



**Politecnico
di Torino**

Honors Thesis

Master's Degree Architecture for Sustainability.

Abstract

**THE POTENTIAL OF BAMBOO IN CONTEMPORARY ARCHITECTURE FOR VULNERABLE
CONTEXTS: A RESILIENT SCHOOL MODEL FOR NEPAL.**

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The climate crisis and the increasing frequency of extreme events characterise the current “Anthropocene era,” making a profound transformation of the construction sector necessary, as it remains one of the main contributors to global CO₂ emissions.

Within this framework, the decarbonisation of the built environment is guiding contemporary debate toward low-emission design strategies, in which material selection plays a decisive role. Among emerging approaches, the use of bio-based materials represents one possible strategy to support the ecological transition. This research investigates the potential of bamboo as a construction material, emphasising its advantageous intrinsic properties, wide availability, rapid growth rate, capacity for regeneration, and low environmental impact, particularly in regions where it grows naturally.

The opportunity to experiment with its application in a real context, where bamboo is a traditionally widespread and readily available resource, was identified in Nepal, one of the countries most exposed to the effects of climate change and characterised by high vulnerability, strong seismicity, and frequent hydrogeological events.

Within this context, the project “Bamboo School” was developed: a resilient primary school designed for the international *Nepal School Project* competition and conceived as a replicable model, capable of adapting to local climatic conditions and functioning as a safe refuge during emergencies, ensuring educational continuity and community support.

The thesis is structured into two main phases: a theoretical phase, dedicated to analysing the Nepalese context, the principles of sustainability applied to architecture, and the study of bamboo as a construction material; and a design phase, in which these principles are translated into a concrete application through the development of the school building. The project submitted to the competition was subsequently revised and further refined, with particular attention to aspects related to resilience, adaptability, and sustainability.

The thesis concludes with a critical reflection on the results and future perspectives, highlighting the potential replicability of the model in other vulnerable contexts and its capacity to adapt to evolving climatic conditions.

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1) Exterior View



2) View of the internal courtyard



3) Bioclimatic section

