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Sustainability of integrated land and water resources management in the face of climate and land use changes

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Sustainable development integrates economic development, social development, and environmental protection. Land and Water resources are under severe pressure from increasing populations, fast development, deforestation, intensification of agriculture and the degrading environment in many part of the world. The demand for adequate and safe supplies of water is becoming crucial especially in the overpopulated urban centers of the Caribbean islands. Moreover, population growth coupled with environmental degradation and possible adverse impacts of land use and climate change are major factors limiting freshwater resource availability. The main objective of this study is to develop a hydrological model and analyze the spatiotemporal variability of hydrological processes in the Caribbean islands of Puerto Rico and Jamaica. Physically based eco-hydrological model was developed and calibrated in the Rio Grande Manati and Wag water watershed. Spatial distribution of annual hydrological processes, water balance components for wet and dry years, and annual hydrological water balance of the watershed are discussed. The impact of land use and climate change are addressed in the watersheds. Appropriate nature based adaptation strategies were evaluated. The study will present a good understanding of advantages and disadvantages of nature-based solutions for adapting climate change, hydro-meteorological risks and other extreme hydrological events.