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Title: Low-carbon building construction materials derived from traditional knowledge of Northwestern Himalayan region (IHP240003)

Abstract: Building materials like steel, cement, and concrete are the most used manufactured materials globally and core materials for the construction industry. Cement and Concrete generate 9% of Global CO₂ emissions, while steel accounts for 7% of Global CO₂ emissions. The high demand for these materials is increasing rapidly, resulting in significant greenhouse gas emissions to the atmosphere and contributing to global warming; therefore, a crucial need exists to find substitute building materials that are low-carbon and require minor processing. On the other hand, Traditional construction methods use local and environment-friendly materials with minimal processing requirements. Traditional construction technologies in any place evolved based on environment, tradition, utility, local material, and regional climate. Much experimentation and local knowledge base evolution have been tested over time. However, industrialization and urbanization changed the approach to building into an efficient, practical industry that could be more responsive to the environment. Additionally, the current standards for building materials are based on technical performance without considering their environmental impacts; therefore, using low-carbon substitute materials helps to balance the technical and environmental performances.

Primary building materials in Uttarakhand and Himachal Pradesh are wood, stone, and mud from the surroundings. Koti-Banal and Kath-Kuni construction techniques developed in the cold regions of Uttarakhand and Himachal Pradesh, respectively. Uttarakhand and Himachal Pradesh's extreme climate necessitates the building to conserve heat and disperse snow; hence, the small doors and windows, extended balconies, and steep sloped roofs appeared in traditional structures. The inherent stability, flexibility, and strength of indigenous Koti-Banal and Kath-Kuni (wood and stone) buildings make them appropriate for this earthquake-prone terrain. The technique articulates local materials systematically, making it practical and aesthetically gratifying. This research aims to revive the low-carbon building construction materials derived from traditional knowledge of North western Himalayan region. Enhancing low-carbon natural building materials in these regions would be one of the many small steps toward a carbon-neutralizing scheme.

Scope for the project are:

- To study and analyze the available traditional building materials in hilly regions of the western Himalayan region
- To test and validate the Thermal Performance of available traditional building materials
- Simplified construction details from the rural construction manuals using traditional building materials

Objective: To create a Database of available traditional building materials of the western Himalayan region for developing construction details

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