



Living Root Bridges: State of knowledge, fundamental research and future application

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Abstract

Living root bridges are *Ficus elastica*¹ based suspension bridges within dense tropical rainforests of Meghalaya in the North Eastern Indian Himalayas (25° 30' N and 91° 00' E). Ranging in span from 15 feet to 250 feet, these bridges are grown by Khasi² tribes over a time period of 15 to 30 years, and last for several centuries. With 1) exceptional robustness³ under extreme climatic conditions, 2) minimal material and maintenance cost, 3) no environmental damage, 4) progressive increase in load-bearing capacity, 5) carbon sequestration, 6) remedial properties on surrounding soil, water and air, 7) collective grass root involvement based on human-plant interaction across multiple generations, 8) support to other plant and animal systems, and 9) keystone⁴ role of *Ficus* plant species in local ecology, living root bridges offer an extraordinary model for long-term socio-ecological resilience⁵ and sustainable infrastructure solutions, and warrant further scientific study.

Keywords: *Ficus*; living root bridges; biological systems; resilience; robustness; redundancy; sensitive environments; developing economies; collaborative approaches; human-plant interaction.

1 Introduction



Figure 1. Location diagram of living root bridges

The indigenous Khasi tribes of Meghalaya in the North Eastern Indian Himalayas exemplify a unique relationship with their environment. Demonstrating a high degree of self-sufficiency, which in part is owing to their remote location and distinctive environment⁶, Khasis have developed numerous sustainable practices based on collective and planned cooperation. One such practice is the 'living root bridge'. Locally known as *jing kieng jri*, this indigenous technology uses the aerial roots of *Ficus elastica* to grow bridges ranging in spans from 15 feet to 250 feet over a time period of 15 to 30 years. Situated in heavily forested and wet places, which are prone to unexpected environmental disturbances, the underlying growth process of these plant-based structural systems involves nurturing the aerial roots of *Ficus elastica*, and guiding them across deep gorges and rivers. The supporting