

## ABSTRACT

### Ecosystem Services Approaches for Natural Resource Planning and Management in Trinidad and Tobago

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Mainstreaming ecosystem services into decision-making has the potential to resolve very difficult and often contentious questions around the use and management of natural resources, and for helping decision-makers to optimize land use options while sustainably managing ecosystems. However, this is more of an ideal rather than practice, and there is a lacuna of empirically based evidence of how to achieve ecosystem service mainstreaming.

This dissertation elucidates lessons on the process of mainstreaming ecosystem services (ES) into decision-making drawn from a case study of the use of ecosystem service approaches for informing natural resources planning and decision-making in Trinidad and Tobago in the Caribbean. Two important lessons emerging from the case study are that incomplete biophysical datasets do not preclude the development of ecosystem services' information to support decision-making. The second lesson is that mainstreaming ES into national level decision-making processes require both top-down and bottom-up interventions and the participation of at least a 'policy champion', statutory agency, researchers, and an interested public stakeholder group (ES beneficiary). The lessons were derived from assessment of the process

of engaging the national authority on planning for Trinidad and Tobago, in the uptake and use of ES maps and modelling processes. Erosion regulation ecosystem service maps were produced for the Northern Range, Trinidad, and ecosystem service modelling was used to estimate the potential ecological benefits of riparian restoration in the Caura-Tacarigua watershed, Trinidad - retention of sediments, nitrates and phosphates, and subsequent reduction inflows of these into the Caura-Tacarigua River. The erosion regulation service provided by natural vegetation was found to be greatest in the upper parts of the NR watersheds, and natural vegetation on very steep slopes (30 – 50 degrees) reduces potential erosion by as much as 95%. Riparian vegetation can potentially reduce sediment and nutrient inputs into streams by as much as 50% and 22% respectively for a riparian buffer zone of 90m in width. The modelling produced information on trends which the Town and Country Planning Division (TCPD) felt were adequate for land planning and for supporting the implementation of the National Spatial Development Strategy (NSDS) and the National Forest Policy, the revision of the Hillside Development Policy, and for planning the development of the North Coast Growth Pole.

Lessons on mainstreaming were also derived from assessment of the process by which a global ecosystem services project supported the mainstreaming of ES into national level and local level decision-making processes.

Keywords: Ecosystem services mainstreaming; InVEST; ecosystem service modelling and mapping; community-based natural resource planning; ecosystem based planning.