Sustainable construction in Mountain Regions

a question of resources, livelihoods and climate change

- towards Atma Nirbhar Uttarakhand

DST TIMELEARN Programme, State Level Webinar

21st August, 2020, 3:00 PM to 5:00 PM

Background Note

Mountain regions are major eco-systems representing the inter-related ecology of our planet. They are a key source of water, minerals, forest and agricultural products and their stability is essential for the health of the global ecosystem. Mountain ecosystems are, however, rapidly changing and this change is being accelerated by collective impact of development. Mountain regions in India, as is commonly the case in other parts of the world, lie in disaster prone zones. While seismic activity maintains a moderate-high risk of earthquakes, cloudbursts and resulting landslides are also recurring climatic phenomena in the region. The way the built environment is planned and constructed has a big impact on the degree of damage due to these extreme natural events.

Uttarakhand Mountains are blessed with tremendous natural resources and are highly vulnerable to extreme natural events. Further, changes wrought by developmental activities and construction are threat to its eco-system stability. Construction practices in the region have been changing rapidly, mainly under the influence of cement-based practices which are perceived as stronger to resist earthquakes and longer lasting. The penetration of cement and construction practices from plains regions into the mountain regions have accelerated this change. Burnt clay bricks which are transported from kilns in the plain regions (Roorkee) are commonly used in construction. The high prevalence of non-local construction materials undermines local economy and erodes opportunities for skill development among local community. Another outcome of this trend is the steady erosion of traditional construction which had a greater awareness of local climatic needs and disaster response.

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Thus natural materials like stone slates and timber are harder to source today because of environmental regulations. Particularly in caser of timber, it is valued as an important building material, even though there is a knowledge gap in making timber based construction more disaster resistant in an affordable manner. The steady, also needs to be reversed.

The currently unfolding COVID pandemic adds another dimension to the construction scenario in mountain regions- in terms of manpower which is returning to the region. The movement of materials from the plains is also now constrained and is likely to be under continued uncertainty for some time. **This offers an opportunity to strengthen local construction systems and skills and enable self0reliance – *Atma Nirbharta* in the region and its people.** Self-reliance will come with the promotion of the right skills and technology that suited to needs and specific conditions of mountain habitat especially from the perspective of disaster resistance, response to climate change and livelihood creation.

The project **Delivery Model for Eco-Friendly Multi Hazard Resistant Construction Technologies and Habitat Solutions in Mountain States** implemented in Uttarkashi by Development Alternatives under the Department of Science and Technology (DST) TIME-LEARN programme which focuses on sustainable development in mountains provides some answers to the problems of the Mountain region and the potential to capture the opportunities today. The project introduced environment friendly building materials and hazard resistant construction systems in the region. It established a local delivery system for these products and services through group and individual enterprises. The solutions offered by the project include Stabilized Compressed Earth Blocks (SCEB) using local soil, Concrete blocks, improved stone masonry with vertical reinforcement for ductility, precast roofing elements for improved and safer RCC-based practice and Timber shingle based roofing. While all the other building materials, production technologies have been in development for many years and have been tested successfully in other regions, the introduction of *Chir* Pine shingles as a roofing material, together with the engineered trusses and chemical treatment for timber has been an indigenous effort in the region (technology development by the Forest Research Institute).

Delivery systems for these technologies has been created through building capacity of local community – women groups for SCEB, local carpenters for improved timber roofing and individual micro enterprises for the pre-fabricated construe products. The materials were introduced in the project through intensive community and market discussions. These have been assessed by a independent group of professionals (mason's ink) as having a high "localization" component thus providing evidence of a high local economy development and local resilience potential if disseminated widely and mainstreamed in public and private construction projects.

A complete **Technology Package with Options for Eco-Friendly Disaster Resistant Construction** has been developed and this would be shared at the Webinar.

The solutions implemented by the project in three demonstration buildings and the experience of engagement with local community and entrepreneurs serve bring forth lessons which can inform a larger strategy for mainstreaming sustainable construction in mountain regions. The objective of the webinar is to share these lessons as well as the technical knowledge products developed in the project. The webinar will invite views and feedback from the larger stakeholder group including policy makers, technical experts, and civil society organisations active in the region and elicit interest in promoting these systems. The deliberations at the webinar will seek to generate consensus regarding action needed on various fronts such as policy to enable efficient use of mountain resources, decision making in line with green procurement, micro-enterprise based delivery systems and building requisite capacities of mountain communities.

ISSUES THAT WILL BE ADDRESSED IN WEBINAR

- Strategies to integrate components of local economy generation and environment response in addition to disaster safety in the construction practices in district disaster management action plans.
- Strategies to develop and strengthen the supply chain of eco-friendly job creating building materials in the region.
- A way forward for timber-based construction products and services in mountain regions and policy imperatives of sustainable forest resource management for supply of timber.
- Policy imperatives and opportunities in schemes and programmes to support construction of buildings with green/sustainable materials in Uttarakhand.

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