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Soil bioengineering measures for disaster mitigation and environmental restoration in Central America: authochtonal cuttings suitability and economic efficiency

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The use of Soil Bio-Engineering techniques in Developing countries is a relevant issue for Disaster mitigation, environmental restoration and poverty reduction. Research on authochtonal plants suitable for this kind of works and on economic efficiency is essential for the divulgation of this Discipline. The present paper is focused on this two issues related to the realization of various typologies of Soil Bio-engineering works in the Humid tropic of Nicaragua.
In the area of Río Blanco, located in the Department of Matagalpa, Soil bio-engineering installations were built in several sites. The particular structures built were: drainages with live fascine mattress, a live palisade, a vegetated live crib wall for riverbank protection, a vegetative covering made of a metallic net and biotextile coupled with a live palisade made of bamboo. In order to evaluate the suitability of the various plants used in the works, monitorings were performed, one in the live palisade alongside an unpaved road and the other on the live crib wall along a riverbank, collecting survival rate and morphological parameters data. Concerning the economic efficiency we proceed to a financial analysis of the works and once the unit price was obtained, we converted the amount in EPP Dollars (Equal Purchasing Power) in order to compare the Nicaraguan context with the Italian one.
Among the used species we found that Madero negro (Gliricidia sepium) and Roble macuelizo (Tabebuia rosea) are adequate for Soil-bioengineering measure on slopes while Helequeme (Erythrina fusca) reported a successful behaviour only in the crib wall for riverbank protection.
In the comparison of the costs in Nicaragua and in Italy, the unit price reduction for the central American country ranges between 1.5 times (for the vegetative covering) and almost 4 times (for the fascine mattress) if it's used the EPP dollar exchange rate.
Thus, a conclusion can be reached with regard to hydrological-risk mitigating actions performed on a basin scale and through naturalistic techniques: not only are they technically attainable, even in hardship areas (by maximizing the contribution of the local labor force and minimizing the use of mechanical equipment), but they are also economically sustainable.