

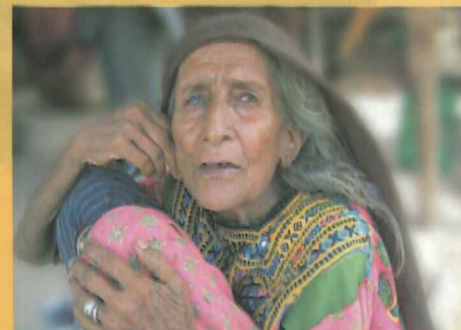


GEF SGP Pakistan's

Benazir Housing Technology

A Poor Person's House in the Age of Climate Change!

Successful mainstreaming of energy efficient disaster resistant low cost housing technology



Pakistan: Housing Scenario

Pakistan's annual requirement for construction of houses is more than 500,000 housing units. At present the number of housing units being constructed is only 300,000. The demand and supply gap is resulting into serious repercussions for the society as it had changed more than half of Pakistan urban land into squatter settlements and is eating away the agricultural land of the country.

Housing Needs of a Poor Person in the Climate Change Era

A poor person already burdened with economic pressure and hardly making both ends meet has a peculiar housing needs keeping in view the climate change era. It has been realized that a poor person's house should include the following characteristics:

- Low cost
- Energy efficient
- Could meet the disasters
- Use of local construction material which is environment friendly
- The material could be made by the poor himself
- There should be possibility of recycling

UNDP GEF SGP's Response to Housing Needs of the Poor

The UNDP GEF SGP, Pakistan Programme has taken an initiative to introduce energy efficient Benazir Housing Technology in the coastal region of Sindh province. The first model was created 8 years back in District Thatta; which has evolved into current shape.

The Benazir Housing Technology has following landmark climate change adaptation and mitigation features:

- No use of bricks thus no green house gases emission as a result of brick kilns
- No brick-kilns, no fuel wood cutting
- No or minimum use of wood in roof structure
- Minimum or sustainable use of water, energy and fuel
- Able to withstand natural disasters

Key Features of 'Benazir Housing Technology'

The Benazir Housing Technology provides unique housing solution combining in itself a blend of disaster risk reduction, energy efficiency and low cost features that especially suit to physical conditions of disaster prone areas of Pakistan.

The house comprises on the following components:

- | | |
|----------------------------|------------------|
| ■ Two bed rooms measuring | 11'3"X11'3" |
| ■ One verandah measuring | 10'X24' |
| ■ One Kitchen measuring | 4'-0" X 10'-6" |
| ■ One Wash Area measuring | 4'-0" X 4'-9" |
| ■ One Toilet measuring | 4'-0" X 4'-0" |
| ■ One Animal Shade | 11'-0" X 14'-6" |
| ■ Kitchen Garden measuring | 11'-0" and 6'-0" |

Unique Design of Energy Efficient House

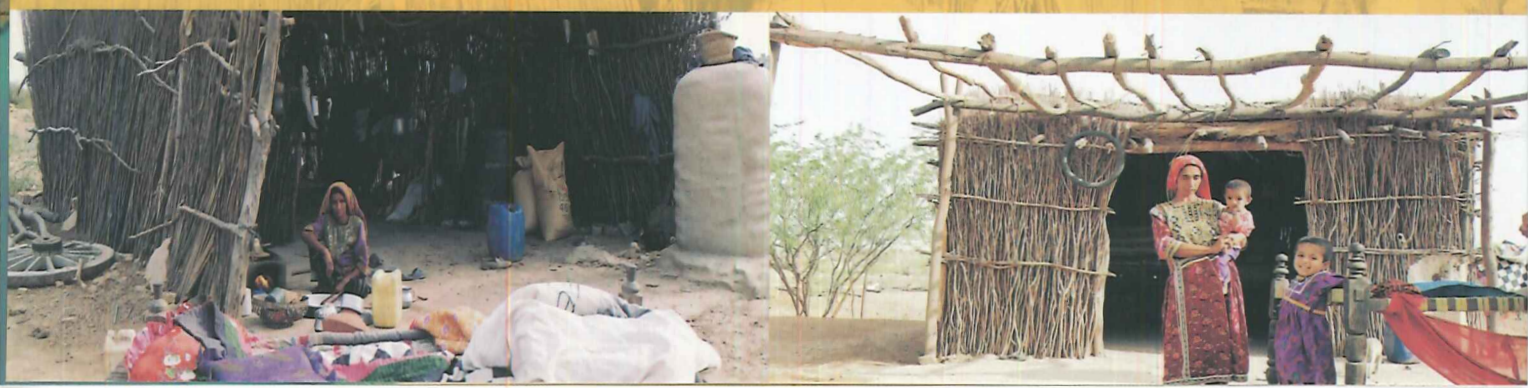
The following features make the design an energy efficient, disaster proof and low cost model:

Arched Foundation to address the problem of seepage, dampness, salinity and cost effectiveness

Pyramidal Roof which is thermal efficient, damp and leakage proof, light weight and economical wooden roofing design as compared to conventional roofing

Compressed Earth Block is consisted of ordinary soil with less content of clay; generally mouram soil is used with 5% to 6% lime or cement at optimum moisture content

Wire Reinforced Brick Block Masonry to ensure quality, cut down masons cost, speed up the work progress, make the construction simple and provide the provision of wire reinforcement to make the structure safe against earthquake and high wind and lateral pressure



UNDP GEF SGP's Benazir Energy Efficient Housing Versus Conventional Housing

The Benazir housing technology is in many ways unique and outstanding as against conventional housing. The comparison between both the technologies is illustrated as below:

Table: Comparative Analysis of Conventional and Energy Efficient Construction

Activity	Conventional Construction	Energy Efficient Construction
Foundation	Brick load bearing structure can not survive longer due to dampness, seepage and erosion salinity	Hollow reinforced height strength isolated footing 3'-3" x 3'-0" at 6'-0" center to center with arch foundation and plinth beam which is the only solution of dampness control and which has frame structure
Wall Construction	Brick masonry and block masonry which has 25% to 30% water absorption and it disintegrates in coastal area. It has low strength with high conductivity of heat	Hollow block and CEB block low water absorption, high strength and low conductivity of heat, low cost, non load bearing wall.
Roof Construction	Tier, Girder with clay Tile. Heavy load, Clay tile not available on mass scale, Deforestation, Air pollution and no provision of sky light	Steel Pyramid Roof efficient drainage, light weight, fast construction provision of mezzanine floor, Energy Efficient, Day light sky. Moon light in night, fiber glass pyramid, ventilators provided to exhaust hot gases
Earth Quake and Cyclone Resistanci	Heavy load of wall and roof are generally used which are not safe from earth quake point of view, no roof beam, plinth beam, sill level reinforcement, frame structure reinforcement footing and reinforcement columns are generally used to ordinary construction	Provided beam at roof level, plinth level and reinforcement at sill level, reinforced per cost column and foundation are used. Stud columns provided at 6'-0" center to center light weight structure and three dimensional roofs are provided which never collapse. Shadow of roof will from within the room therefore it will not get heated
Floor Construction	Cement floor in grey color	Specially Designed Clay Tiles laid on stone dust sub floor
Sanitation	Soak pit, no concept of waste water reuse	Recycling of Kitchen and Bathroom waste water disposal of black WC waste water through individual Floor

Specially designed pyramidal roof with ventilators, and using CEB makes the house energy efficient



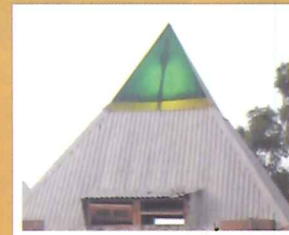
Hollow Block



Compressed Earth Blocks



Arched Foundation



Pyramidal Roof

Replication of Benazir Housing Technology in Collaboration with Sindh Government

UNDP GEF SGP Pakistan Programme has been working in the country since 1993 and has implemented more than 255 projects in almost all key areas of Pakistan. Some of the projects attracted international attention by receiving international awards including Ashden Prize, Alcan Prize and UN Habitat Award. UNDP GEF SGP is now focusing Indus delta area for conservation.

The Government of Sindh has launched peoples' housing programme. People's Housing Cell has been established to provide for the housing needs of the poor who either do not have their own houses or their houses are in dilapidated condition posing risk to their life and property. UNDP GEF SGP has signed an agreement with Peoples' Housing Cell to replicate 500 energy efficient low cost houses in the disaster hit coastal belt of Sindh (Badin, Thatta and Karachi). The houses are being provided to poor women free of cost.

UNDP GEF SGP possessing over 8 years research and execution experience of already piloted low cost energy efficient housing units through its partners in District Thatta and Badin engaged its partner NGOs to construct the houses in the coastal belt.

Important Features of the Project

Beneficiary Profile and Selection Criteria

The project is being implemented in 28 villages of the target three districts. Poorest of the poor having their own land/plot for the construction of a house is included in the housing project as beneficiary. From each beneficiary village 5-25 households have been selected for the construction of houses. The village selection has been carried out by the concerned elected representative, whereas UNDP GEF has facilitated in providing a list of potential villages for the government's short-listing.

Manufacturing

The project uses many innovative features like compressed earth blocks, hollow blocks, pyramidal roof structure, clay tiles for flooring; which are not readily available in the market therefore the project has established its own manufacturing units for the purpose.

Specially designed Block Manufacturing Machines

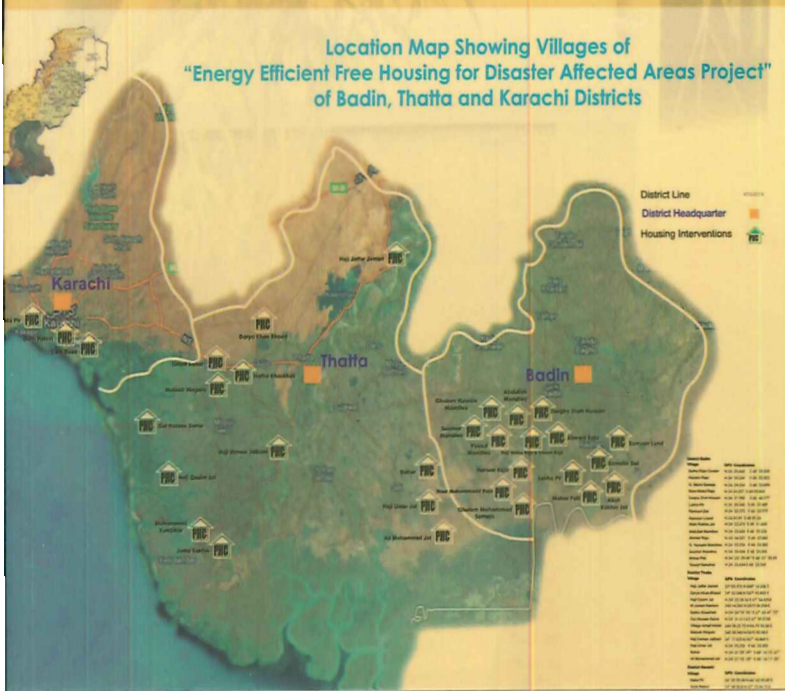
Under this project UNDP GEF SGP designed innovative CEB and hollow block making machines. By using these machines thousands of blocks can be made in one day.

Workshops for Manufacturing of Pyramidal Roof

Two workshops have been established each at Badin and Gharo for fabrication of pyramidal roofs. Each workshop can manufacture 10 roofs every day with the support of 10 skilled labour.

Training of Skilled and Semi Skilled Labour Force

Training of skilled and semi skilled labour is a unique feature of the project. Local masons and helpers have been hired by the project to accomplish masonry works. Prior to commissioning of work the masonry labour was engaged in training. The Chief Technical Advisor of UNDP GEF SGP imparted the training to the 25 masons as Master Trainers by getting model house



Hollow Block Machine
"SGP Spirit"



Compressed Earth
Block Machine "GEF Voice"

constructed at Thatta work yard. Later on these master trainers were engaged at different work sites, where they trained their fellow masons and continued construction work. Over all more than 1,000 persons have been trained in different vocations.

NGOs Trained to construct 'Benazir' Model House

The capacities of two partner NGOs of UNDP GEF SGP i.e: Research and Development Foundation (RDF) and Participatory Efforts for Healthy Environment (PEHE) have been enhanced and strengthened in various ways through providing technical training and back stopping. The NGOs have proved their capacity to further replicate the model anywhere in the country.



Speaker National Assembly of Pakistan

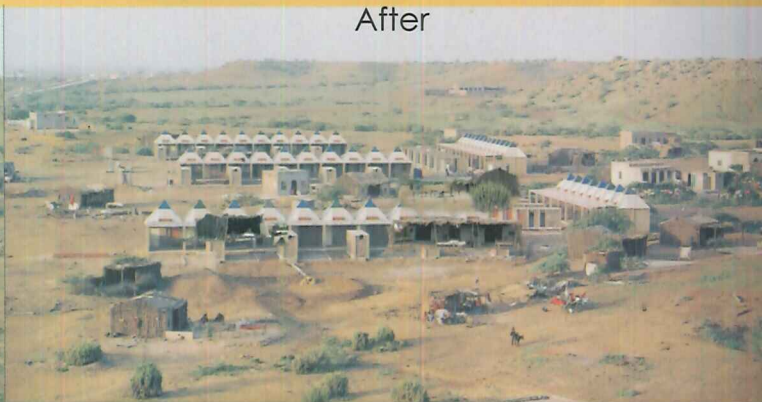
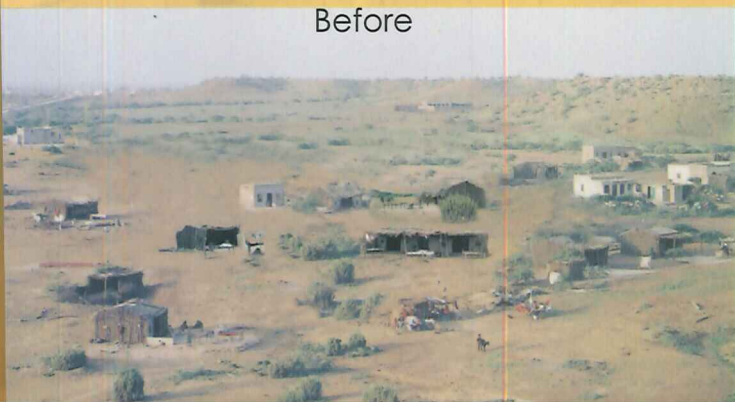
Dr. Fahmida Mirza

giving away keys of the newly constructed house to a woman beneficiary.

The housing work at village Jaffar Jamari

Before

After



For Further Details Contact:

UNDP GEF Small Grants Programme, Pakistan

Masood Ahmed Lohar

National Coordinator

Email: masood.lohar@undp.org

Website: <http://www.sgppakistan.org>

Mailing Address:

H# 25 / 26 Bagh -e- Irum Near Mohammadi Town

Qasimabad Hyderabad Pakistan.

Tel: +92 -22-3830026

Peoples Housing Cell (PHC)

Zia-ul-Islam

Chairman, PHC

Email: zia.zislam48@gmail.com

Website: <http://www.phc.gos.pk/>

Mailing Address:

M-1, Mezzanine Floor, Beaumont Plaza

Behind PIDC Building, Karachi, Pakistan

Tel: +92 -21 920 4178-9

Fax: +92 21 568 0117

Research and Development Foundation (RDF)

Masood Ahmed Mahesar

Executive Director

Email: mmahesar@rdfoundation.org.pk

Website: www.rdfoundation.org.pk

Mailing Address:

B.13 Prince Town Phase I, Main Wadhu Wah Road

Qasimabad, Hyderabad, Pakistan

Tel: +92 22 265 1728

Fax: +92 22 265 3219

Participatory Efforts for Health Environment (PEHE)

Rafique Ahmed Junejo

Chief Executive Officer

Email: rafiquejunejo@gmail.com

Website: <http://www.pehe.org.pk>

Mailing Address:

Bungalow B.11/150 Street No. 1 Abdullah City, Near Naseem Nagar

Chowk, Qasimabad