InVEST:
Quantifying ecosystem services

Taylor Ricketts
Emily McKenzie

Natural Capital Project

World Wildlife Fund – U.S.

Challenge: mainstreaming ES

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- "You can only manage what you can measure."
- Provide tools to incorporate ecosystem services into decisions and policies
- Questions:
  - Where do ES come from?
  - Who do they benefit (or not)?
  - How will they change in future?
- Evaluate choices, quantify tradeoffs

The Natural Capital Project

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– Develop tools to map, value ecosystem services
– Test & apply tools in critical regions
– Support policies to maintain / pay for services

The Nature Conservancy
Protecting nature. Preserving life.™

Woods Institute for the Environment
Stanford University

WWF

University of Minnesota
Driven to Discover℠

InVEST

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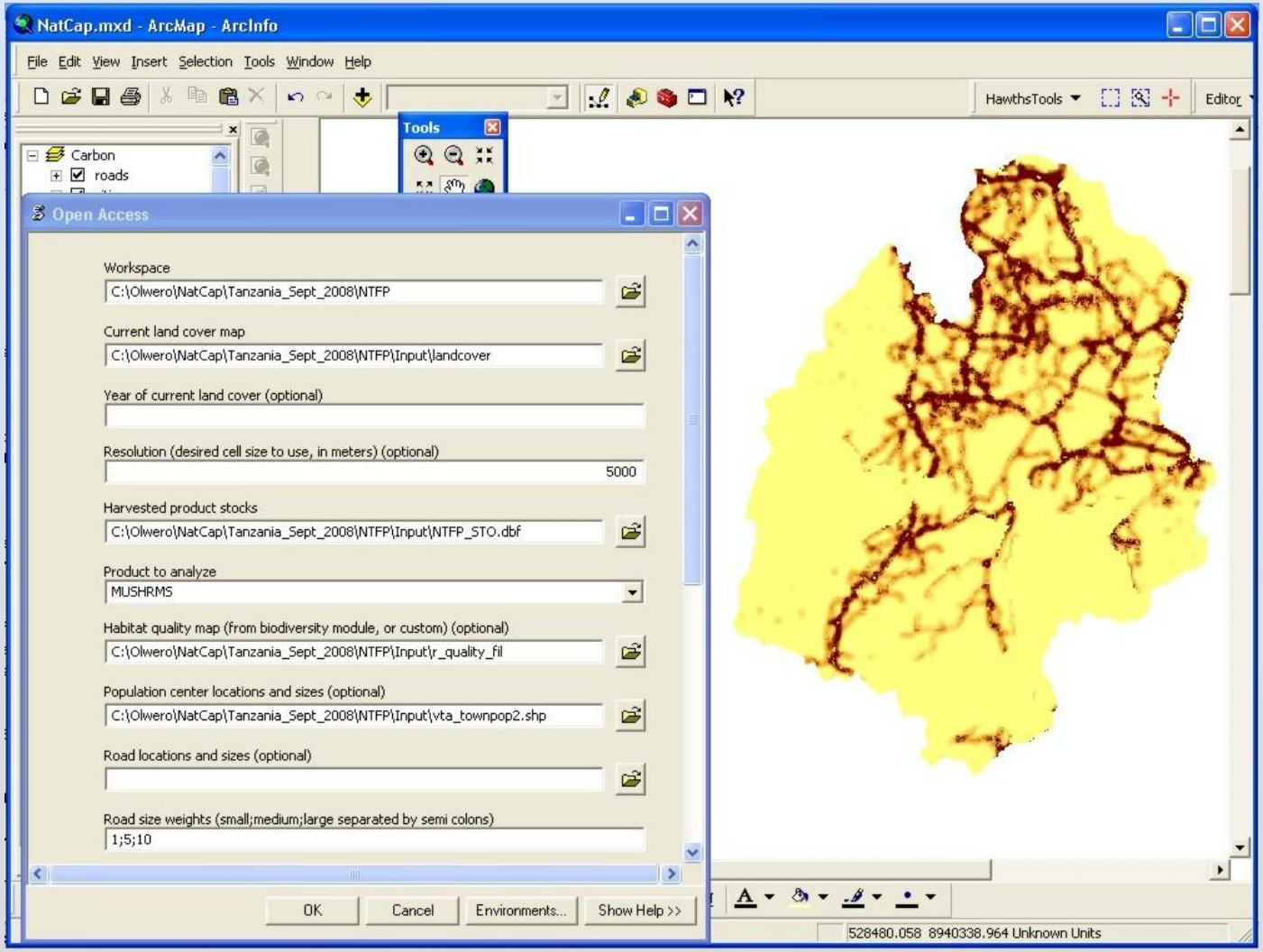

Multiple ecosystem services

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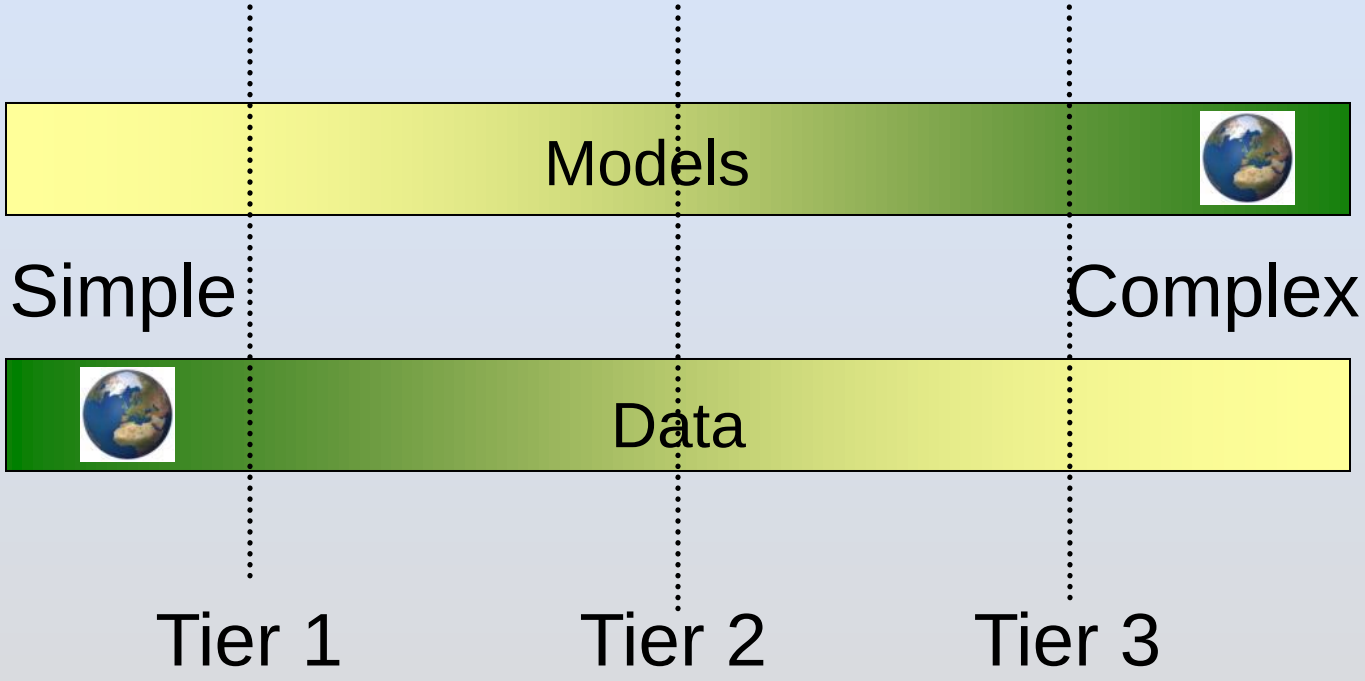
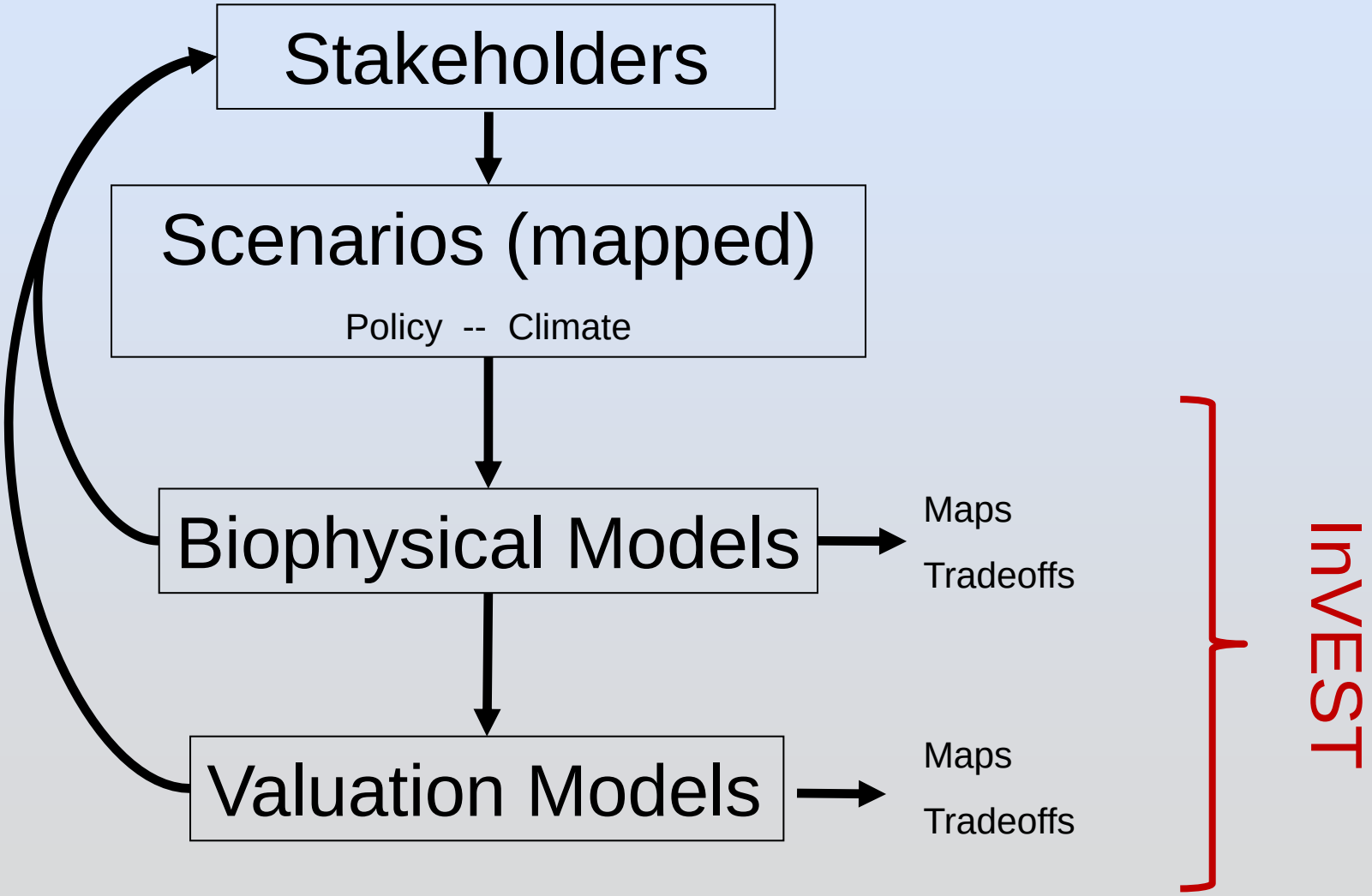
- Carbon storage
- Non-timber forest products
- Sediment retention
- Water purification
- Coastal storm protection
- Crop pollination
- Fish production

A Tiered Approach



Informing decisions



Demonstration Sites

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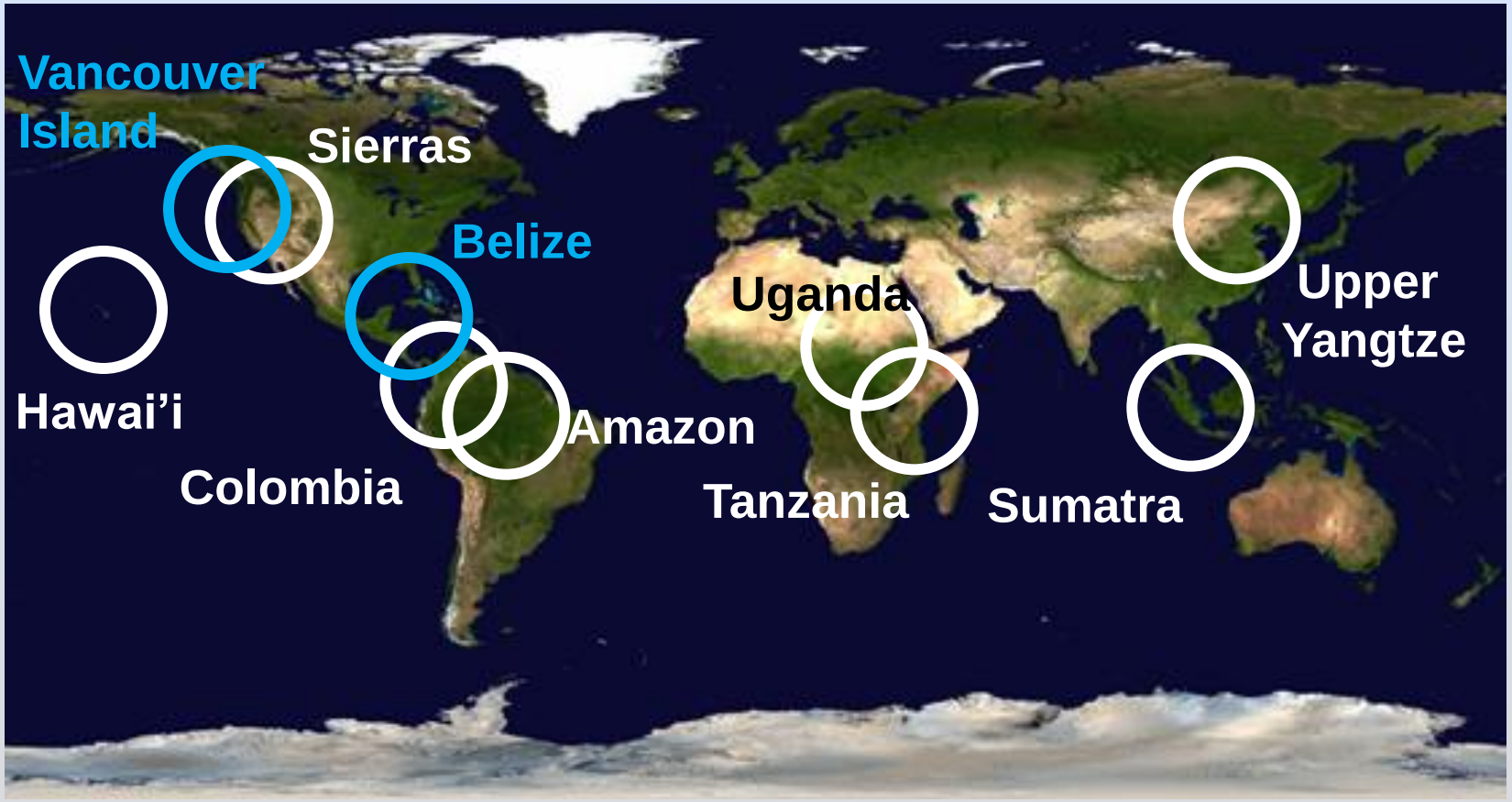
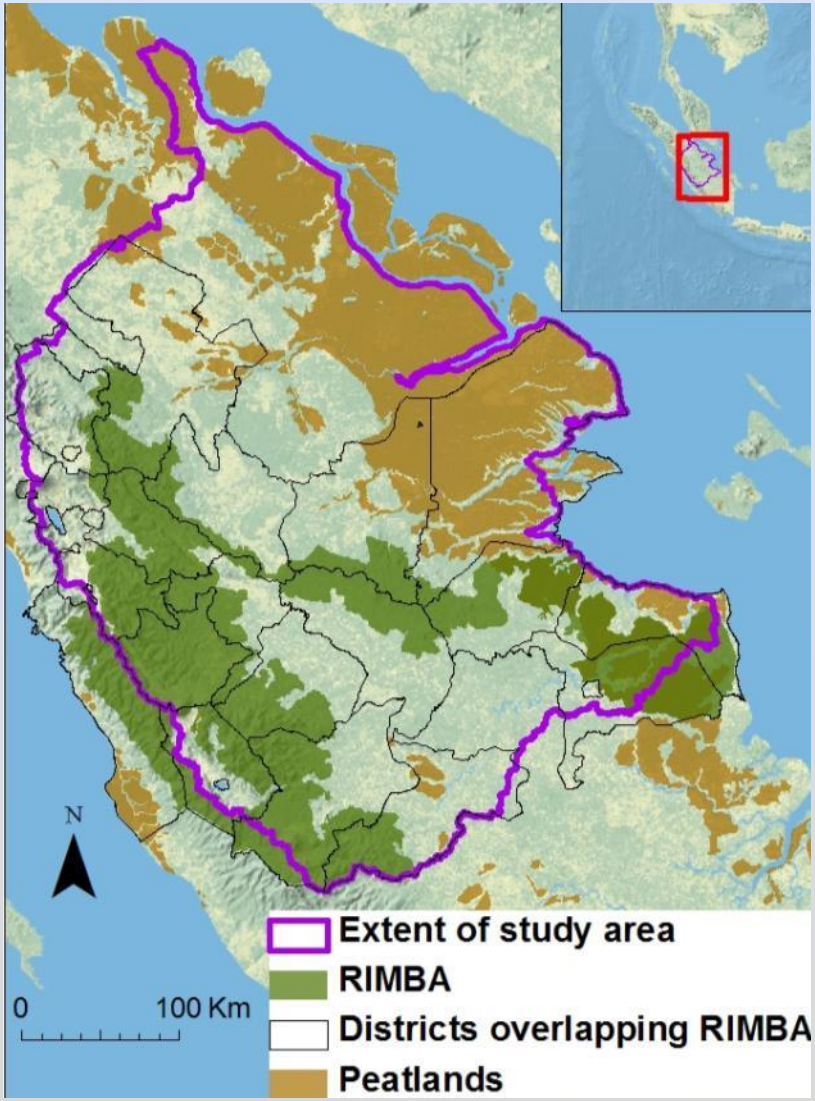


- Test InVEST with field partners and experts
- Advance concrete policy goals
- Roll up / share lessons

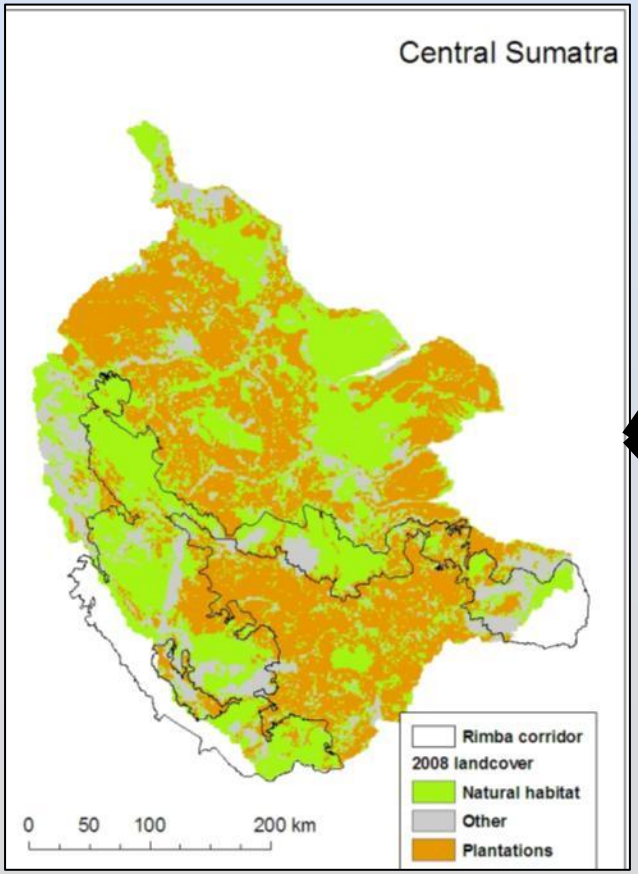
Central Sumatra

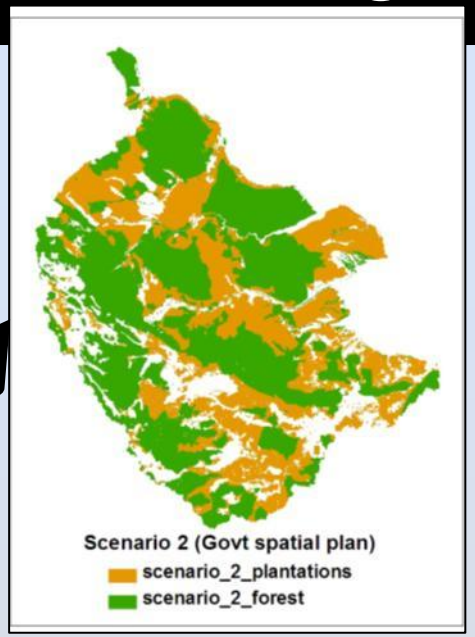


- Island-wide land-use planning
  - Now at district scale
- Governors' commitment
  - Planning
  - Incentives
- Our role:
  - map sources of ES
  - Recommend options to capture values

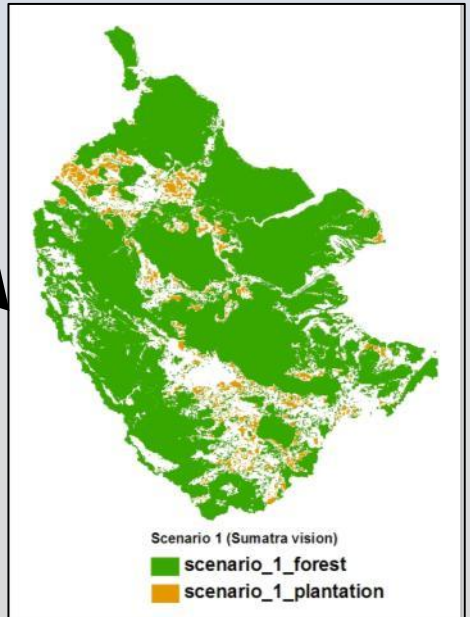
Scenarios of change

2008





2020
Existing
plan



2020
Sumatra
Vision

Change in carbon stored

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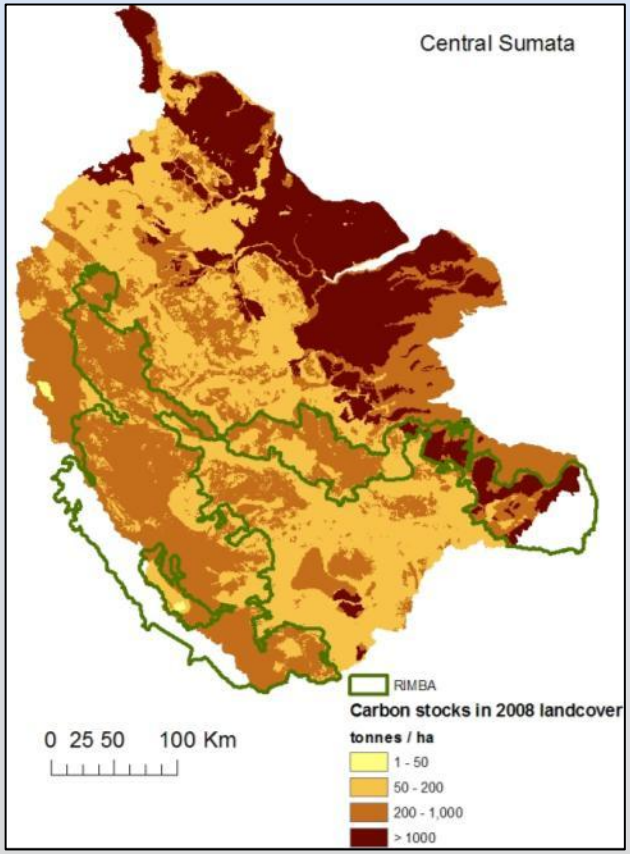
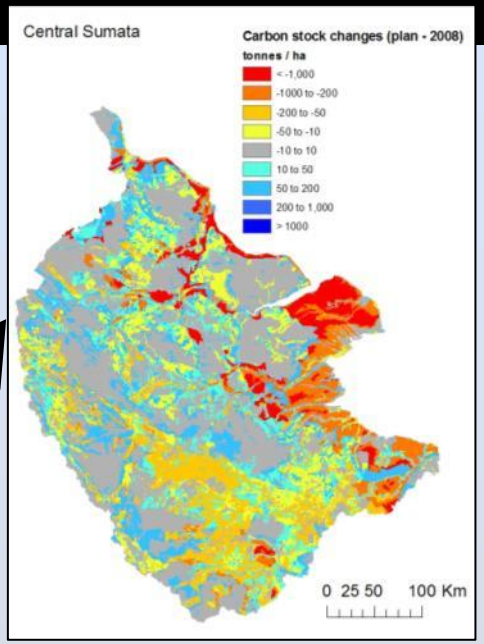
2008





2020
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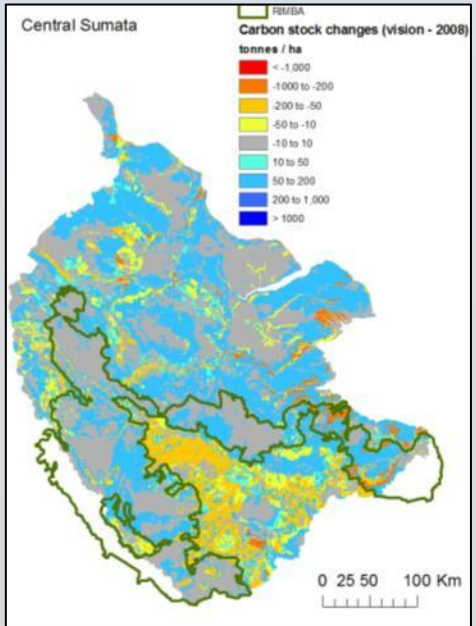
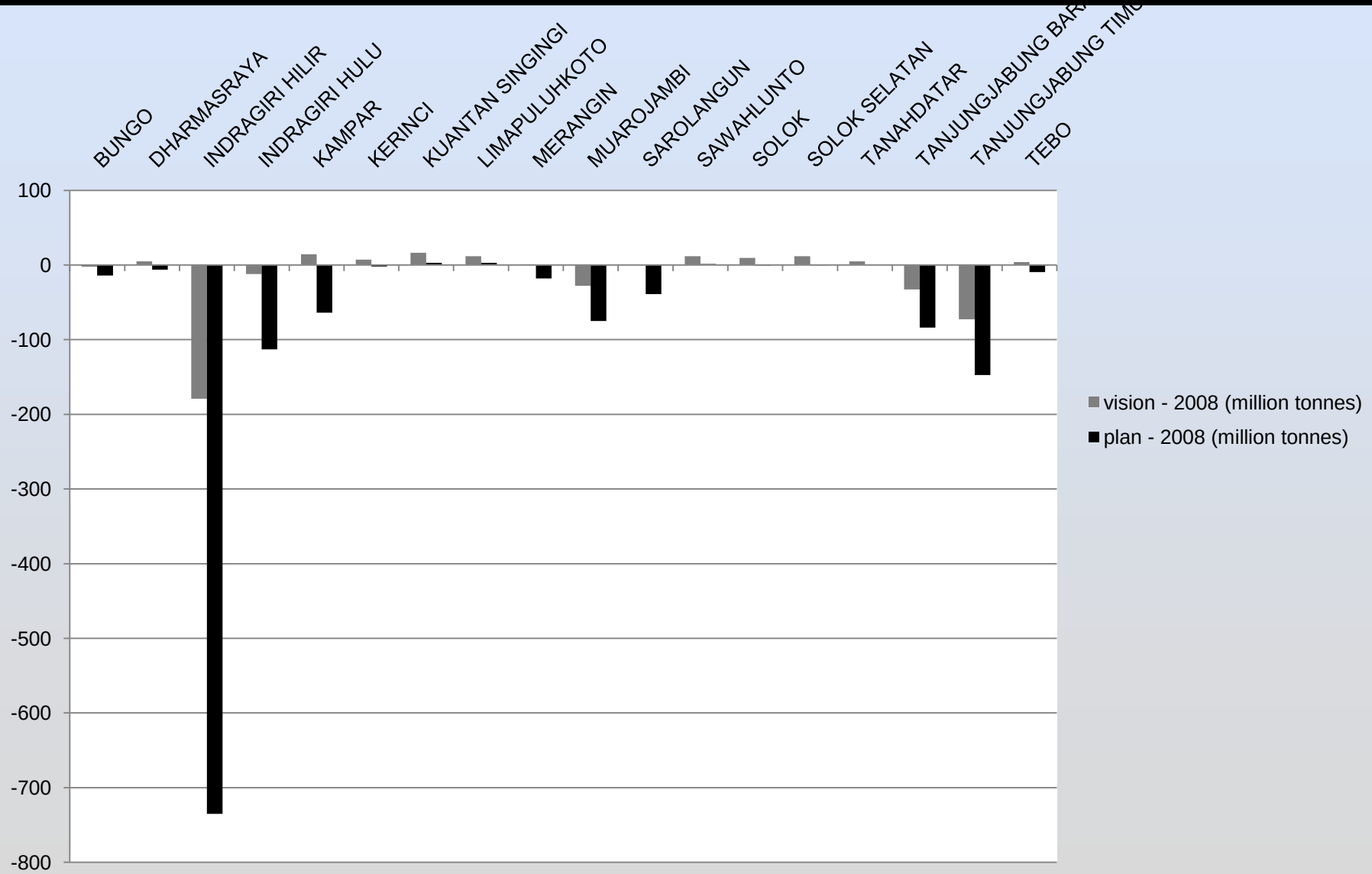
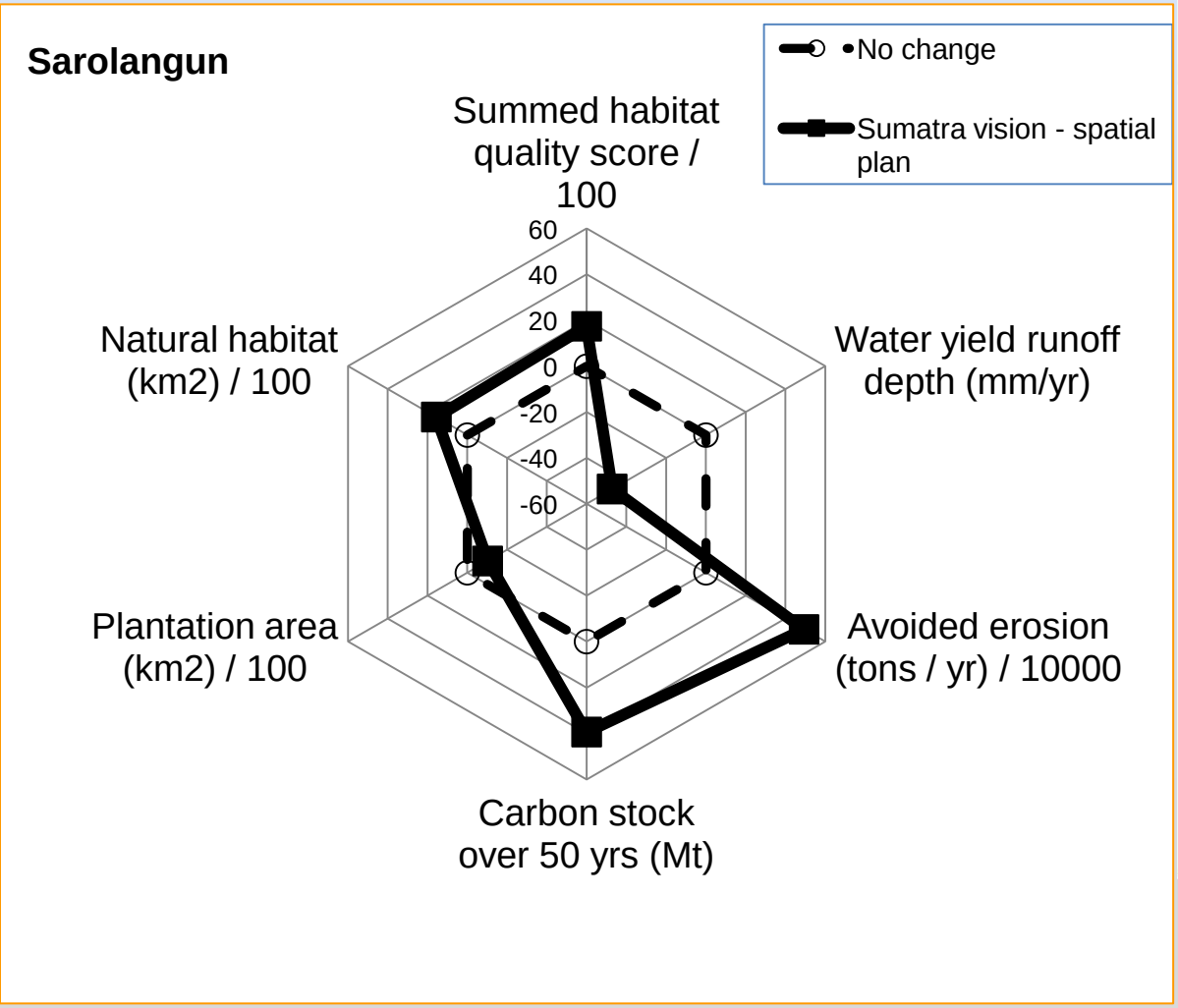


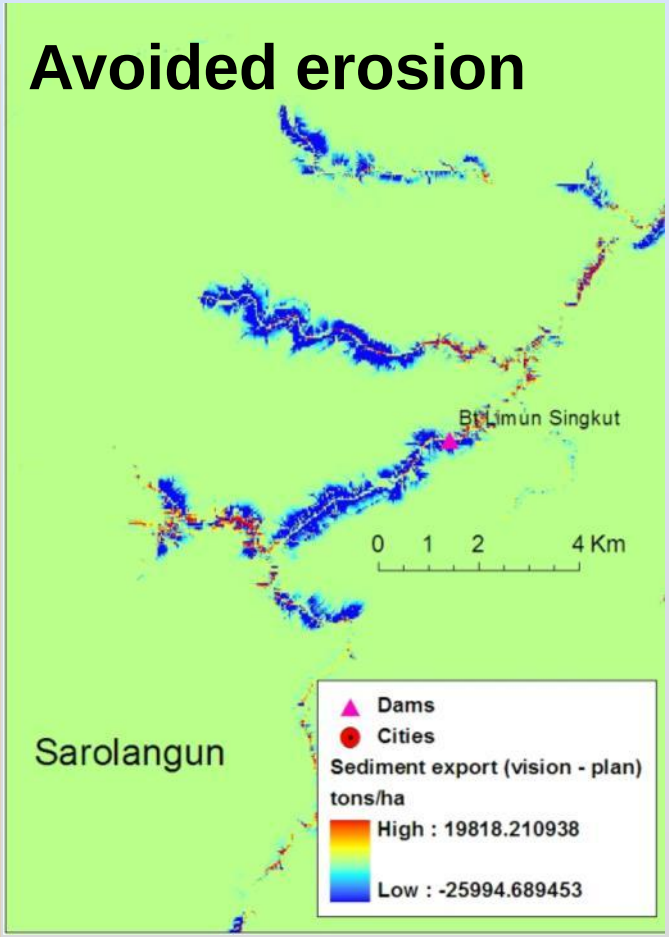
2020
Sumatra
Vision

Accounting for carbon changes



Tradeoff analyses





Production function

- Carbon storage

  ~ f(veg, storage/ha, harvest, decay)

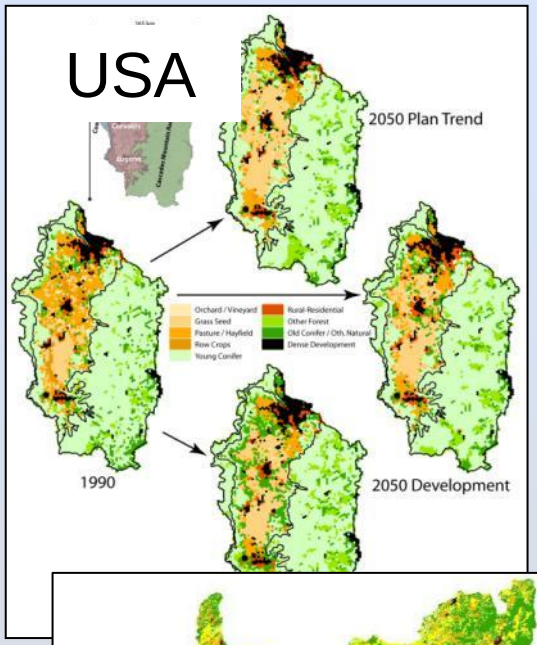
  - Inputs: land use/cover, C densities, harvest rates, decay rates of harvested wood.
  - Outputs: C stored/ha
  - Valuation: damage costs avoided

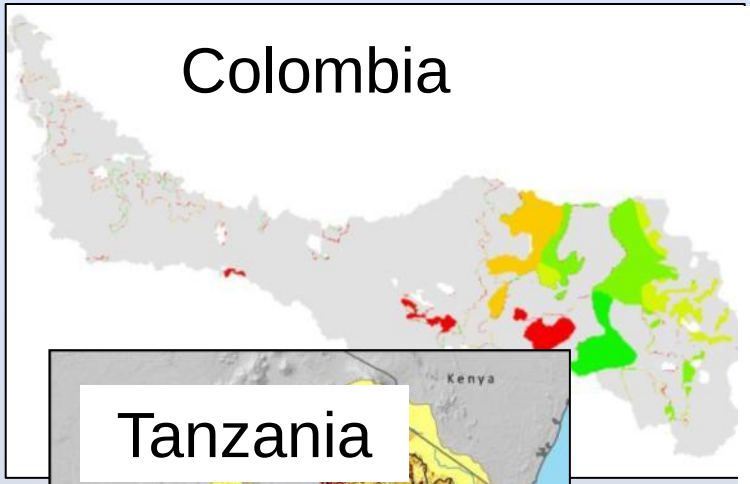
Sediment retention

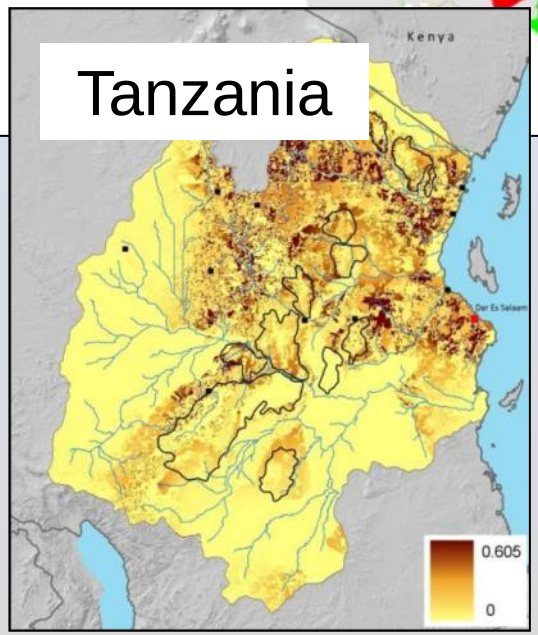
  ~ f(soil, slope length, veg, rain, neighbors)

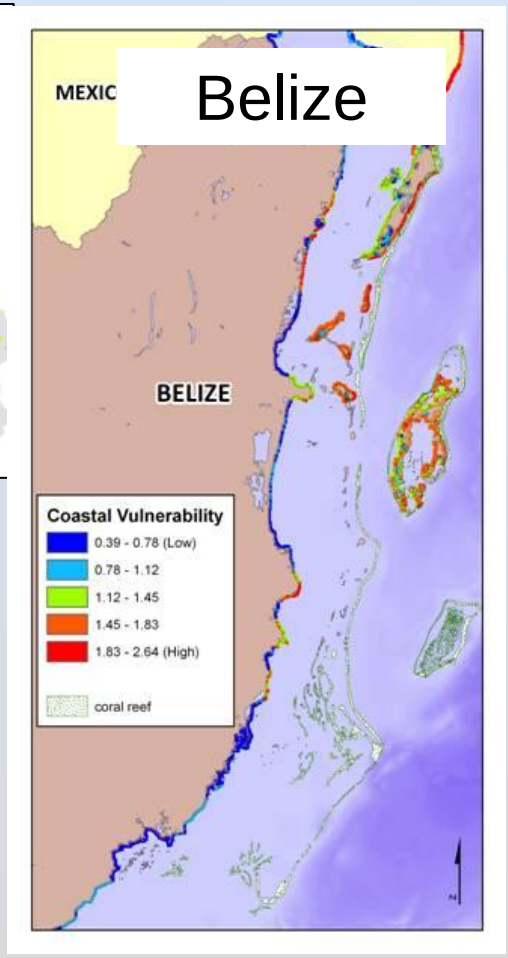
  - Inputs: land use/cover, topography, soils, precip, basins
  - Outputs: tons sediment retained/ha
  - Valuation: replacement costs avoided (dredging)

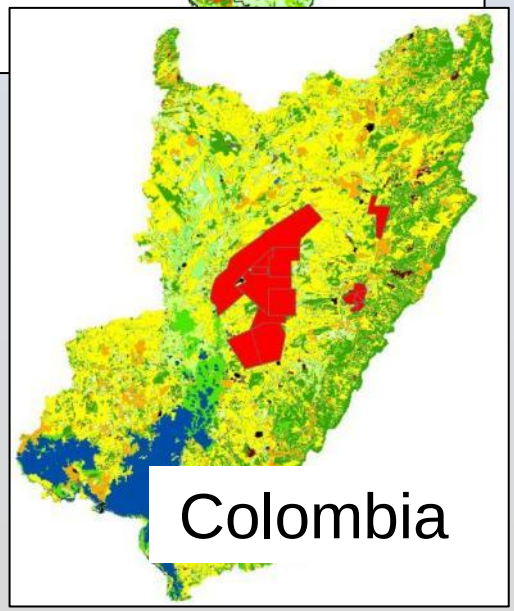
Other projects











- Range of policy contexts
- TEEB case studies

Scientific Foundation

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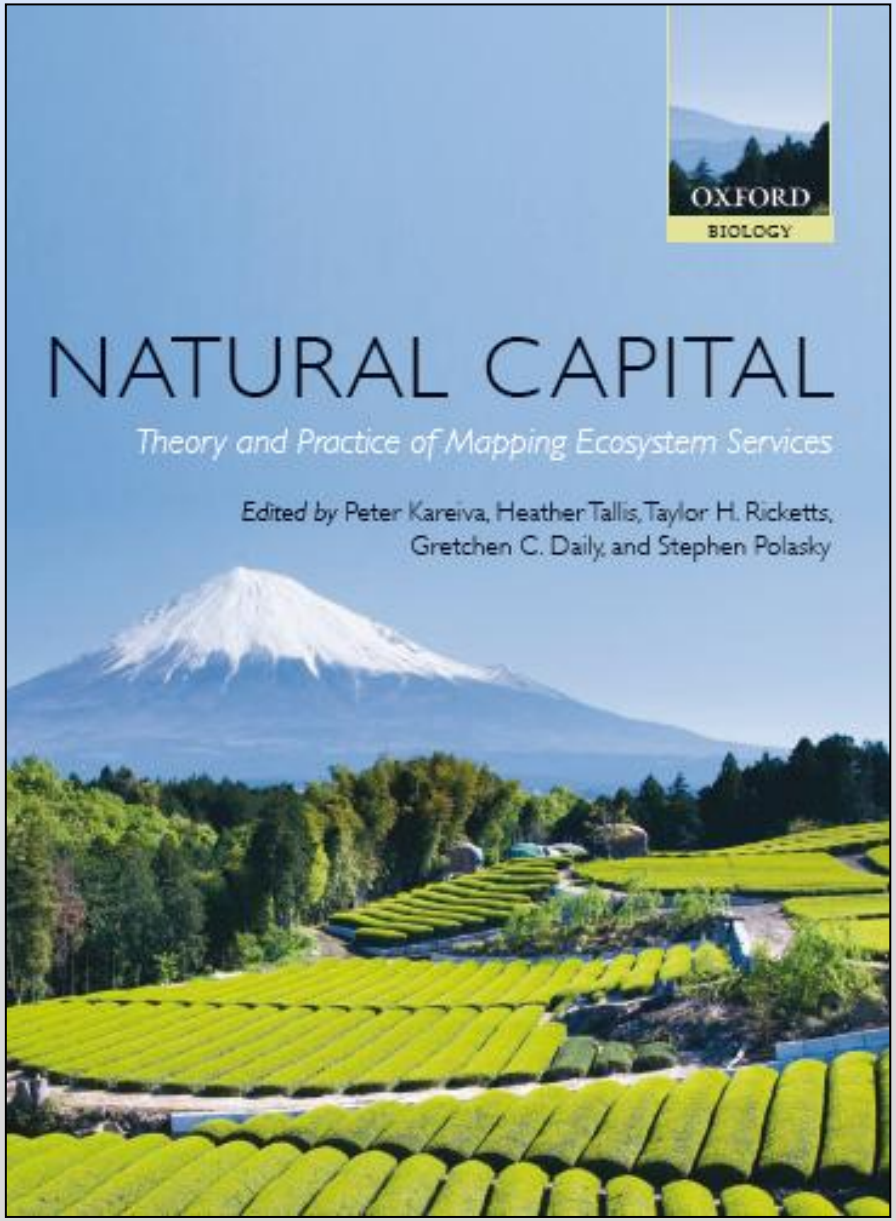
100 + authors

April 2011



InVEST software tool

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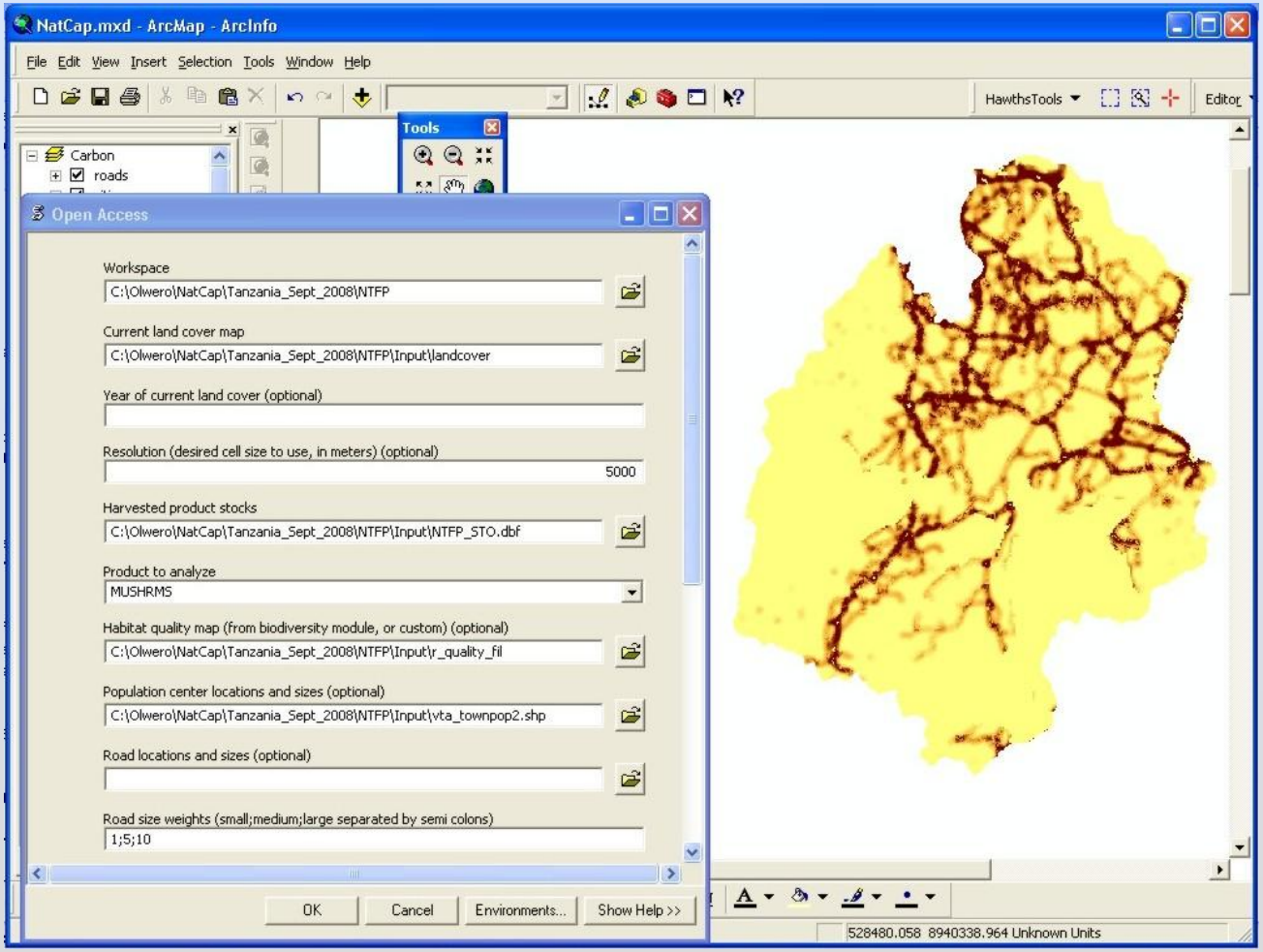

http://invest.ecoinformatics.org

Capacity building

(MA Sub-global assessment, ProEcoServe)

Engaging people

InVEST attributes

– Multiple services and tradeoffs

– Spatially explicit (mapped)

– Production functions

– Evaluate CHANGE: choices, tradeoffs

– Simple

– Open source – many contributors, updates

– To date: subnational, but early national trials

Challenges

- Data – even for tier 1 models
- Capacity to interpret and apply
- Water-related services
- Governmental silos

How can InVEST* help?

- Identify key sources of ES (Kirk)
- Make ES “visible” in Nat. Accounts (Glenn-Marie)
- Demonstrate value, regardless of capture (Pavan)
- Quantify, map externalities (Kirk)
- Retain spatial data within national accounts (G-M)

* Or similar approaches

Thanks…

People

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Nasser Olwero
Steve Polasky
Jim Regetz
Amy Rosenthal
Mathieu Rouget
Mary Ruckelshaus
Heather Tallis
Buzz Thompson
Kerry Turner
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Support

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MacArthur Foundation
Summit Foundation
Roger and Vicki Sant
Peter and Helen Bing
…

What are we measuring?

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	Timber Production	Crop Pollination
Supply	Standing stock of wood (cubic feet ha^{-1})	Insect abundance (# insects ha^{-1})
Use-intermediate service	None	Insect abundance contributing to crop (# of insects ha^{-1})
Use- final service	Harvested wood (cubic feet ha^{-1})	Crop yield due to insects (kg crop ha^{-1})
Value	NPV of harvested timber ($ ha^{-1})	NPV of additional crop yield ($ ha^{-1})