TNC_TRAINING_MATERIALS
(on USBs)

- InVEST Installer Package
  - InVEST_3_0_0_x86_Setup.exe
- InVEST Permitting Exercise (for this morning)
  - InVEST_permitting_3_24_14.zip (Unzip to your computer)
- RIOS Installer Package
  - RIOS_1.0.0b9_x86_Setup.exe
- RIOS Sample Data Package
  - rios_1.0.0b9_sample_data.zip (Unzip to your computer)
- Rios Exercise (for tomorrow)
  - Rios_Blanco_exercise.zip (Unzip to your computer)
- Eastern Division Data
  - GET FROM ANALIE or MARGARET or ERIK

VALUING ECOSYSTEM SERVICES:

INTRODUCTION TO THE NATURAL CAPITAL PROJECT

Adrian Vogl and Brad Eichelberger
TNC Eastern Division Training
April 29-30, 2014

WHAT IS NATCAP?

natural capital PROJECT

Advance science of ecosystem services

Create user-friendly approaches & tools

Build and tell success stories

Get information about natural capital into decisions

Make decisions with better outcomes for people and nature

natural capital PROJECT

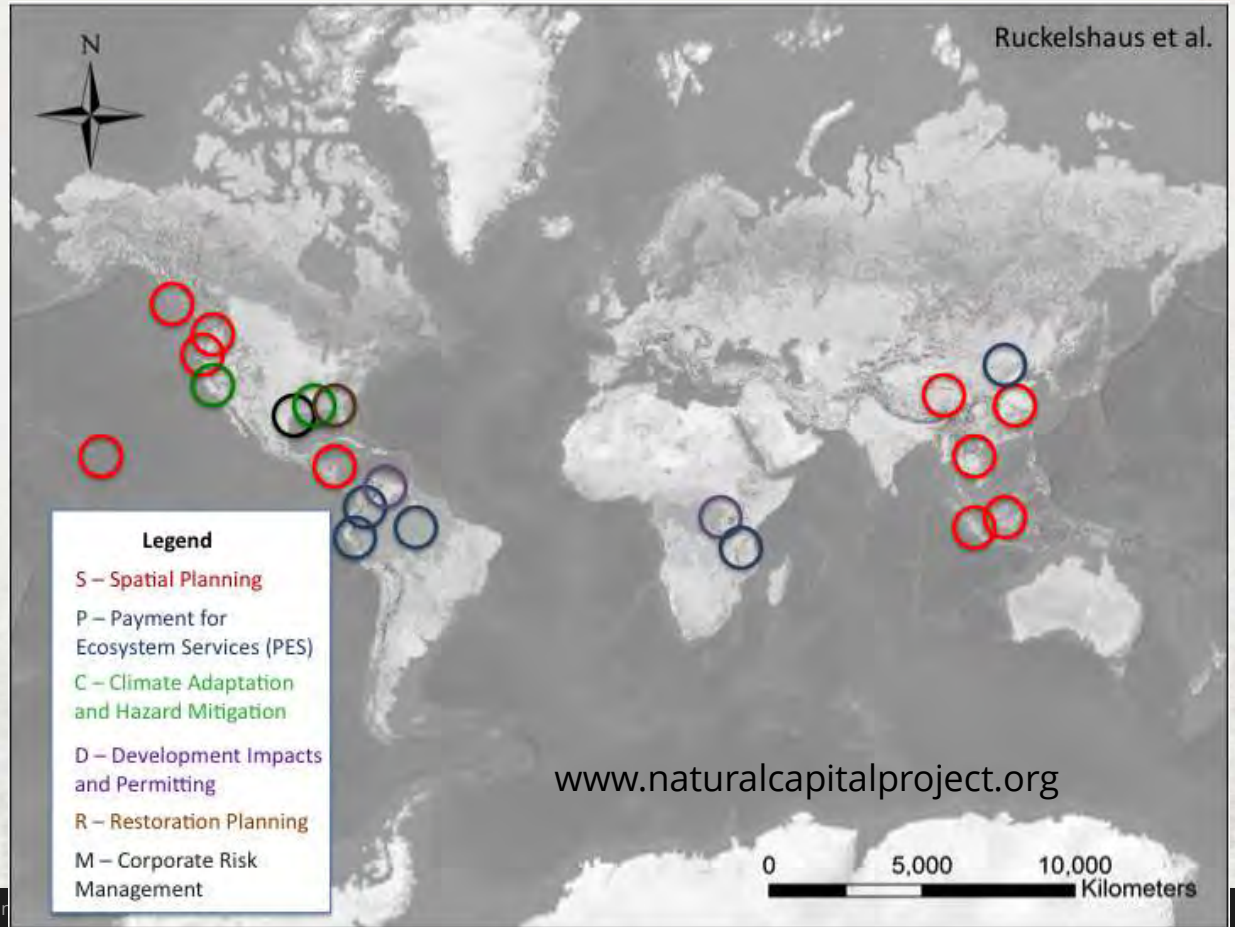
Woods Institute for the Environment Stanford University

WWF

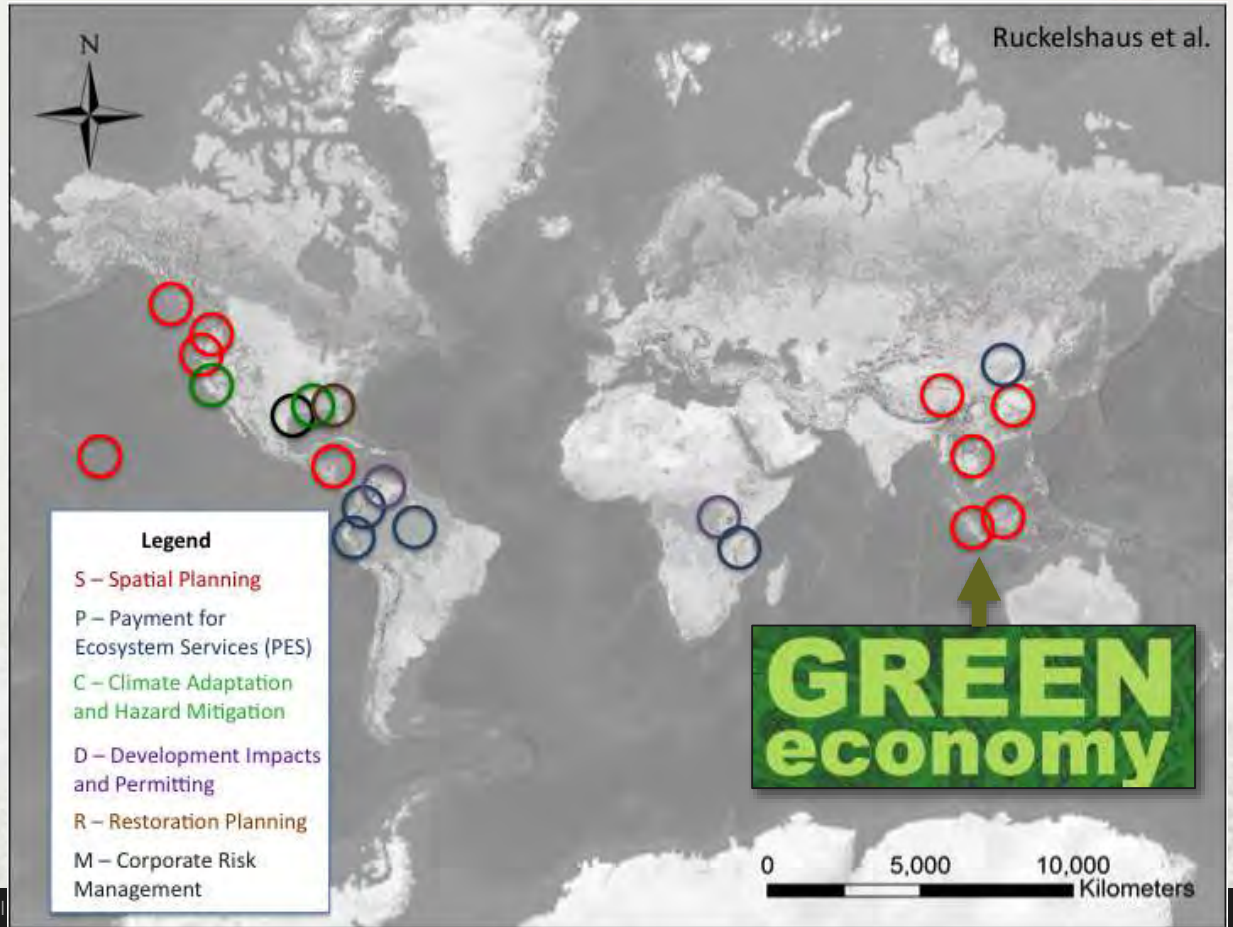
The Nature Conservancy

Institute on the Environment University of Minnesota Driven to Discover

VALUING NATURE IN DECISIONS

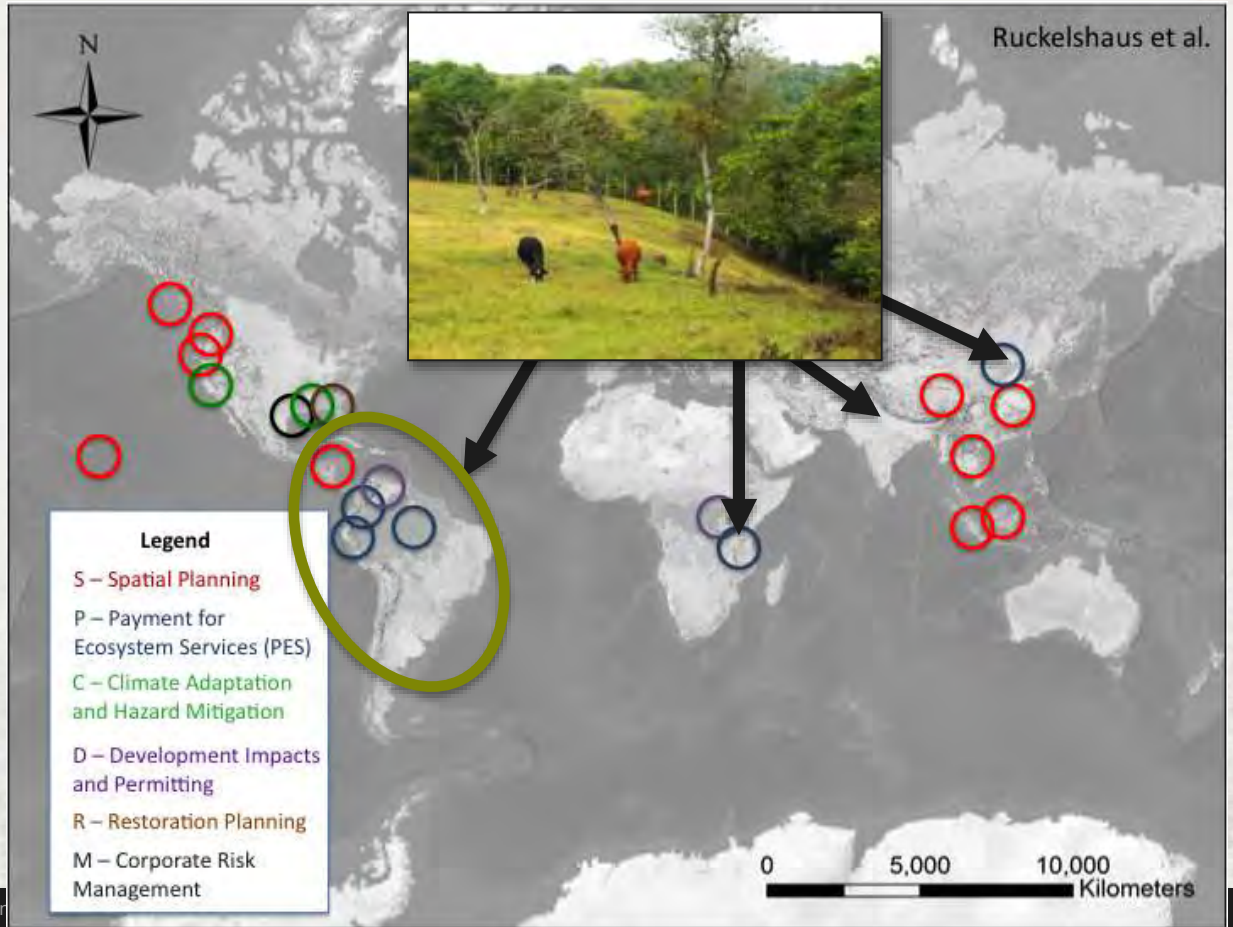


POLICIES TO PROMOTE GREEN GROWTH



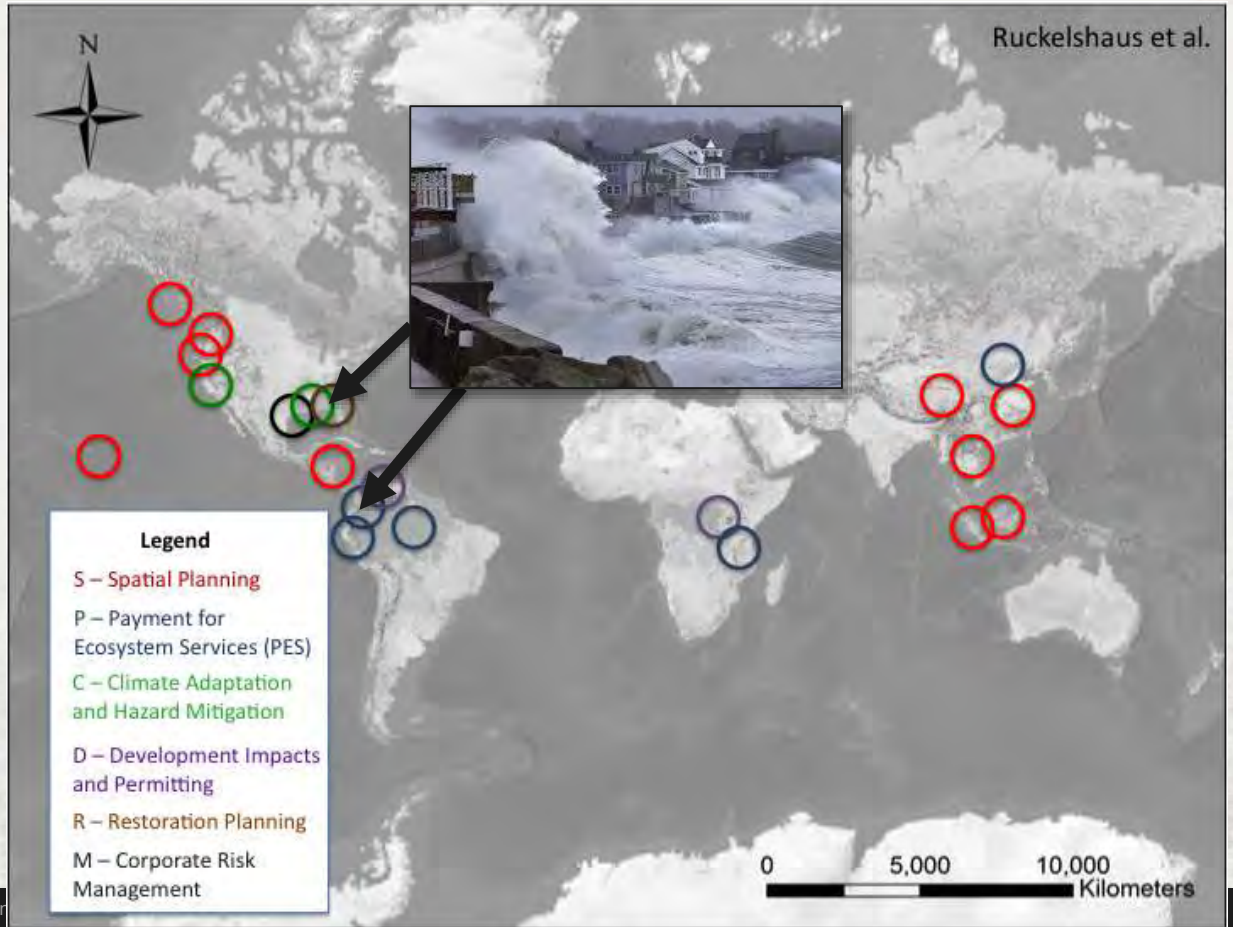
COOPERATION FOR SPATIAL PLANNING

DESIGNING EFFICIENT INCENTIVES

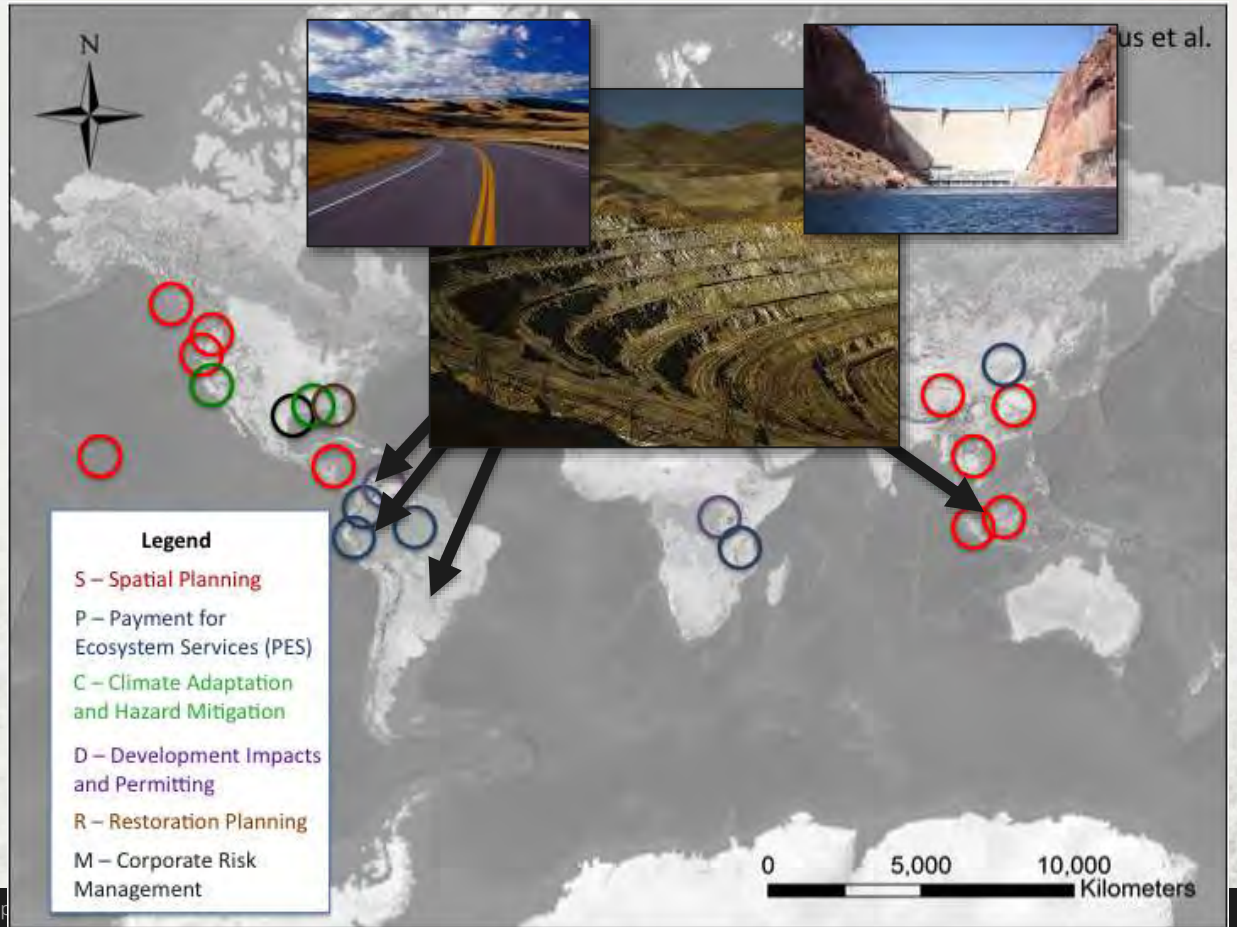


ADAPTING TO CLIMATE CHANGE

natural capital PROJECT



MEETING DEVELOPMENT SAFE-GUARDS



NATURAL CAPITAL ACCOUNTING

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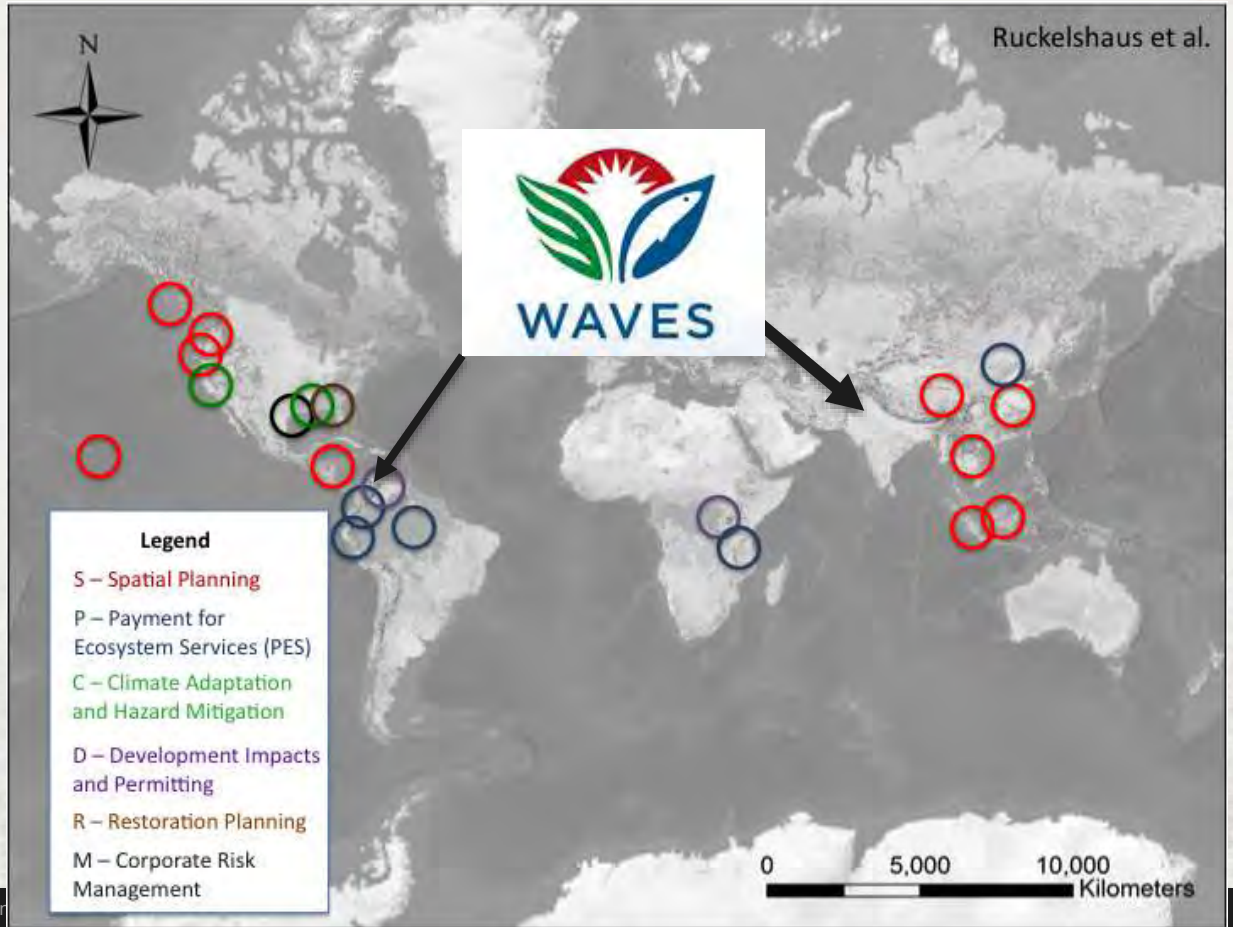


THE NATURAL CAPITAL APPROACH:
TOOLBOX

natural capital PROJECT

InVEST
integrated valuation of environmental services and tradeoffs

RIOS
resource investment optimization system

InVEST Scenario Modeler, Helper Tools



http://naturalcapitalproject.org/InVEST.html

WHY INVEST/ RIOS?

- Applicable across the globe
- Requires easily-available data
- Flexible scale
- Relevant to many kinds of decisions
- Biophysical and economic outputs
- Allows multi-service assessment
- Considers landscape context

INVEST MODEL STRUCTURE

RECENT ADVANCES

- Freely available – 3.0 Framework ArcGIS-independent
- Uncertainty assessment (carbon model)
- Helper tools, Batch scripting
- Scenario generating tools
- Active development community

INVEST MODELS - TERRESTRIAL

Biodiversity: habitat quality

Water yield for hydropower production

Erosion control: reservoirs and WQ

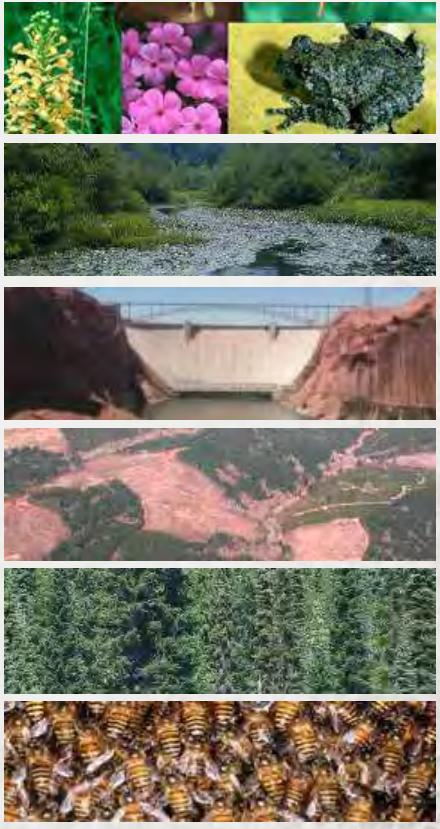
Water purification: nutrient retention

Carbon sequestration & storage

Managed timber production

Crop pollination

Coming Soon – Agricultural Production



IMPROVING INVESTMENT OPTIONS WITH RIOS

- Shows where you can get best results for ***multiple goals*** AND where it is ***practical*** to work

- Can address ***physical realities***, ***feasibility***, and ***cost effectiveness***

- A method that is ***robust*** and ***replicable*** with local capacity

CASE STUDY 1

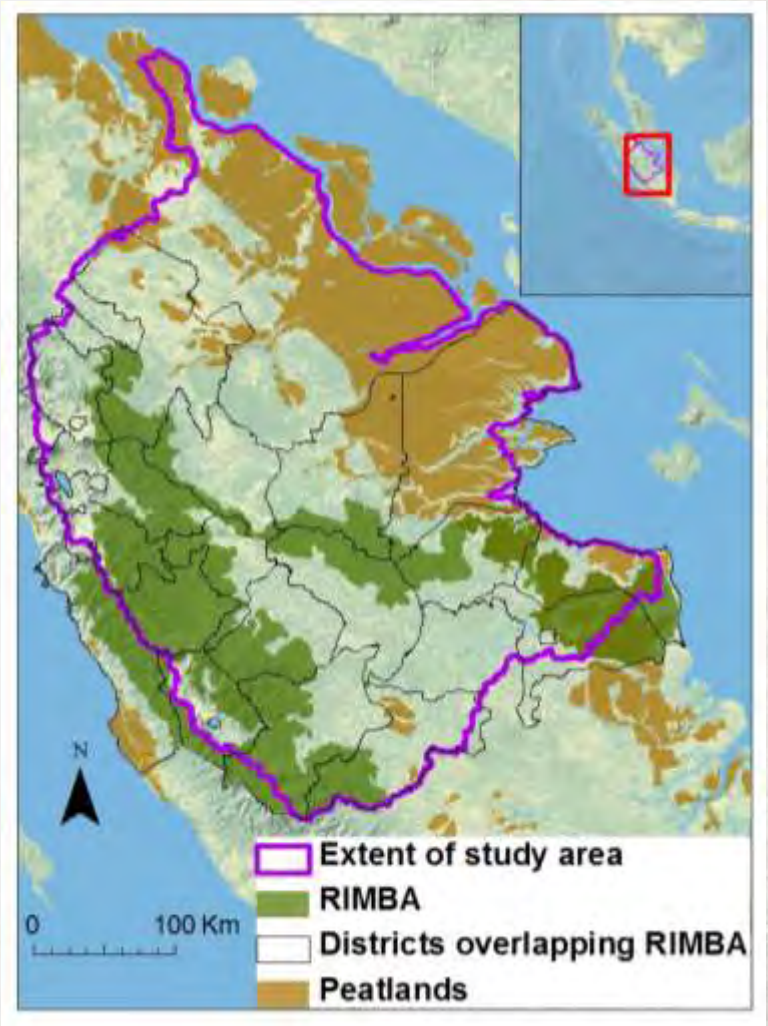
Spatial Planning and Green Growth in Sumatra

WINDOW OF OPPORTUNITY FOR DEVELOPMENT PLANNING IN SUMATRA

- High deforestation rates threatening Sumatra's high biodiversity, vast carbon stocks in forests and peat soils, local services
- Multi-level commitments to reduce carbon emissions, protect remaining forests, funding for REDD projects in Indonesia
- WWF and NatCap partnered with govt agencies and local NGOs to produce recommendations for development planning based on ecosystem services mapping and assessment

PROJECT GOALS

- Guide pilot investments in priority programs:
  - Forest carbon projects
  - Watershed services schemes (including payments)
  - Best management practices for plantations and forestry
  - Forest & habitat restoration



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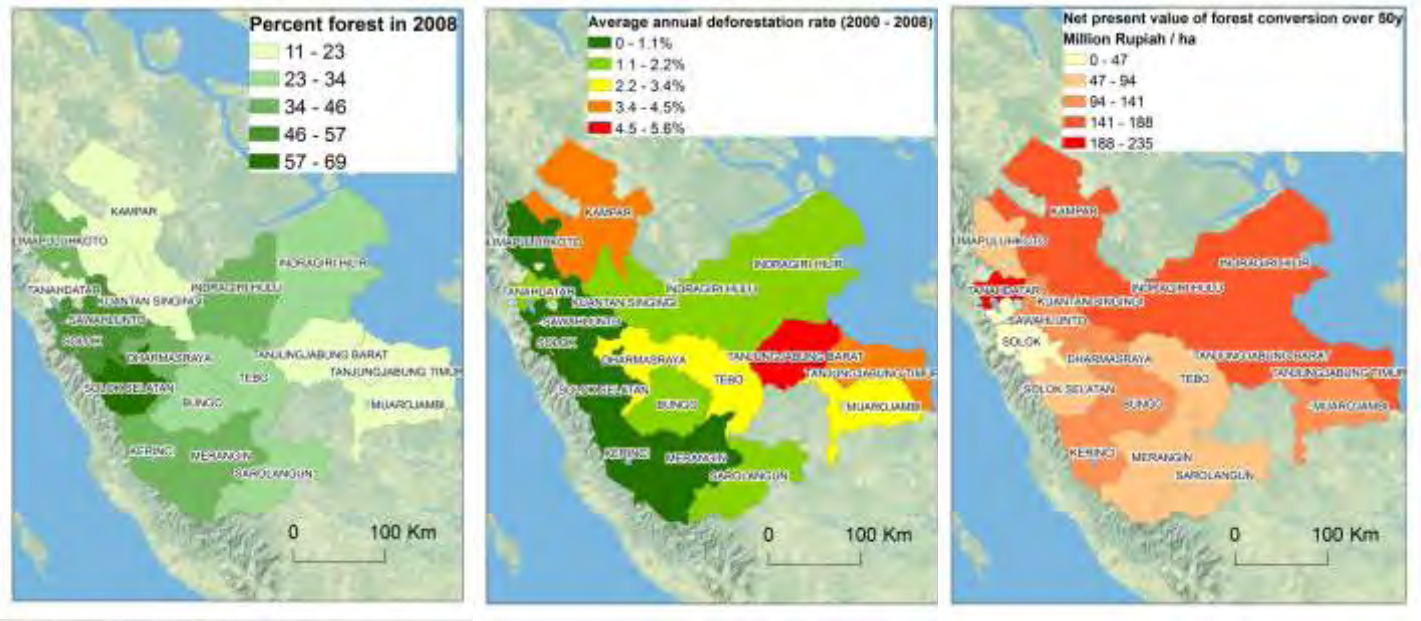
DEFORESTATION AND RETURNS FROM FOREST CONVERSION

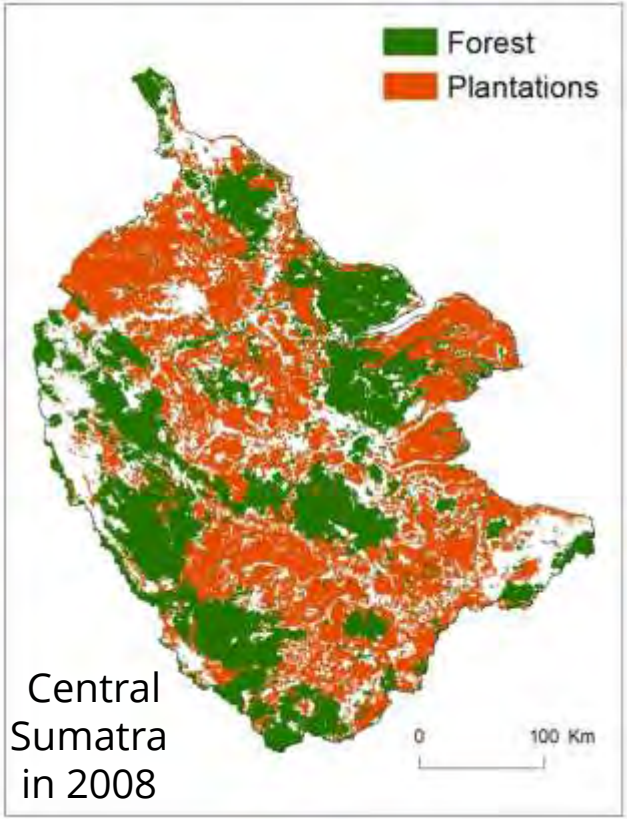


Percent forested in 2008

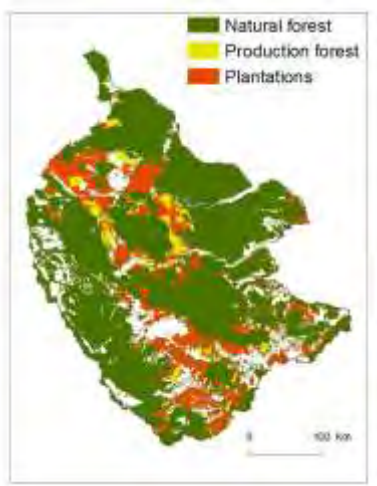
Av. annual deforestation rate (2000-2008)

Av. expected agricultural returns to forest conversion over 50 years (million Rp / ha)

SCENARIOS

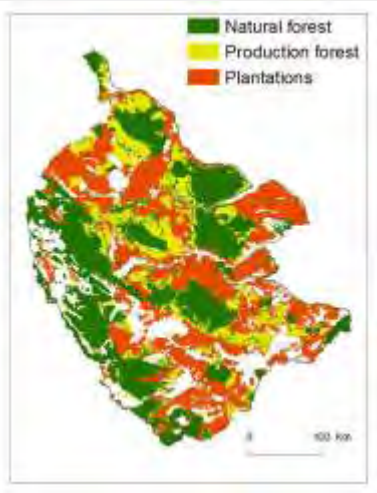


Central Sumatra in 2008



Sumatra Ecosystem Vision

(60% more forest than 2008)

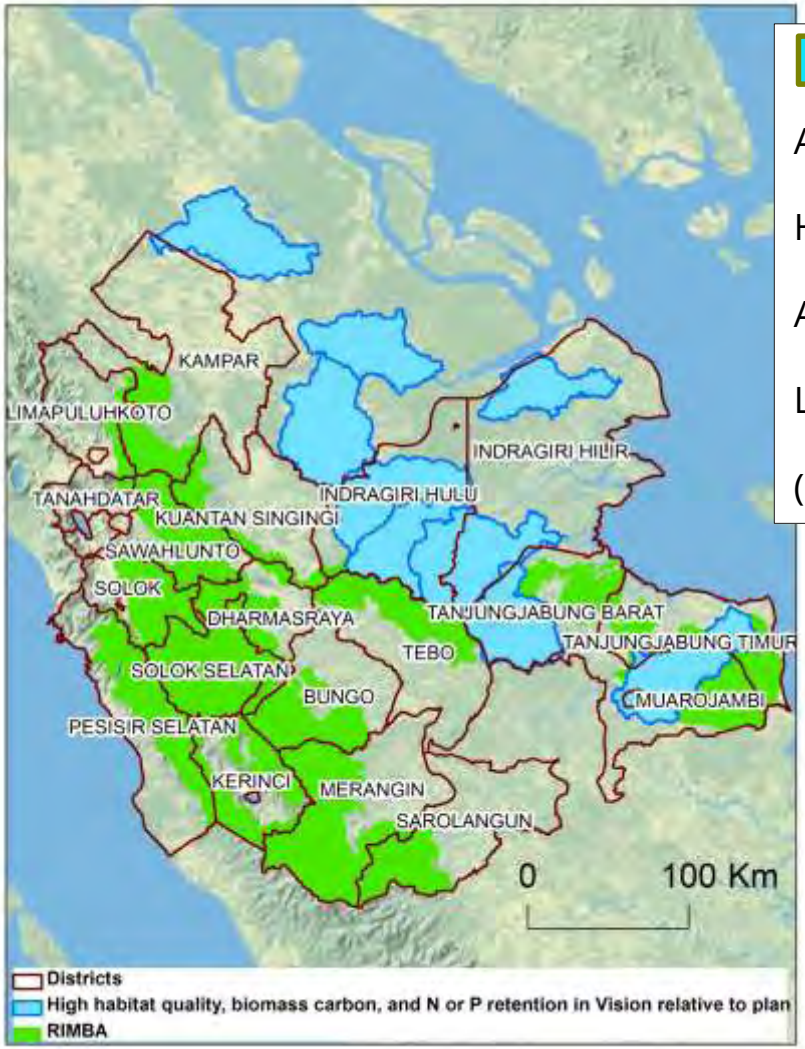


Government spatial plan

Same natural forest as 2008 (but likely worse)

ANALYSES

- Distribution in 2008, and changes under scenarios, of:
  - Habitat quality for tigers
  - Services
    - Carbon storage and sequestration
    - Water yield
    - Sediment retention
    - Nutrient retention (N and P)
- Where are cost-effective investments in ecosystem services possible?



High habitat quality increase

AND

High *biomass* carbon stock increase

AND

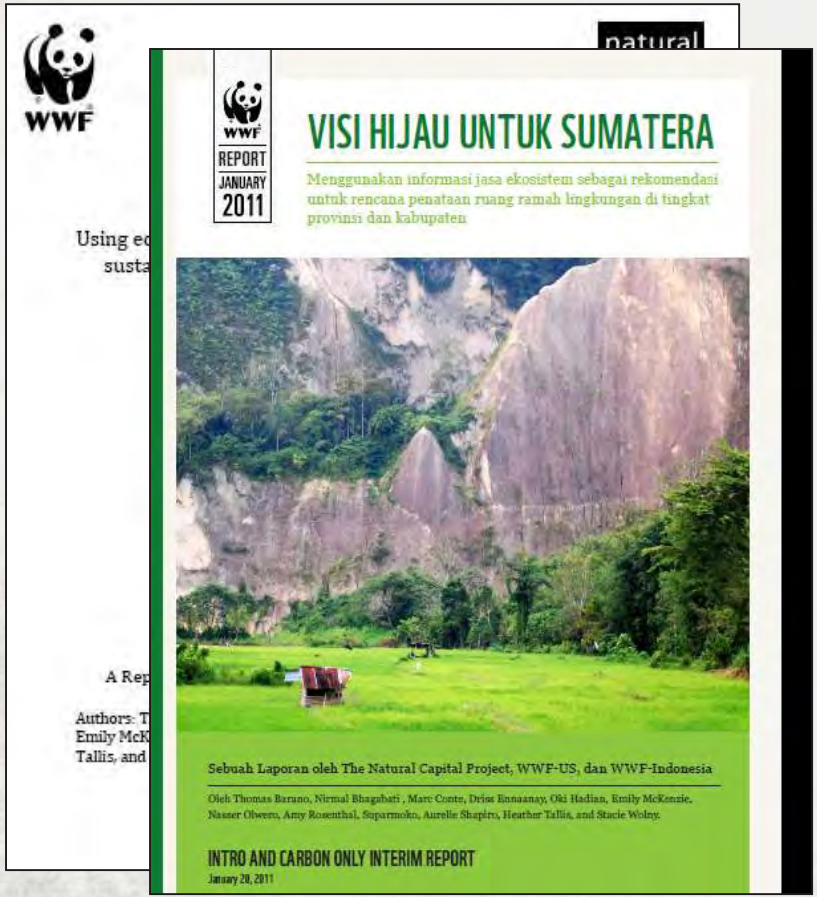
Large reduction in nutrient export (N or P)

(Green Vision – Govt plan)

Implementing the Vision here would enhance wildlife habitat and sequester carbon…

And benefit downstream communities through improved water quality.

APPLICATION OF RESULTS



Recommendations for more sustainable provincial and district spatial plans

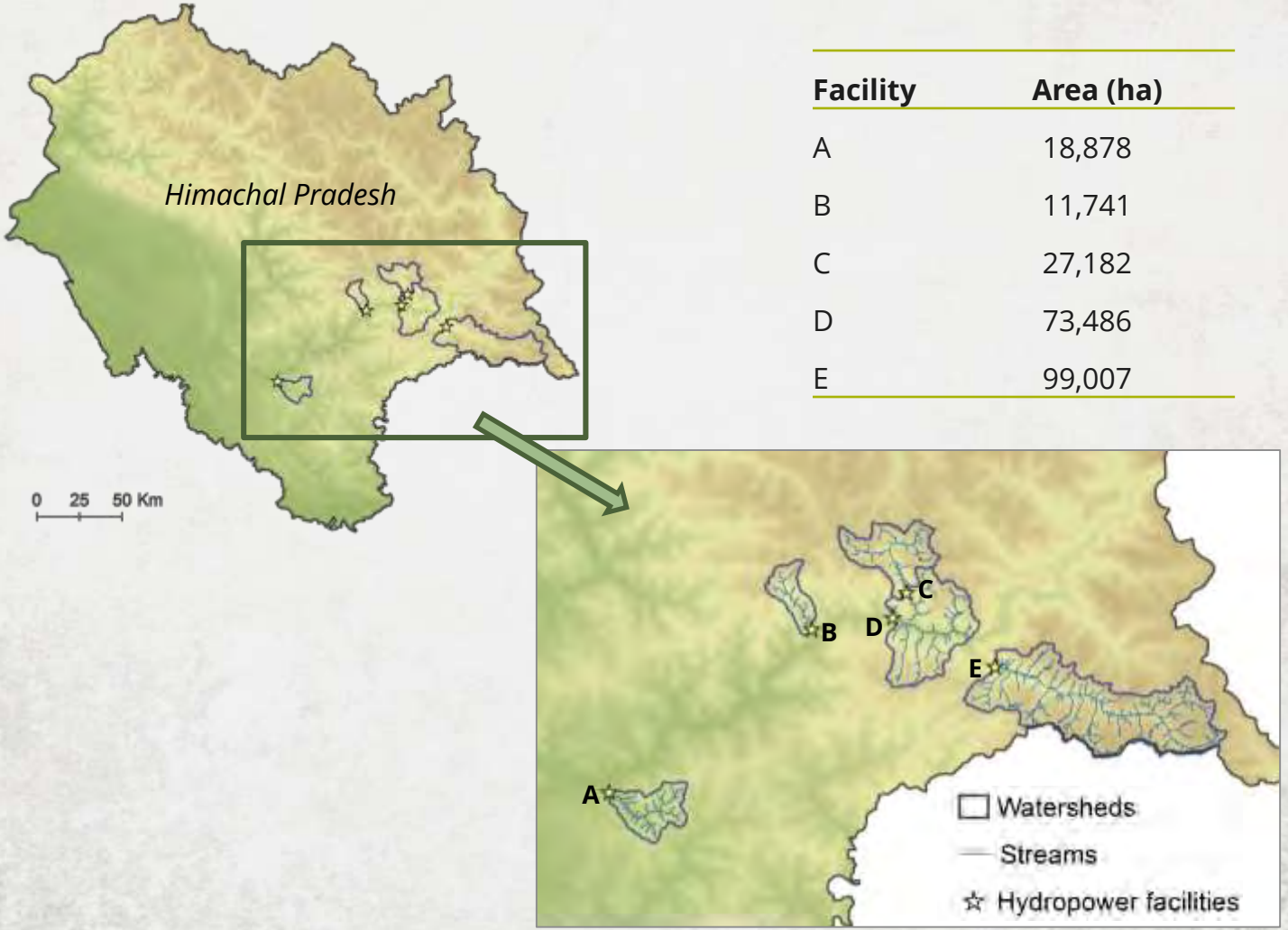
Identifying locations for financing conservation

CASE STUDY 2

Improving targeting of watershed conservation in Himachal Pradesh, India

INVESTING IN WATERSHED SERVICES FOR HYDROPOWER

- World Bank Development Policy Loan to HP
- Partnered with NatCap to provide technical assistance to HP State government
- Goals
  - Improve targeting of investments in watershed management
  - Demonstrate value of forest management for hydropower production



Facility	Area (ha)
A	18,878
B	11,741
C	27,182
D	73,486
E	99,007

PORTFOLIOS AND RETURN ON INVESTMENT

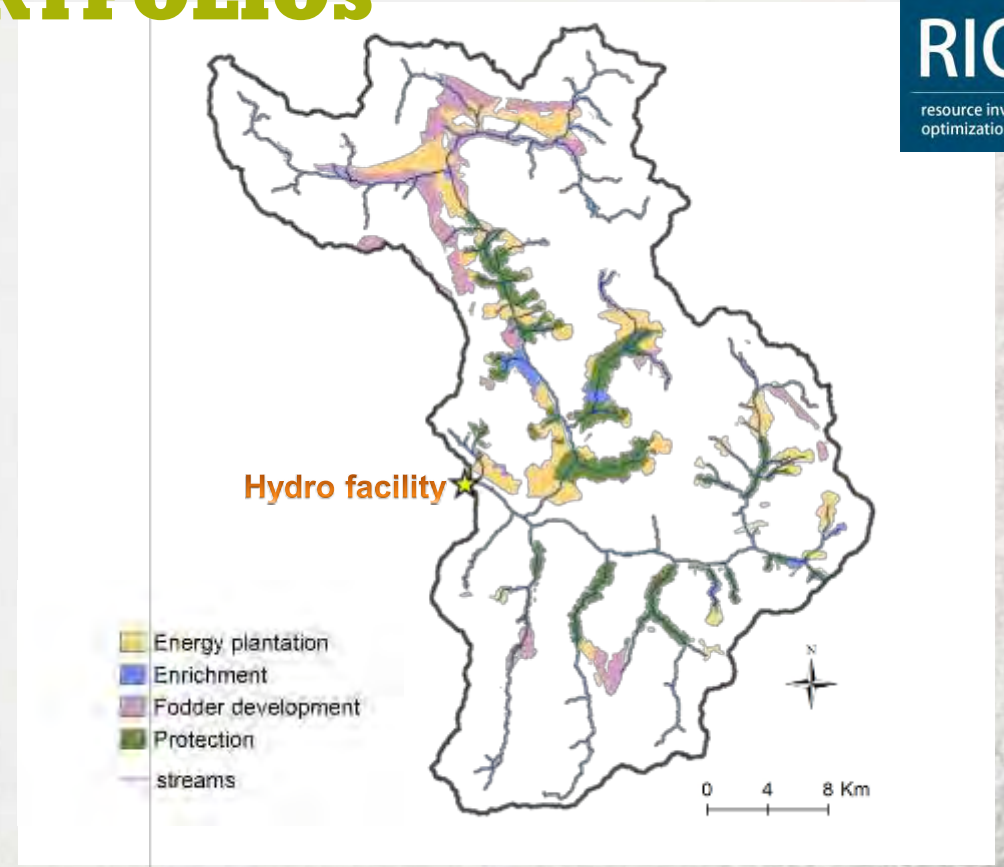
Methods:

- Generated Investment Portfolios using RIOS for each study area, at multiple budget levels
- Budget levels correspond to an amount that would result in different amounts of available land in activities: 5%, 15%, 25%, 35%, and 45%
- Used InVEST water yield and sediment model to calculate the change in water and sediment that would result from implementation of each portfolio.

RIOS OUTPUTS - MANAGEMENT PORTFOLIOS

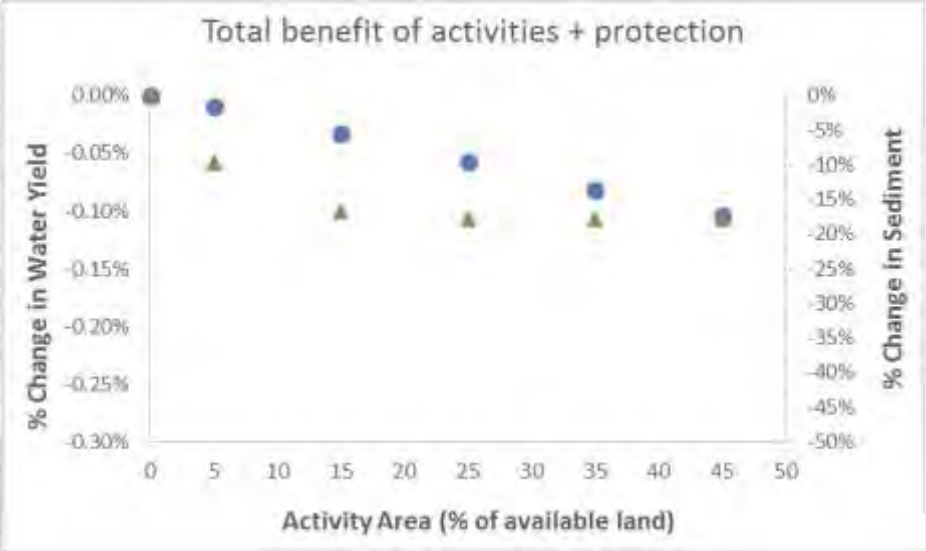
25% of Available Area

Activity	USD
Energy plantation	9,039,474
Enrichment	204,744
Fodder devlpmt	1,404,561
Protection	unknown
TOTAL:	**10,648,779**

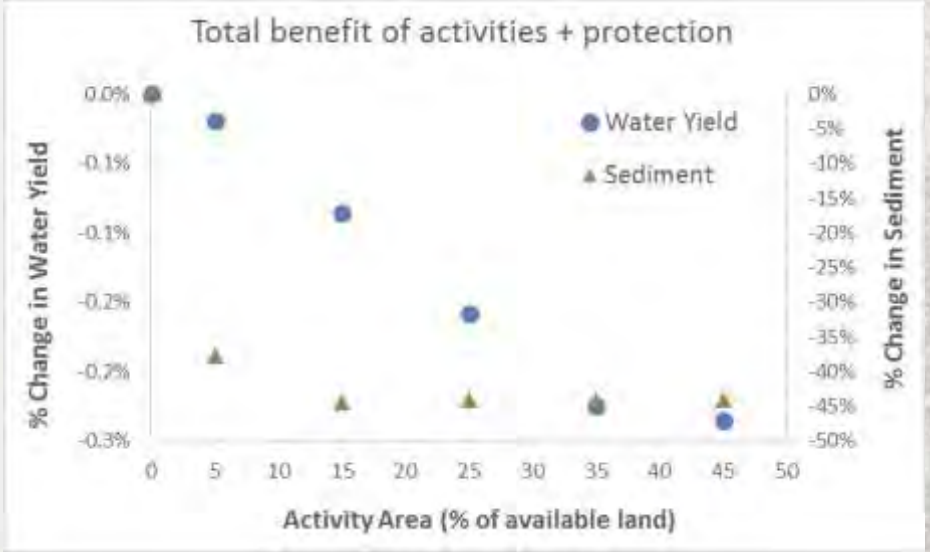


ROI – CHANGE IN WATER AND SEDIMENT

Facility B



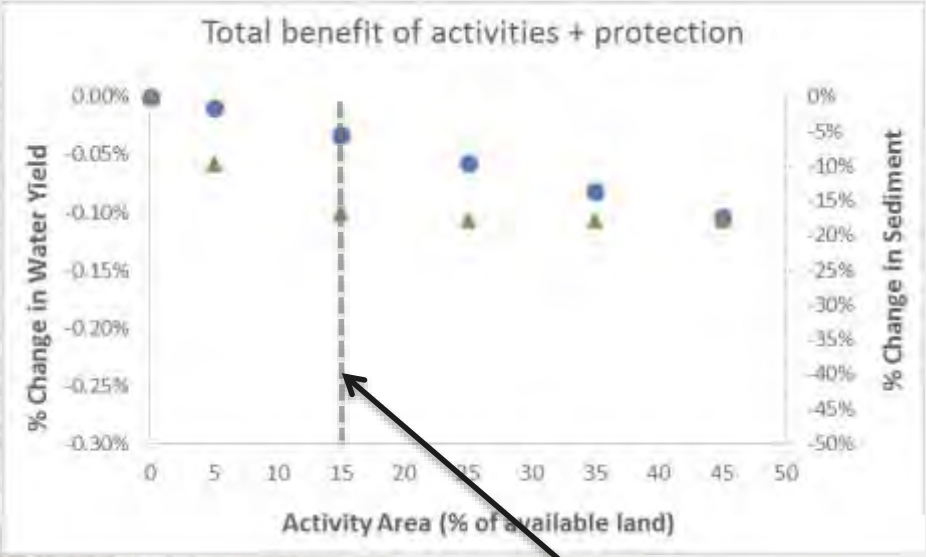
Facility E



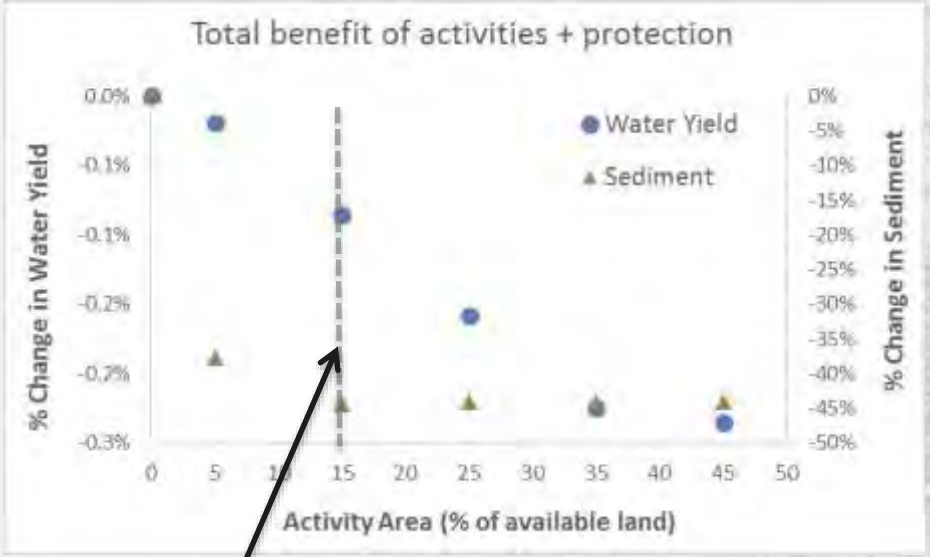
ROI – CHANGE IN WATER AND SEDIMENT

natural capital PROJECT

Facility B



Facility E



HP regulation: target of 15% of land in conservation activities

ACKNOWLEDGMENTS

- InVEST
  - Rich Sharp, Heather Tallis, Taylor Ricketts, Anne Guerry, Spencer Wood, Becky Chaplin-Kramer, Eric Nelson, Driss Ennaanay, Stacie Wolny, Nasser Olwero, Kari Vigerstol, Derrick Pennington, Guillermo Mendoza, J. Aukema, J. Foster, J. Forrest, D. Cameron, Katie Arkema, E. Lonsdorf, C. Kennedy, Gregg Verutes, C.K. Kim, Greg Guannel, Michael Papenfus, Jodie Toft, M. Marsik, Joey Bernhardt, Robb Griffin, Kathryn Glowinski, Nicolas Chaumont, N., Adam Perelman, Martin Lacayo, Lisa Mandle, and Perrine Hamel.
- Sumatra
  - Nirmal Bhagabati and Emily McKenzie
- RIOS & Himachal Pradesh
  - Stacie Wolny, Perrine Hamel, Urvashi Narain, Rich Sharp, James Douglass, Heather Tallis, and S.S. Negi.