. A lack of trust in the poor to handle grants seems to be another factor.

### Recognition

The project has been featured in national and international media:

- [Pakistani Village Seen as Model of Climate Resilience – VOA News](#)
- [‘This will not be swept away’: the bamboo homes helping Pakistan’s post-flood rebuild – The Guardian](#)
- [Disaster-resilient homes for Pakistan’s flood-hit villagers – Reuters](#)
- [Pakistan architect rebuilds sustainable housing after flooding – DW News](#)
- [After successive floods, Pakistan is forced to consider resilient housing – Dawn News](#)
- [Rizq Eco-Housing Project – Rizq Facebook Page](#)

## Transfer and future plans

The premise of the model of barefoot entrepreneurs is its ability to scale up with minimal external support. The Mothers Committee savings programme was launched in 2024 and it is expected this will help scaling up as resources are used more efficiently. Private sponsors helped to fuel the original pilot of 1,000 households in 13 villages, which has now spread to 60 villages with 6,300 housing units. Another 100 households located a couple of villages away from the project, have started construction after finding sponsors.

Internationally, with the support of Re:Arc and Spiritual Chords, the Heritage Foundation of Pakistan is developing the curriculum for a training programme to be launched in 2024 to replicate the model in Malawi. Furthermore, the Foundation has developed training videos on Zero Carbon Channel on YouTube to spread knowledge of safe building techniques.



## World Habitat Reflections

This project provides a different approach to mainstream humanitarian disaster responses, pushing back on the existing model that is becoming increasingly strapped as global disasters increase. The Foundation's model focuses on fostering holistic community recovery to self-sustain in the long-term and supports the right to housing through empowering communities to live in more secure homes. This decolonized and democratic model is already providing sustenance to many thousands of households and could be a solution for millions suffering from poverty and displacement in other parts of the world, providing dignity, hope and agency to those who are otherwise unable to escape the poverty trap.