

## Low Carbon Climate Resilient Construction

### In Semi Arid Spaces: Madhya Pradesh

The construction sector particularly shares an intertwined relationship with climate change. The construction sector meets one of our basic needs i.e. habitat and shelter. Also, construction and operation activities have extensive direct and indirect impacts on the environment as the sector is very resource intensive. The sector also contributes to 22% of the national Green House Gas (GHG) emissions. On the other hand, impacts of changing climate are keenly felt by the sector. An increased tendency of extreme climatic events places additional demands of durability and performance on buildings.

Madhya Pradesh, predominantly semi arid region in Central India is highly vulnerable to impacts of climate change due to bio-physical aspects as well as the low resilience of communities to the change. The huge existing housing deficient combined with the growing urbanisation puts a lot of pressure on the limited natural resources. The construction sector has an immense potential to mitigate this damage while building resilience. Low carbon climate resilience (LCCR) construction can help the sector achieve this potential, however in order to do so there is a need for

#### Assessment tools for decision making

While benefits of alternate materials and technologies are often talked about, quantification of these benefits is not available. Thus the advantages are vague and subject to speculation. Tools and softwares aid the design process and help shortlist the most appropriate passive strategies for a particular climatic zone and simulate designs and observe the impacts on energy consumption.

Carbon and water intensities can also be used as indicators to decide the most appropriate material and technology choices. Footprinting tools provide comparisons between various technologies to help in decision making.

#### Research & Customisation

There is a research need to fill knowledge gaps and customize technologies to local context. The next step is communicating this research to the grassroots.

- Design and planning for existing building stock needs to be considered, too, alongside the construction of new buildings.
- Potential in solar and wind energy in MP needs to be recognized and harnessed and used in buildings. Electricity audits are necessary in all new construction.

#### Norms for Operation

The transition to a low carbon pathway is not just a function of technology and design. The key to a successful transition is behaviour change among all stakeholders especially user communities. Guidelines for use of spaces should be part of the design process and shared with occupants on a regular basis.

#### Effective implementation of Codes and Guidelines

A major barrier is the lack of standardisation around LCCR design strategies and materials. There has been some movement in introducing these for materials like fly ash and hollow bricks, however most technologies suffer for the lack of codes and standards. There is also concern around implementation of existing codes.

- The schedule of rates should include LCCR building materials and they should be specified in government project tenders.
- Water recharging systems need to be made mandatory and strictly checked in all building systems.
- Cleaner brick production that reduces stress on agricultural soil needs to be pushed.

#### Extensive land degradation

MP has one of the highest degraded land area in the semi-arid region – primarily due to extensive deforestation over the last 50 years and the resultant erosion of top soil.

#### Acute water shortage

Severe drought from 2003-2008 due to serious deficit in rainfall and depleted ground water resources. In 2009, 37 out of 50 districts declared drought-hit.

#### Excessive mineral extraction

Indiscriminate quarrying, deforestation, silting of water bodies and air pollution for extraction and processing of mineral resources.

#### Building material needs

Access to building material resources for durable climate-resilient habitat problematic in poverty stricken areas.

- Green building concepts exist in the current building codes but are only recommendatory. They should now become mandatory. Guidelines need to be given for this.
- A regulatory authority, with relevant expertise should be formed to formulate guidelines and monitor implementation
- Building and strengthening the capacities of government offices is needed to ensure alternate projects see the light of day.

### Incentives

Incentives in the form of bank rebates, reduced interest rates, government subsidies, reduced taxation for using LC-CR construction will go a long way in promoting uptake. This can be coupled with de-incentivization and possibly taxation of energy and resource intensive construction.

Prizes and rewards for innovation in this field by the government will promote research..

### Skill Development & Technical Capacity Building

One of the key barriers faced by architects who convince their clients to opt for alternative technologies is to source skilled labour capable of executing them. Technical specifications and structural details of these technologies are hard to come by. A cadre of skilled masons, engineers and architects are needed to promote these technologies in a cost effective and quality manner.

- Introduction of LCCR concepts in the technical curriculum will help shape the new generation
- Technical trainings for masons and engineers need to be organised on a regular basis
- Updating building section departments in urban local bodies through capacity building is a must in accordance with current issues and challenges.

### Awareness Generation

While architects have heard of alternate technologies, most developers and home builders have not and are unwilling to deviate from conventional energy and resource intensive technologies. A pull factor will be created when people demand or accept alternate technologies on par with conventional ones with respect to quality, costs and aesthetics.

- All government buildings should be built using LCCR principles to build confidence in the technology. Exposure visits to such buildings will aid.
- Benefits of LCCR concepts and existing policies promoting them in terms of social, economic and financial aspects need to be explained to local bodies.
- Capacity building of media personnel to propagate ideas of LC-CR construction and make people aware of a low carbon lifestyle. Also, they need to made aware of the options available to them as an alternative to conventional energy intensive construction techniques.

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A series of workshops were held for Policy Makers and Building Professionals in Madhya Pradesh. The workshops were part of a larger initiative that seeks to generate knowledge support for LC-CR solutions for small towns and rural spaces. The aim was to influence policies and building practices in response to imminent climate change trends and need for low carbon construction. The recommendations are culled out of these discussions and workshops.

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