

Science and Technology Group Annual Report FY2016

Payal Shah
Science and Technology Associate

1 Introduction

My research focuses on issues of environmental conservation and sustainability of natural resources. I use economic theory and statistical methods, combined with tools from ecology and biogeography, to evaluate the impact of conservation policies and to develop optimal strategies for conservation efforts in the face of environmental and economic uncertainties. Recently, I have also ventured into using contingent valuation methods to quantify the willingness of people to support and fund conservation efforts. I am also working with members of the OKEON (Okinawa Environmental Observatory Network) project established at OIST to use remote sensing data to track the effects of land use patterns on the local terrestrial and marine environment.

2 Activities and Findings

Determinants and Implications of Global Protected Area Effectiveness

Establishing protected areas is a cornerstone of global conservation policy targeted at preservation of species, ecosystems and in adapting to and mitigating the impacts of climate change. Protected areas are important for conservation, but only if they are effective in protecting land from degradation and conversion. We use a high resolution global data of forest cover loss from 2000 to 2012 to understand the determinants and implications of the effectiveness of global protected areas established between 2000 and 2012 (Hansen *et al.* 2013). We use matching methods that we developed in Shah and Baylis (2015) to estimate the heterogeneity in the effect of protection on forest cover loss by country. In figure 1a, we show the preliminary results for

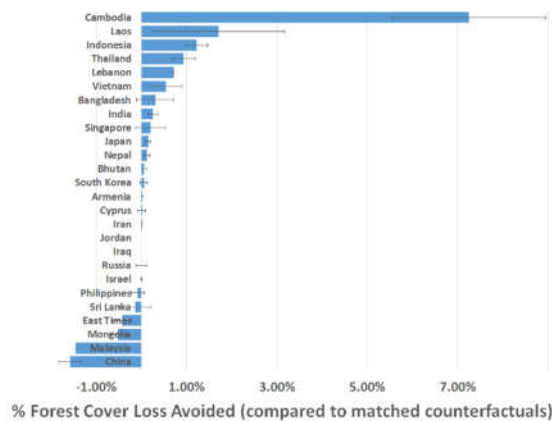


Figure 1a: Asia Protected Area Effectiveness Estimates

with park effectiveness. We also evaluate how gap analyses of protection provided by the new protected areas change when we consider the effectiveness estimates. In figure 1b, we provide a snapshot of one such cost-benefit analyses for Asia in which we map the country level protected areas effectiveness estimates against the mammal biodiversity that the new protected areas represent and the opportunity cost of establishing these protected areas.

protected area effectiveness for Asian countries. In ongoing work, we use linear regressions and regression trees to determine the relationship between these country level effectiveness estimates and a range of demographic and economic indicators to understand what factors are associated

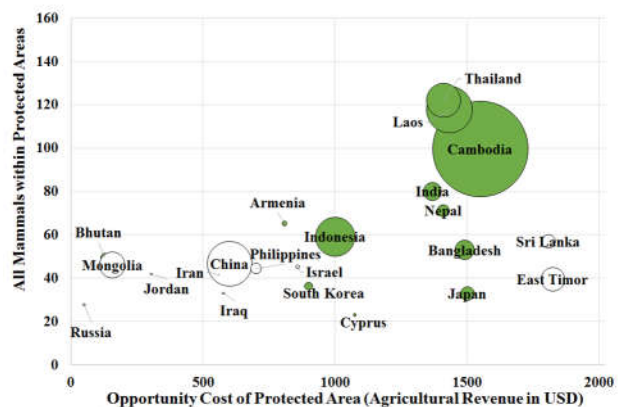


Figure 1b: Opportunity Costs vs. Biodiversity Benefits of Asian Protected Areas with Impacts

3 Collaborations

- Choice experiment survey of Okinawa's marine environment

Collaborators: Paulo A.L.D. Nunes, Global Coordinator of ProEcoServ, United Nations
Assistant Professor Sahan Dissanayake, Colby University

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Professor Yoko Fujita, University of Ryukyus

- Watershed modeling for identifying terrestrial “hot spots” that impact coral reefs in Okinawa

Collaborators: Assistant Professor Evan Economo, Okinawa Institute of Science and Technology Graduate University, Japan

Kenneth Dudley, GIS and Remote Sensing Technician, Okinawa Institute of Science and Technology Graduate University, Japan

- Optimal conservation planning and climate change uncertainty

Collaborators: Professor Amy Ando, University of Illinois at Urbana-Champaign

Associate Professor Mindy Mallory, University of Illinois at Urbana-Champaign
Glenn Guntenspergen, Research Ecologist, United States Geological Survey

- Global deforestation and protected areas

Collaborators: Associate Professor Kathy Baylis, University of Illinois at Urbana-Champaign

Jonah Busch, Senior Research Fellow, Center for Global Development

Jens Engelmann, Phd Candidate at the University of Wisconsin

- Economic drivers of changes in deforestation near protected areas

Collaborators: Professor Don Fullerton, University of Illinois at Urbana-Champaign

Associate Professor Kathy Baylis, University of Illinois at Urbana Champaign

4 Publications and other output

4.1 Peer Reviewed Publications

- Ando, Amy, W. and Shah, Payal. 2016. The Economics of Conservation and Finance: A Review of the Literature. *International Review of Environmental and Resource Economics*, 8(3–4), 321-357. <http://dx.doi.org/10.1561/101.00000072>
- Shah, Payal and Ando, Amy W. 2016. Permanent and Temporary Policy Incentives for Conservation under Stochastic Returns from Competing Land Uses. *American Journal of Agricultural Economics*, 98(4), 1074-1094.

4.2 Book Chapter

- Shah, Payal, Dissanayake, Sahan, T.M., Carlson, Nils, Fujita, Yoko, and Nunes, Paulo A.L.D. 2017. Preferences for marine protection in Okinawa: A comparison of management options and two groups of beneficiaries. *Forthcoming in Handbook on the Economics and Management for Sustainable Oceans, UN Environmental Programme and Edward Elgar Publishing House, UK*

4.3 Oral Presentations

- November 2016: “Evaluating Conservation Effects of Forest Protection in Indonesia”. Invited Seminar at Kyushu University, Japan.
- February 2017: “A brief introduction to environmental economics: policy design, risk management and impact evaluation” given at the STG Research Colloquium, Okinawa Institute of Science and Technology Graduate University, Okinawa, Japan.
- November 2016: “Environmental Economics” given at the Kyushu University-OIST Women Scientists Networking Workshop held at Kyushu University, Japan.
- June 2016: “Evaluating heterogeneous conservation effects of forest protection in Indonesia” (with Kathy Baylis) given at the Conservation Asia 2016 Conference, Singapore.