

Carbon-Negative Development Pathways of Bhutan, Suriname, and Panama: A Comparative Review of Policy Strategies and Lessons for Developing Nations

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Abstract:

The growing urgency of the climate crisis has further emphasized the need for development models that can balance economic development and environmental sustainability. Although many countries are working towards carbon neutrality, only a few developing countries have achieved or are close to carbon negativity. This research comparatively examines the carbon development models of Bhutan, Suriname, and Panama between 2020 and 2025 in terms of forest cover, carbon balance, renewable energy mix, governance structure, and economic structure.

Through a qualitative comparative approach based on secondary data from global climate reports, country-level policy documents, and economic statistics, this research assesses the interaction between ecological resources and governance structures in determining the carbon performance of countries. The results show that high forest cover, hydropower dominance, and effective environmental governance are important factors in lowemission performance. The carbon negativity of Suriname is mainly because of its vast natural forest resources, the sustainability model of Bhutan is sustained by its constitutional protection of forests and integration of renewable energy, and Panama is following a policy-led transition to carbon neutrality in a service economy.

The comparative analysis shows that a sustainable low-carbon transition is not only driven by ecological resources but also by institutional dedication and economic systems. The conclusion of the study highlights transferable policy lessons for developing countries, focusing on the legal integration of environmental protection, the priority of renewable energy, and the economic diversification of developing countries for a climateresilient transformation.