Climate proofing homes in Rajasthan: Case-studies from Western India

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- SEEDS experience : Responding to humanitarian situations on the ground in Asia and the region, participating in recovery actions, educating communities on risks and vulnerabilities.
- Our mission: Equipping the most vulnerable with appropriate tools and technologies, sharing knowledge and skills, and promoting linkages among the stakeholders to prevent life loss and suffering.

Certified in HAP 2010 Accountability and Quality Management

The Humanitarian Imperative

- Jammu & Kashmir floods
- Odisha Phailin Cyclone
- Uttarakhand Floods
- Assam Floods
- Tamilnadu (Thane) Cyclone
- Leh Cloud Burst
- Bihar Floods
- Orissa Floods
- Rajasthan Floods (Barmer)
- Kashmir Earthquake
- Indian Ocean Tsunami
- Gujarat Earthquake

TABLE 5 Total number of reported disasters, by type of phenomenon and year (2004–2013)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total[1]
Droughts/food insecurity	19	28	20	13	21	31	27	24	30	12	225
Earthquakes/tsunamis	24	25	24	24	23	22	25	25	23	24	269
Extreme temperatures	19	29	32	25	11	26	34	19	52	17	264
Floods[2]	135	193	232	219	175	159	189	159	142	149	1,752
Forest/scrub fires	8	13	10	13	5	9	7	7	7	10	94
Insect infestation	12	n.d.r.	1	n.d.r.	n.d.r.	1	n.d.r.	n.d.r.	n.d.r.	n.d.r.	14
Mass movement: dry[3]	1	n.d.r.	1	n.d.r.	3	1	n.d.r.	n.d.r.	1	1	8
Mass movement: wet[4]	16	12	20	10	12	29	32	18	13	11	173
Volcanic eruptions	5	8	12	6	7	3	6	6	1	3	57
Windstorms	128	131	77	105	111	87	91	85	90	106	1,011
Subtotal climato-, hydro- and meteorological disasters	*337*	*406*	*392*	*390*	*335*	*342*	*380*	*312*	*334*	*305*	*3,533*
Subtotal geophysical disasters	*48*	*33*	*37*	*27*	*33*	*26*	*31*	*36*	*31*	*32*	*334*
Total natural disasters	**385**	**439**	**429**	**417**	**368**	**368**	**411**	**348**	**365**	**337**	**3,867**
Industrial accidents	81	76	64	53	38	43	36	32	25	25	473
Miscellaneous accidents	62	66	33	43	30	27	47	34	26	31	399
Transport accidents	216	229	205	181	192	160	152	178	137	136	1,786
Total technological disasters	**359**	**371**	**302**	**277**	**260**	**230**	**235**	**244**	**188**	**192**	**2,658**
Total	**744**	**810**	**731**	**694**	**628**	**598**	**646**	**592**	**553**	**529**	**6,525**

Source: EM-DAT, CRED, University of Louvain, Belgium

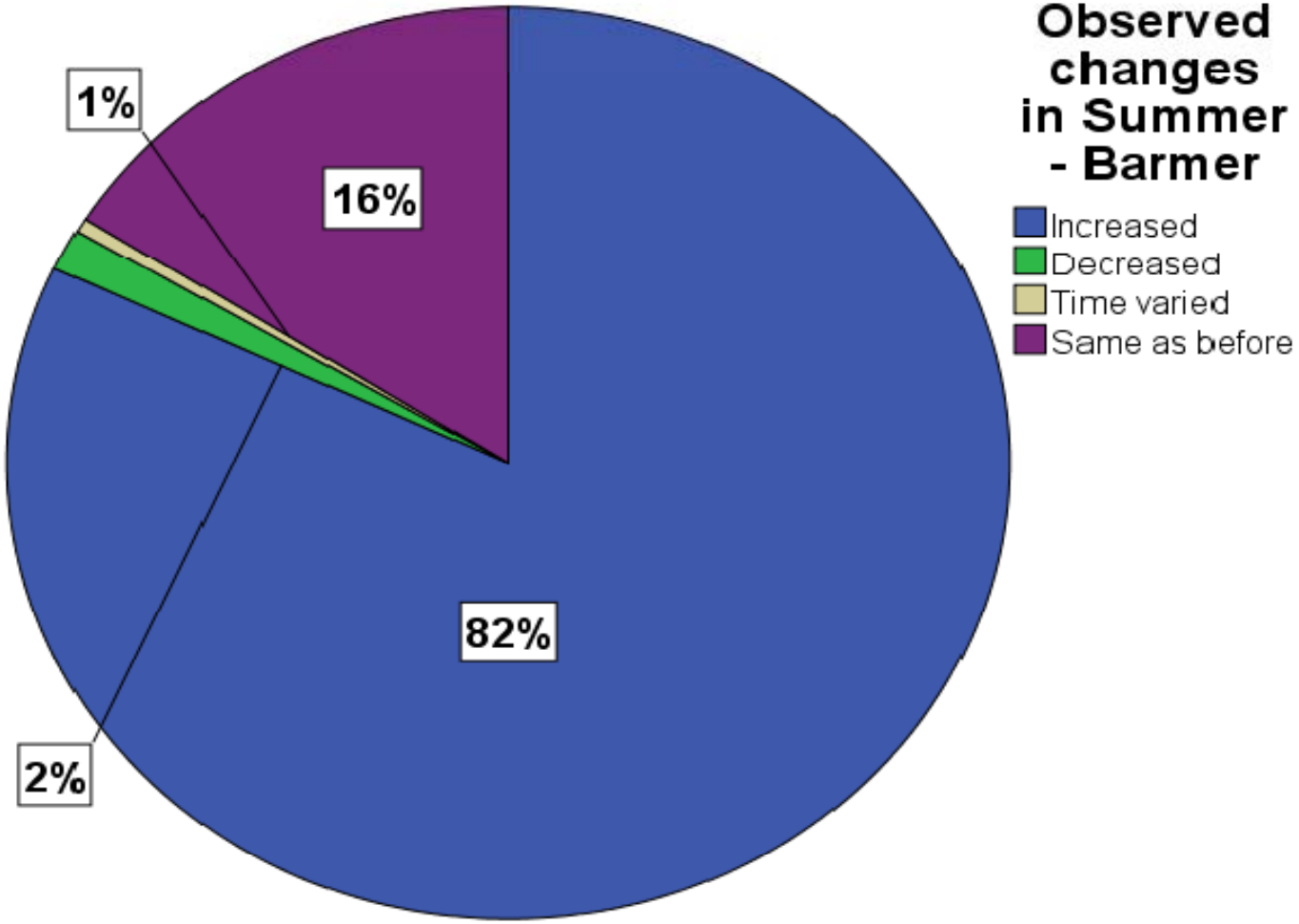
Growing hydro-met disasters! A 10:1 ratio

Western Rajasthan

•Characterized by low and erratic rainfall, high air and soil temperature, intense solar radiation and high wind velocity.
•Changing climate acts as an additional stress on ecological and socio-economic systems.
•Major disasters experienced – drought, flashfloods, earthquakes, heat waves,
•Climate change impacts- increase in temperature and decrease in precipitation, health impacts, pest infestation, low agricultural produce, increasing drought conditions.

Rajasthan State Action Plan on Climate Change estimates the mean annual rainfall would decrease slightly, but extreme rainfall (more than 244.5 mm rainfall in a day) is **expected to increase** in frequency and intensity in the model projections for 2071-2100……. average temperature in Rajasthan is projected to rise by 2035 in the range of 1.8˚ Celsius to 2.1˚ Celsius.

People's Perspectives about Climate Change in Rajasthan



Primary Survey in Barmer, SEEDS, 2013 covering 200 HHs

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Our approach

To reduce vulnerabilities and strengthen people's capacity to cope with hazards.

Considering long term adaptation

- Usual practice ignores community's inherent 'coping' capacities.
- Models are imposing the problems on the community from outside.
- These approaches are largely unsustainable as they rely heavily on external agencies.

Barmer, Rajasthan, India

Flash flood in desert /drought prone region.

The disaster:

August 2006 saw unprecedented rainfall/floods in otherwise drought stricken region of Barmer, Rajasthan. The floods led to a loss of 139 lives and rendered 50,000 homeless.

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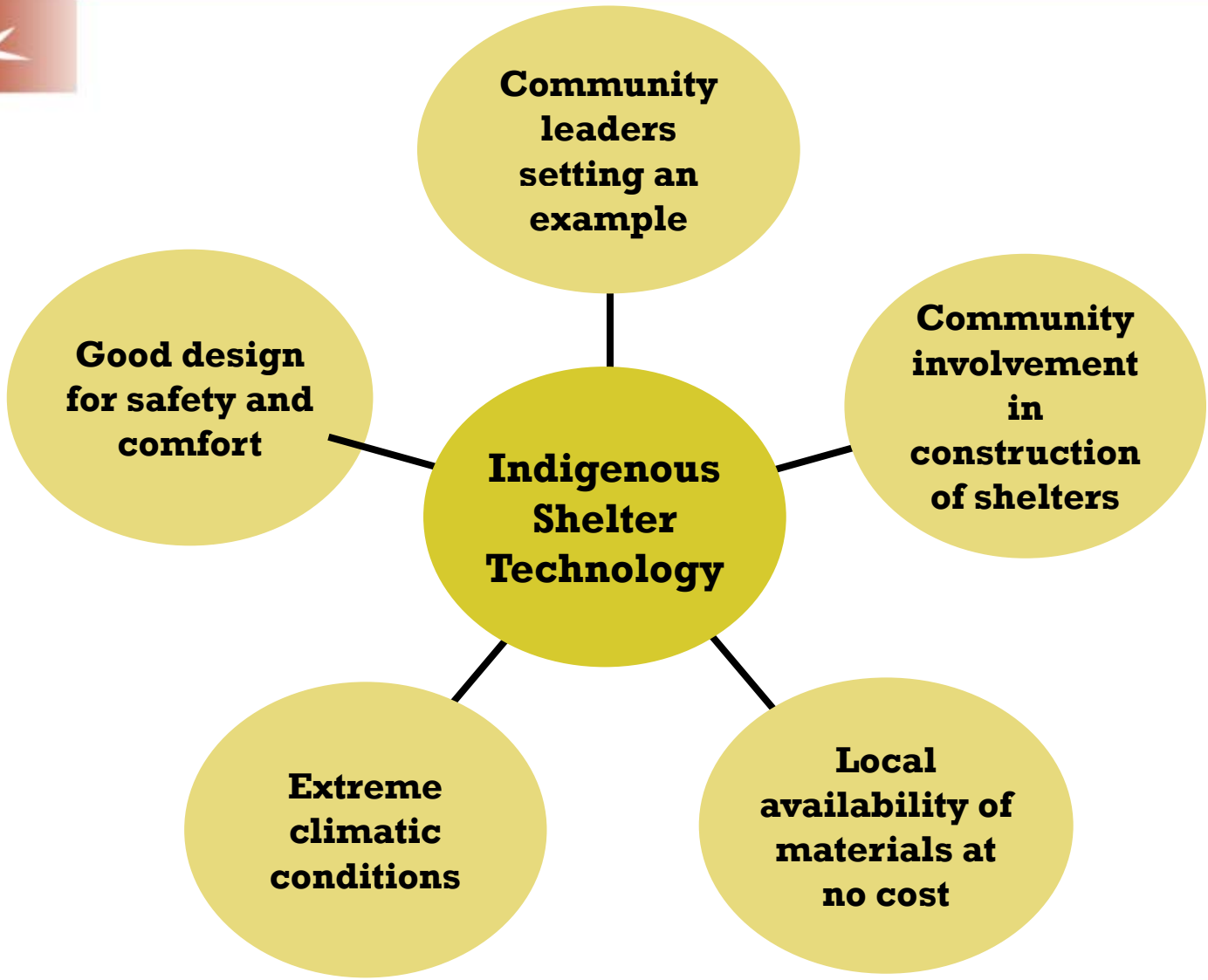
Learning traditional practices

- Environmental friendly materials were traditionally used for housing (mud walls & thatched roofs).
- The houses were conducive and thermally comfortable in the extreme weather conditions.
- Circular design protected the structures from strong winds and earthquakes.
- However, the adobe structures collapsed when severe floods took place

Traditional practices were very appropriate, shortfalls in the water resistant capacity of the mud structures led to damage during floods. Traditional design was effective but need some technological intervention to address unprecedented disaster.

Indigenous Construction Practice Recognized, 'Adapted'



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Post-flood Shelter Construction

360 Interim Shelters were reconstructed along with the community by upgrading traditional designs.

- Mud walling upgraded to soil-cement.
- Traditional roof material retained.
- Traditional design enlarged.
- Reconstruction in-situ.
- Household owners provided maximum labour

The task was accomplished in 4 months

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The houses built were in complete compliance with local environmental and cultural nuances both in terms of design and technology used. At the same time, hazard and vulnerability profile of the area was also considered to ensure safety from future disasters.

Traditional Houses

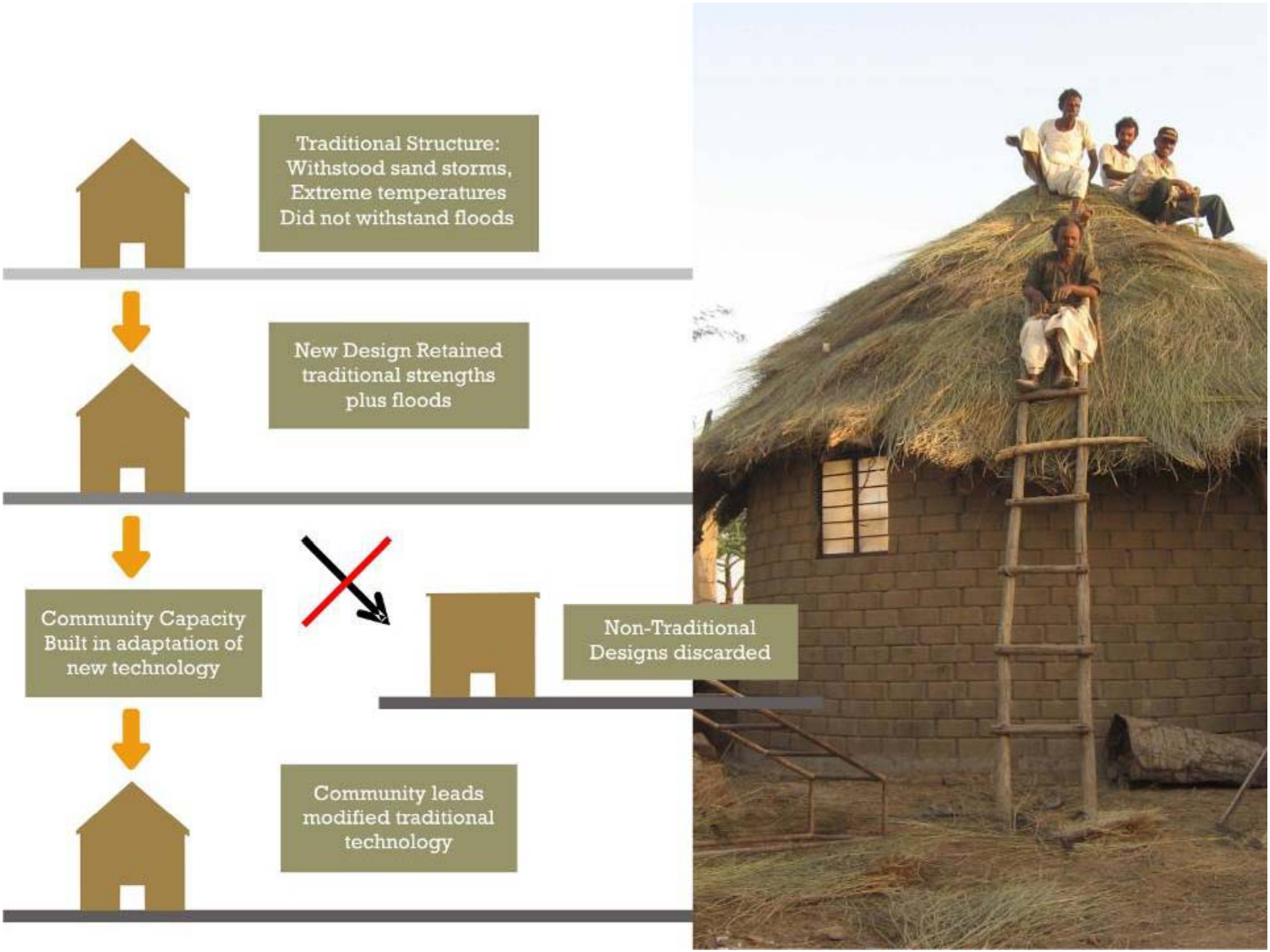
Made of mud, circular in design and had thatched roofs

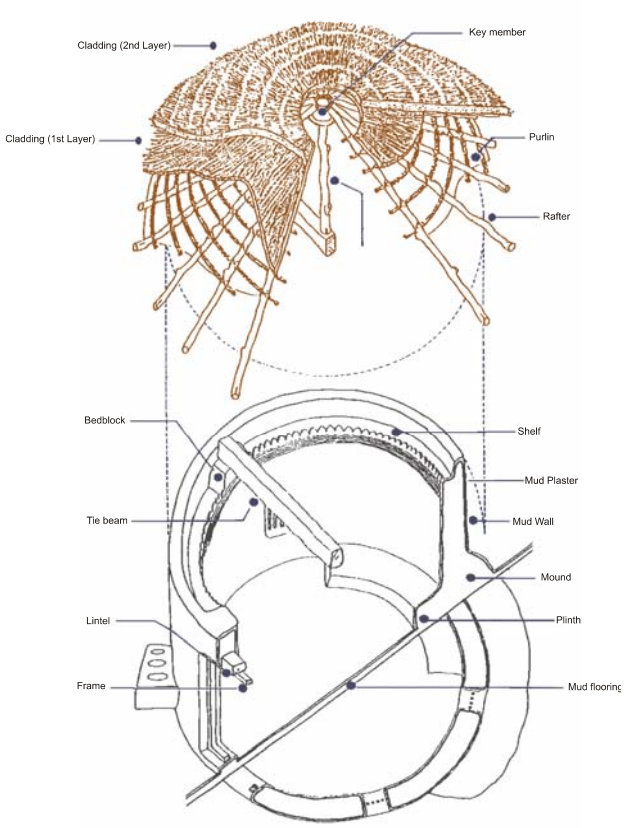
New Houses

Mud stabilized with 5 % cement and compressed for strength

Circular with interlocking blocks, proper foundations, and structural bands for strength

Thatched roofs for thermal comfort


Traditional Structure:
Withstood sand storms,
Extreme temperatures
Did not withstand floods
New Design Retained
traditional strengths
plus floods
Community Capacity
Built in adaptation of
new technology
Non-Traditional
Designs discarded
Community leads
modified traditional
technology



Design of the emergency shelter

Village Development committees (men, women, local govt. representative, school teachers, NGO representative) were formed in each village to guide, take decisions and monitor construction process.

> Solutions to community's problems should correspond to their perception of risk and solutions rooted in tradition

Lessons learnt

- “Adaptation” shelter programme must utilize existing traditional wisdom on construction materials and technologies.
- Participation of house owners in decision of site, design and construction details is critical
- New technology must be introduced, but in a minimalist way so as to add value to traditional systems.
- Transfer and local recognition of technology is critical for sustainability, replication and scaling up.
- Local linkages with governments, private sector and academia helps in long term sustenance.
- Linkages with other sectors – water, livelihood and education creates greater equity for process.

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Role of External Agencies

The role of external agencies is to create enabling environments that strengthens communities understanding and application of their natural environment and find technological solution that help remove impedance in understanding and application.

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Thank You