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Preface

Global climate and land use change caused by the activities of 7.3 billion humans are directly or indirectly affecting all parts of our planet. The loss of biodiversity and extinction of species is well documented as landscapes are converted to meet human needs. Climate change resulting from increasing concentrations of CO₂ and other greenhouse gases in the atmosphere is warming our planet, with glaciers in retreat, islands and coast lines threatened by sea level rise, droughts becoming more intense and longer-lasting, wildfires more frequent and larger, and fresh water supply stressed because of reduced mountain snowpack, higher evaporation, and poor management practices around the world.

We face significant challenges in addressing these and other negative impacts of climate and land use change. Scientific understanding of these processes is key to our response, as we learn to adapt to, and mitigate these global changes. New science-based tools and good governance will allow us to undertake the necessary steps to manage lands for the benefit of all while not sacrificing biodiversity, forest, water, and other natural resources of our planet.

At the Smithsonian Tropical Research Institute (STRI) we strive to understand and sustain a biodiverse planet. Researchers at STRI study terrestrial and marine environments in the present and the past, work from the scale of molecules to ecosystems, and conduct research in both theoretical and practical realms. We educate children and the public in general, mentor students, collaborate with scholars, and make our science relevant and available to decision makers. The Agua Salud Project is a STRI led effort to understand ecosystem function in the provision of a diverse suite of ecosystem services produced by seasonally moist forests and how these services change with land use and climate change. We participate in the Environmental Leadership Training Initiative (ELTI), a program based at the School of Forestry & Environmental Studies at Yale University (Yale FES) that is designed to bring the best science to landscape management decision makers.

STRI hosted a two-day conference in Panama in 2014 under the auspices of ELTI and the PRORENA project (a collaboration between STRI and Yale FES with the goal of understanding the barriers to reforestation with native tree species) in collaboration with the Biodiversity and Ecosystem Services Program of the Inter-American Development Bank. The conference highlighted new science and policy developments for watershed management in the stepland Neotropics: an area of important cultural heritage and biodiversity that is under intense economic and climate and land use change pressure.

The conference:

- identified advances in science, governance, and landscape management that are focused on the needs of residents in the steepland Neotropics;
- presented research at selected sites that addresses fundamental questions related to the provision of fresh water and interactions with other ecosystem services;
- described novel approaches to employing economic incentives to improve management that are now moving beyond pilot stages to larger scale implementation;
- provided examples of where and how good governance is advancing.

This report synthesizes the results of the conference and includes recent research and practices related to watershed management in the region. It provides a biophysical understanding of ecosystem function for key land uses in the area, summarizes ecosystem services, addresses the implications of climate and land use change, and provides socio-economic foundations of ecosystem services and advances in the region. The report presents a road map for improving watershed management and provides selected case studies to illustrate examples of where advances are being made.

I thank Michele Lemay and her team at the Biodiversity and Ecosystem Services Program of Inter-American Development Bank for their efforts to advance management and policy and base it on the best available science. I am grateful to PRORENA and ELTI – particularly Jefferson Hall, Jacob Slusser, and Saskia Santamaria – for their efforts in organizing an informative and innovative conference. I congratulate all of the authors and contributors for their efforts in writing a first of its kind report describing the foundations of, and highlighting the best practices in watershed management in the region. Lastly, special recognition goes to Jefferson Hall, Vanesa Kirn, and Estrella Yanguas, for their efforts in producing this important new e-book.

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