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MOPAN AND QUE'CHI MAYA ECOLOGICAL ENGINEERING: DESIGN STRATEGIES FOR SUSTAINABLE ECOSYSTEM RESTORATION AND HUMAN SUBSISTENCE

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ABSTRACT Many indigenous groups traditionally manage local ecosystems to provide for familial needs while protecting their surrounding environment, and such practices can aid in understanding efficient and sustainable ecosystem design strategies. The Mopan Maya of southern Belize practice an agroforestry system that conserves the surrounding rainforest while utilizing natural forces to drive change through nine distinct successional stages, including three herbaceous, two shrub, and four forest stages. This study presents Mopan traditional ecological knowledge (TEK), quantitatively describes the plant community and associated soil ecology of successional stages, and documents traditional knowledge regarding the immediate use of plant species and those useful for soil fertility enhancement. Woody plant diversity increases during successional stages, and surpasses that of primary forest. In all stages, traditional farmers use over 95% of available plant species for food, medicine, raw materials, and natural biocides. Over 90% of woody plant species present in fallow stages are traditionally thought to enhance soil fertility. Soil nutrients increase with succession and time since intentional burn, nutrient and soil macrobiotic activity in shrub and forest stages relate to the presence of managed plants, indicating engineered soil modification. Such effects on biodiversity and soil ecology, coupled with agricultural productivity, indicate Mopan TEK offers tools to provide for familial needs while concurrently promoting a biotically varied rainforest ecosystem. As Mopan techniques originate in highland areas, their success in lowland forests after migration over a century ago provides an example of potential applicability and adaptability of such design strategies in regional conservation and restoration efforts.

Keywords: ecological engineering; succession; traditional ecological knowledge; local ecological knowledge; indigenous; agroforestry; plant community; soil ecology; macrobiotic activity; Mesoamerican Biological Corridor