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Mahila Housing Trust

Bijal Brahmbhatt Director Mahila Housing Trust





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Climate Change and Slum Dwellers : Key Issues Identified













CLIMATE CHANGE AND SLUM DWELLERS: **THE PROGRAM**

Devising local coping mechanisms and adaptation technologies to build climate-resilience capacities of urban poor in South Asia







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CLIMATE CHANGE AND SLUM DWELLERS: KEY OBJECTIVE - 1

Training Delivery For Climate Change: Understanding Concepts, Risks and Resilience Building.





Training Toolkit on Climate Change Risks and Resilience Measures

Module 1: Orientation Training on Climate Change

II. UNDERSTANDING THE CONCEPT: PARTICIPATORY GAME OF SNAKE & LADDERS

In the game, "ladders" signify improvement in a women's life subject to adequate facilities, access to finance & education whereas "snakes" indicate the impacts of negative climatic changes in their lives forcing them back down and keeping them vulnerable



2 Solutions <t

EXPECTED LEARNING OUTCOMES

- Vulnerability of Slum Dwellers & Informal Settlements
- · Causes and impacts of climate change
- Vulnerability of Women
- Role of women as agents of climate change adaptation

- METHODOLOGY
- Animated visual tools
- Participatory games
- Posters
- Story telling









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CLIMATE CHANGE AND SLUM DWELLERS: **KEY OBJECTIVE - 2**

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Vulnerability Assessment & Resilience Planning Training.

How have things changed over the years Realise RISK 1 Histogram Moser Framework ST UNIT Analyse Temperature Before 10 to 15 years **Current Situation** Impact Matrix **Risk Quadrant** Root cause Analysis Adaptive Capacity Visualise Θ Jersey City Summarizing results of all the exercises

Risk Analysis and Risk Quadrant

RISK 2

Women involved in interconnections activities















PRO POOR - CLIMATE RESILIENT SOLUTIONS **MODROOF**

INNOVATIVE ROOFING SOLUTION - CHARACTERISTICS

Manufacturer & Application

Pal Rematerials Private Limited in Ahmedabad, Used as a **cooling solution for roofing material**

1

Thermal

bserved to reduce home

thermal performance

Rockwool insulation for high

 Cost per unit
 Id Rs. 270/- per square feet.

 Durability
 warranty and can be cation to another and supports incrementality.

nd.

Ease of access



SIGNIFICANT AND DIRECT ASSOCIATION WITH FINANCIAL INSTITUTION

A direct loan provided to households interested to change their roof to MOD Roof through MHT and Credit Co-operatives. **MHT has proposed a loan model ranging from Rs 30,000 to Rs 2,00,00.**



MOD Roof has been successful in enhancing its product through time contemplating the gaps in usability and constant change.



VOICES OF WOMEN

My name is Mina Soni. I live in

Vishwasnagar since 15 years. Previously. We had a roof made of corrugated tin sheet. I work as a seamstress and live with my husband and two kids. Earlier it did not get this hot. But since these last years, the heat is intolerable. The second problem is that when it rains, my roof used to leak. Every monsoon season, I had to repair my roof. I have got to know about Mod roof in one of our Vikasini meetings in MHT. Few things I liked about this technology are its cost effectiveness and durability. Despite concrete roof being unaffordable to us, Mod roof looks like a pucca concrete roof. We could also take a loan and pay in instalments. Most importantly. We don't suffer from heat anymore. The company assured us that we can add a floor in the future.

MINABEN, VISHWASNAGAR, AHMEDABAD.













Cool Roof Technology



Modular Roof with Airlite Ventilation





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Cool Roof Technology



Solar Reflective





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Adrienne Arsht-Rockefeller Foundation Resilience Center

Cool Roof Technology



Bamboo Roof





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PRO POOR - CLIMATE RESILIENT SOLUTIONS **SOLAR REFLECTIVE WHITE PAINT**

INNOVATIVE ROOFING SOLUTION - CHARACTERISTICS

Manufacturer & Application

Few common companies providing solar reflective white paints are **Kaycoat**, **Insultec**, **Nerolac etc.**

Thermal

properties

Solar Reflective Paint reduce indoor temperatures **up** to 4°C to 5°C. Exterior walls facing maximum sunlight to be painted for larger impact.

Cost per unit

The product costs around **Rs. 25/- per square feet**. A roof of area 100 sq ft requires 8 litres of paint.

Durability

Solar paint is durable for **4 years without** maintenance.

Ease of access

Easily available in markets. Lime paint or Chuna are affordable alternatives.

hermal Quick & easy installation alternative alternative

Fire and Weather retardant

SIGNIFICANT AND DIRECT ASSOCIATION WITH FINANCIAL INSTITUTION

A direct financial and technical support has been provided to households interested to change their roof and are willing to apply the solar reflective white paint. **MHT through AWAAS and Credit Co-operatives has been promoting the pro poor and affordable technology** in various cities across India.



MHT in partnership the Ahmedabad Municipal Corporation has been part of the "Coo Roof Programme" under the Ahmedabad's Heat Action Plan. MHT's team painted around 250 roofs across the settlements with the help of the inhabitants.



VOICES OF WOMEN

Ever since we got our tin roof painted white, we've been able to save on electricity since the speed at which the fan rotates has also gone down because we don't feel so hot anymore. We are now able to work on our stitching in the afternoon from 2Pm to 5Pm and finish it on time because we feel at ease and cooler.

MEENABEN KHORI,

RAMESHDUTT COLONY, AHMEDABAD.















GRP PHASE 2: SCALING UP AND DEVELOPING A SUSTAINABLE MODEL LONGITUDINAL STUDY LEARNINGS

GRP Phase 1 ended in December 2017 and the scaling up of the project started in the mid of 2019. Hence, in order to identify the behavioural changes in the past 1.5 years, both quantitative and qualitative study was done.

The project's greatest success has been in people's very understanding of climate change, with **96.75% of respondents recognizing that climate change is manmade.**

8% of the people introduced to the concepts have adopted green roof technologies in Jaipur since the project ended. As further examples, 4% of households in Bhopal have adopted of white paint solutions, while another 7% adopted thermocol based false ceiling to combat heat stress post the project.

Vikasinis' contribution has been significant at the policy level with their engagement in **the formulation of the Monsoon Action Plan, Ahmedabad** Heat Action Plan, as well as the Ahmedabad Cool Roof Policy which is under consideration right now.

Climate resilience behavior of not only the CAG members, but also the community at large, has improved considerably. **Cleanliness is being taken seriously as awareness of vector borne diseases has increased**. People keep stored water covered to prevent breeding of mosquitoes and ensure that stagnant water does not collect in the monsoon. The CAG members also regularly call the AMC to have the slum fumigated.

There is interlink between the building of social capital and the development of community-led climate resilience solutions will be further explored through the organization's work.



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QUANTITATIVE ANALYSIS









ENERGY CONSERVATION BUILDING CODE (ECBC) FOR AFFORDABLE HOUSING

Parameters that impact RETV of a building

Walling material & construction

(U-value of walls)

RETV

Glass

(SHGC value)

Window to wall

ratio

Glass

(U-value)

Direction of

wall/openings

Shading of openings



Monitoring Energy Consumption and Environment

The monitoring was done through direct measurement method of energy use and environmental variables using energy meters and sensors-loggers.



The installation design was developed in accordance with owners, MHT officials and CARBSE team. Electricity bills of all twenty houses were procured for energy monitoring.

Thermal Comfort RNRH survey

The thermal comfort of the residents evaluated at a particular **'point-in-time' at the place occupied by them** is termed as 'Right Now Right Here' or RNRH survey.

This survey **evaluates the resident's thermal comfort** by knowing their thermal sensation vote, preference vote and acceptance vote, the clothing items worn, their metabolic activity in the past one hour.

Along with this, the environmental parameters like Air Temperature (ta), Relative Humidity (RH), Air Velocity (va) and Globe Temperature (tg) is also measured.

KEY OUTCOMES OF THE DATA ANALYSI

The following variables, that might impact the energy consumption, were investigated:

- No of occupants and occupancy schedule
- Electric appliance penetration and connected load
- Income of the family
- Indoor air temperature
- Residential Envelope Thermal Transmittance (RETV) of the building

THE RESIDENTIAL ENVELOPE THERMAL TRANSMITTANCE VALUE (RETV)

The Residential Envelope Thermal Transmittance value (RETV) is calculated for a building, this metric is a measure of the envelope's intrinsic heat transfer (loss as well as gain) capacity.

Maximum Desirable RETV for all climates (except cold climate) is 15 W/m²

- Reduce heat gain/loss Utilize natural ventilation and daylighting
- Reduces peak indoor temperature to 30-35°C during peak summer period

Improves thermal comfort & reduces energy consumption

Developers have incorporated solutions such as solar white paint, mosaic flooring on the terrace, partially glazed windows, extended window overhangs and building material suggestions such as AAC blocks.



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Relevance of Research

- Research is results and solution oriented and leads to a positive impact on the lives of those at risk of climate change including women and children.
- Research is transdisciplinary and co-created through collaborative effort with users.
- Research should have a process to incorporate learning while doing (research action links to strengthened.)



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Policy Influence with Cities

- Influence on city Heat Action Plan.
- Formulation of Cool Roof Policy.
- Extending the policy initiative to Bangalore.



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Thank you







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