

## Using Bamboo to Build Sustainably

### Neri Braulin

Architect  
EMISSIONIZERO Association,  
Milano, Italy  
[neri@emissionizero.net](mailto:neri@emissionizero.net)

Neri Braulin born 1942, obtained his degree in Architecture from University Institute of Architecture of Venice (I.U.A.V.). He is responsible for the bioarchitectural planning and development at EMISSIONIZERO. He is also Professor of Technology of Architecture at the Politecnico di Milano

### Valeria Chioetto

Founder and President  
EMISSIONIZERO  
Milano, Italy  
[emissionizero@emissionizero.net](mailto:emissionizero@emissionizero.net)

Valeria Chioetto, born 1956, is a social psychologist. She has a degree in Philosophy and is Post-Graduate in Psychology, both from Università degli Studi di Milano. Since 2000 she leads the non-profit EMISSIONIZERO Association

### Mario de Miranda

Consulting Engineer  
*Studio DE MIRANDA Associati,*  
Milano, Italy  
[mdm@demiranda.it](mailto:mdm@demiranda.it)

Mario de Miranda, born 1954, obtained his Civil Engineering degree from the Politecnico di Milano. As a Partner of Studio de Miranda Associati - Consulting Engineers, he is experienced in the design and construction of large bridges and structures. He is also Professor of Structural Design at the University of Venice - IUAV

## Summary

Bamboo is a traditional building material in tropical areas of the world where it grows in large amounts. The physical characteristics of bamboo make this highly renewable material suitable for solving a number of problems of sustainable building, mainly in the civil and infrastructural sectors as it can provide a lightweight structural member used for supporting buildings. In recent years, bamboo has received new attention as a substitute of wood and steel in several building projects. Innovative technological and engineering developments now make it possible to use bamboo for public infrastructures as well as roadway bridges construction. The aim of the paper is to demonstrate the feasibility and convenience in many situations of such infrastructures by means of some practical issues taken from the experiences of the authors like: the presentation of design concepts and construction-maintenance techniques; the illustration of the results of recent research developed in Italy on the layout and strength of structural joints; the description of some recent structures built by applying the aforementioned concepts.

**Keywords:** sustainable constructions, bamboo structures, green building, renewable building materials, bridge engineering, laminated bamboo, bamboo joints, bamboo preservation treatments

## 1. Introduction

For thousands of years bamboo has been used for the manufacture of small artefacts as well as for home building, suspended bridges, and scaffolding. As a construction material it has a history and tradition. It is not new or modern, but rather a very ancient material that was just recently rediscovered for a new and broader spectrum of applications, as people in modern society have begun to ask questions about the ecological sustainability of conventional building materials.

One such application is as a construction material for residential dwellings and infrastructure in developing countries. Bamboo:

- Grows rapidly in tropical regions and can be harvested in five years
- It can be worked on with simple tools
- It is easily separated into light-weight elements that can be transported by hand
- Minimizes the need for machinery and transportation

In summary, this material is ideal for an economic construction, and for do-it-yourself-construction by single owner/builders, or by small organizations. Finally, besides being practical and economical, bamboo offers good structural characteristics with some high-performance features that