Harmonizing People & Nature:
The Natural Capital Project
~ Making Conservation Profitable ~

A New Business Model

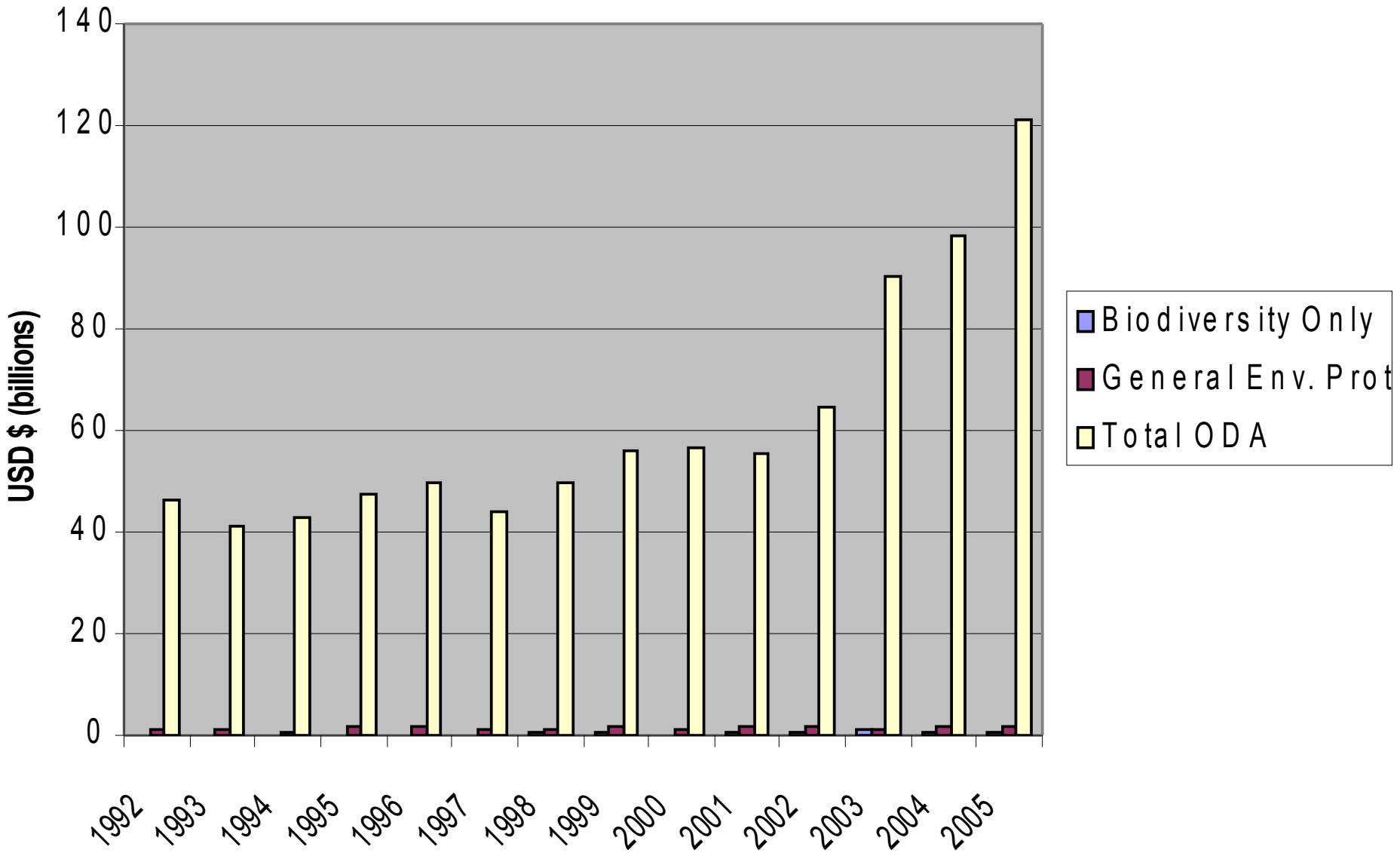
A New Business Model

beyond reserves

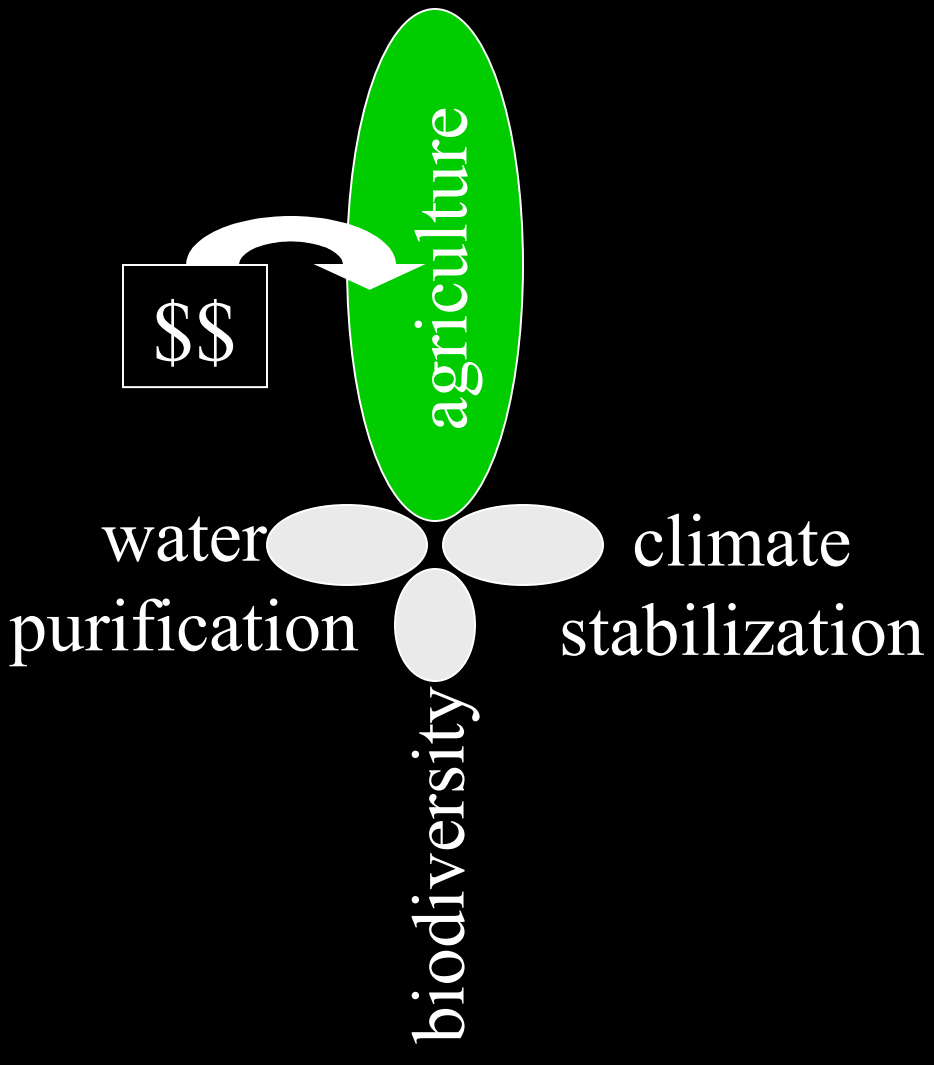
beyond charity

beyond biodiversity

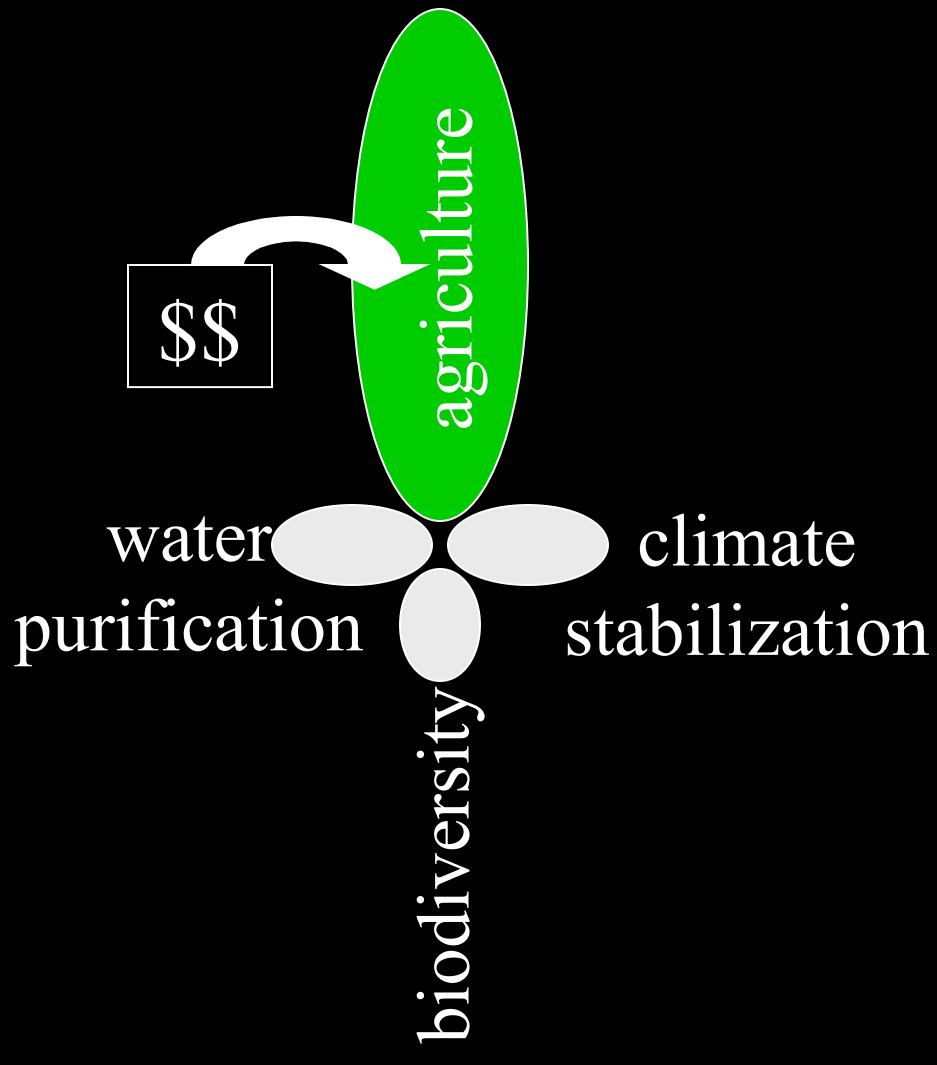
Overseas Development Assistance

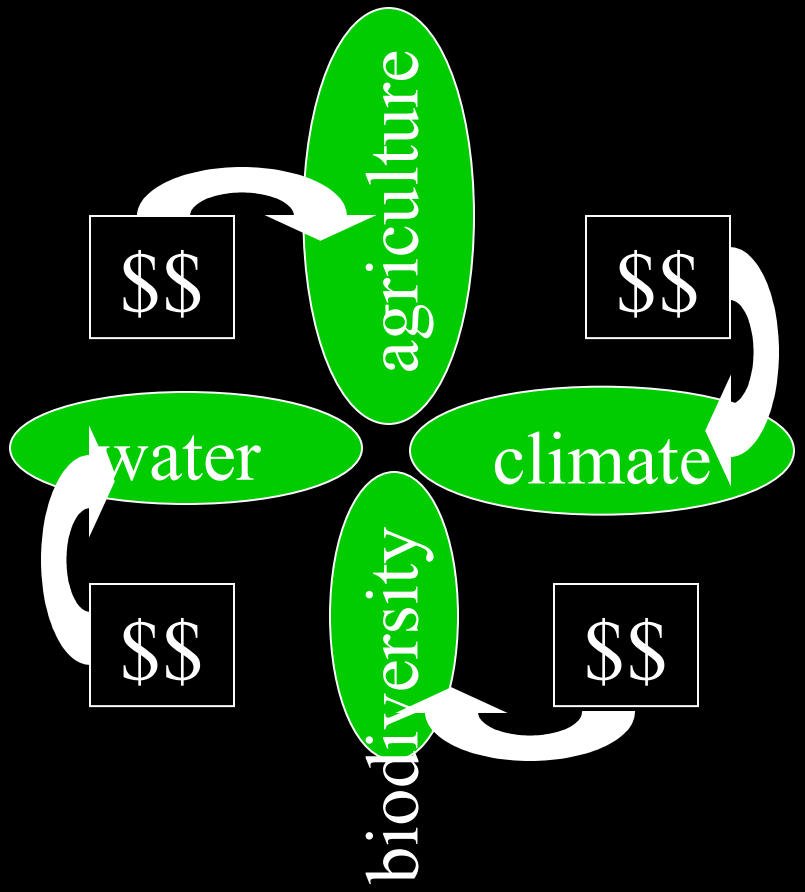


A New Business Model: Livelihood Options



A New Business Model: Livelihood Options





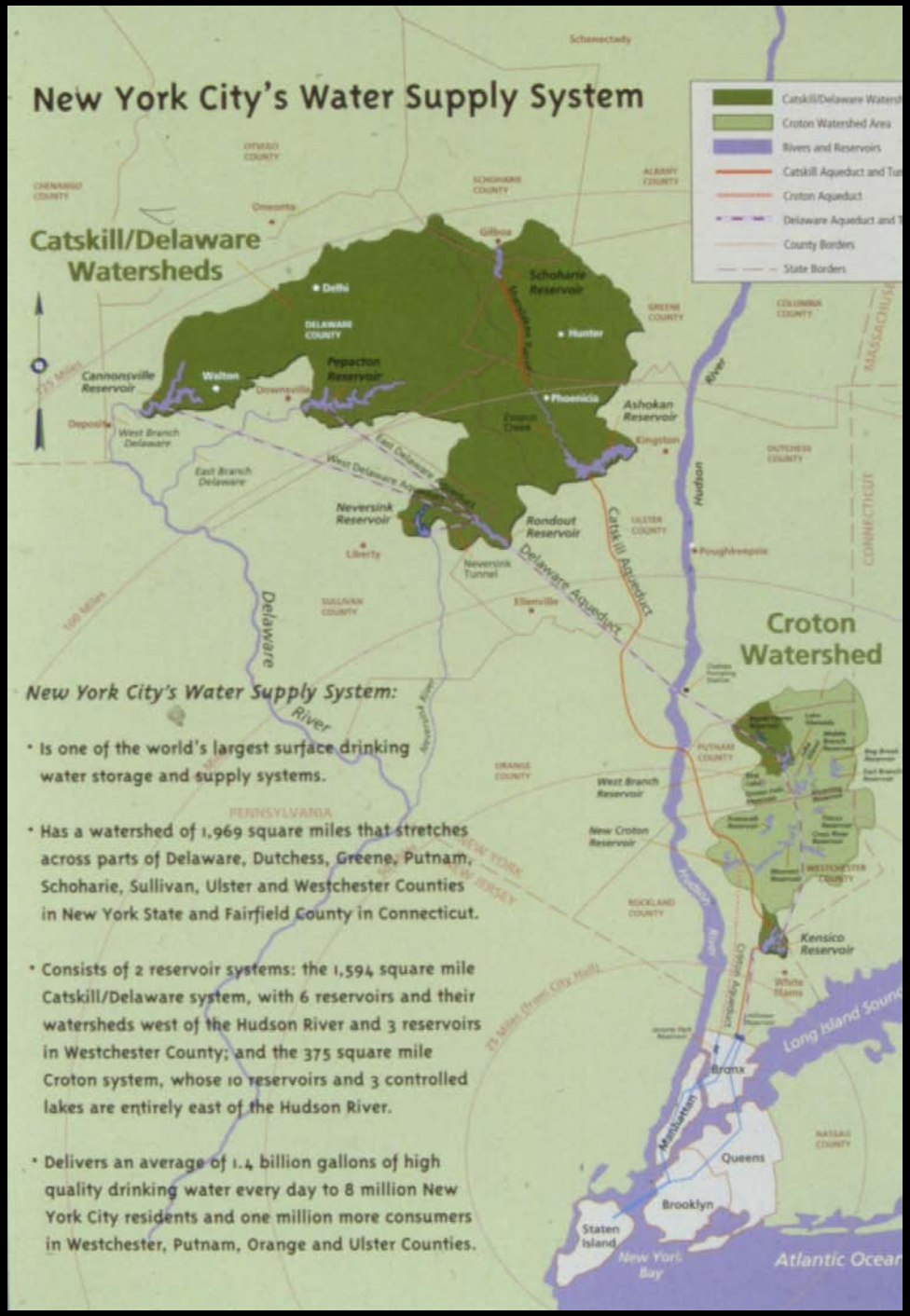
The Economist

APRIL 23RD–29TH 2005 www.economist.com

Rescuing environmentalism (and the planet)

A New Business Model

- Goal?
- Who pays?
- How much?
- To whom?
- For what?
- For how long?



New York City's Water Supply System:

- Is one of the world's largest surface drinking water storage and supply systems.
- Has a watershed of 1,969 square miles that stretches across parts of Delaware, Dutchess, Greene, Putnam, Schoharie, Sullivan, Ulster and Westchester Counties in New York State and Fairfield County in Connecticut.
- Consists of 2 reservoir systems: the 1,594 square mile Catskill/Delaware system, with 6 reservoirs and their watersheds west of the Hudson River and 3 reservoirs in Westchester County; and the 375 square mile Croton system, whose 10 reservoirs and 3 controlled lakes are entirely east of the Hudson River.
- Delivers an average of 1.4 billion gallons of high quality drinking water every day to 8 million New York City residents and one million more consumers in Westchester, Putnam, Orange and Ulster Counties.

NYC ~ Water Purification

PHYSICAL CAPITAL

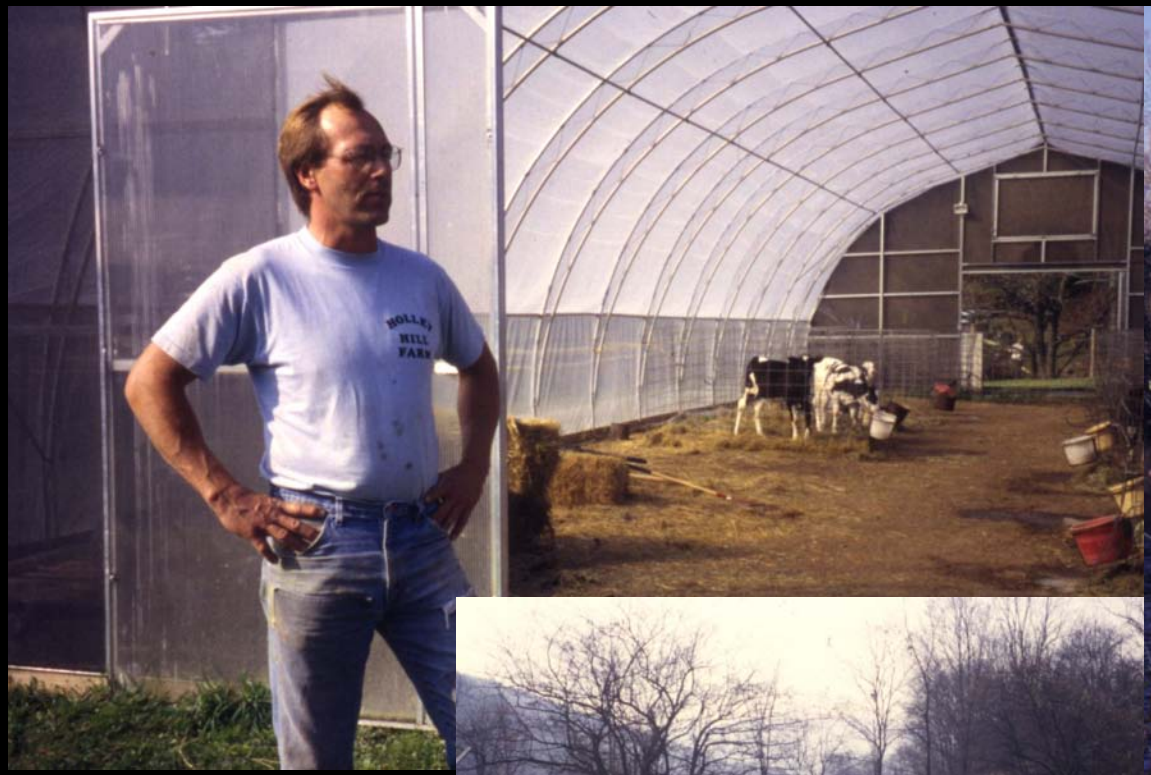
- FILTRATION PLANT
- **US$ 6-8 BILLION**

NATURAL CAPITAL

- RESTORATION OF WATERSHED
- **US$ 1-1.5 BILLION**

Investment in Natural Capital

Investment in Natural Capital



Costa Rica
Payment for Ecosystem Services

Climate Stabilization

Water Purification

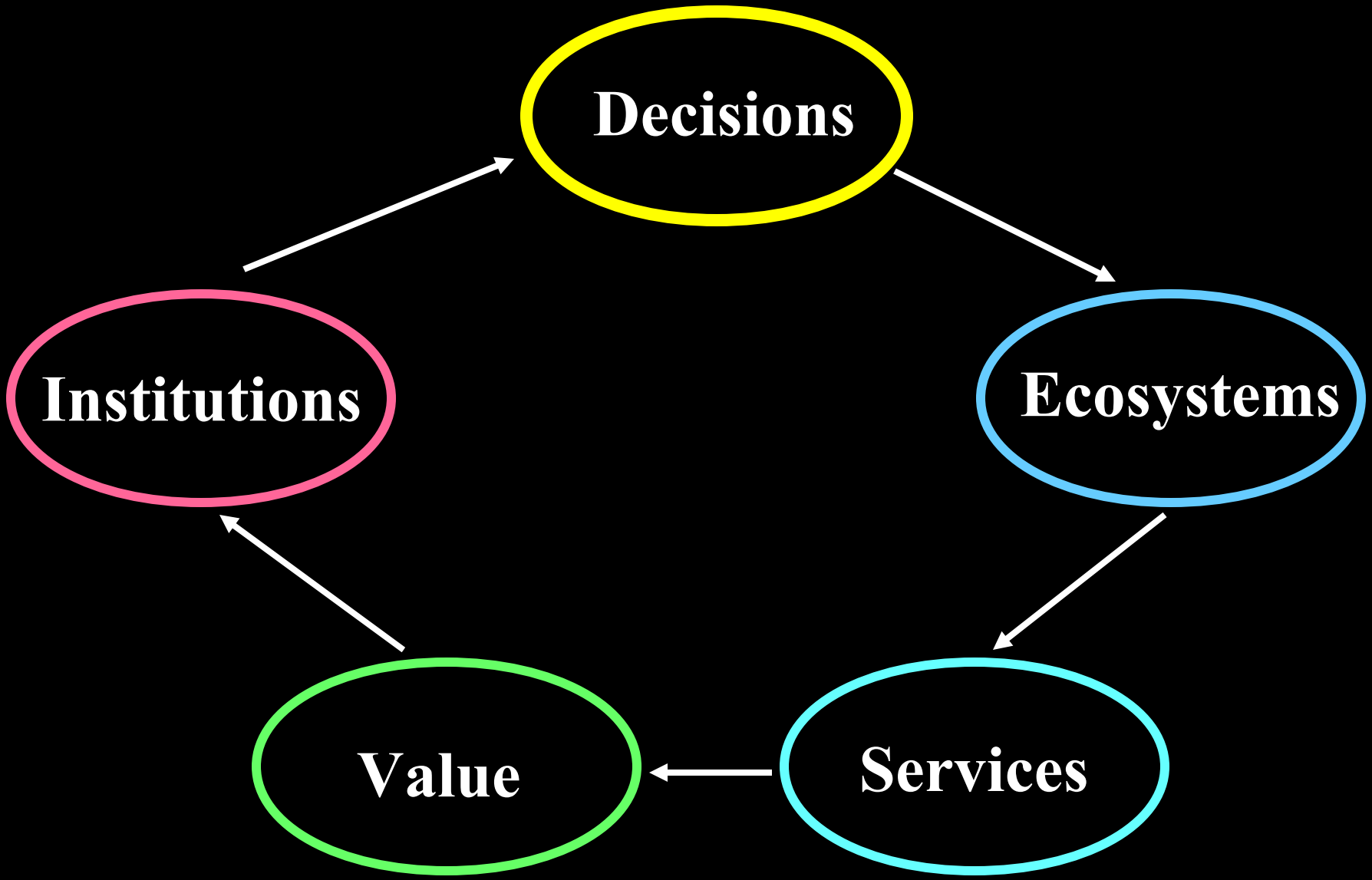
Biodiversity Resources

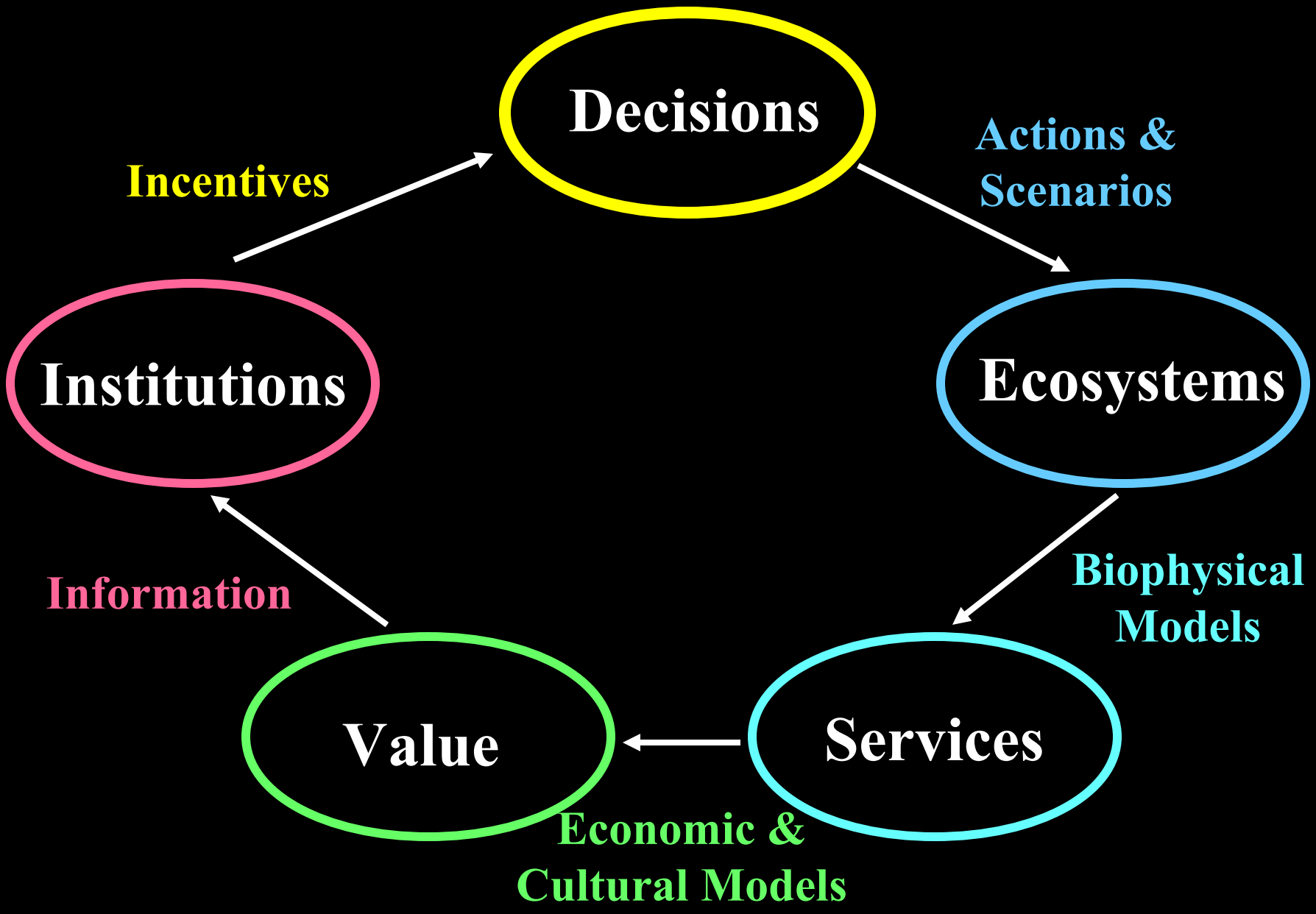
Scenic Beauty

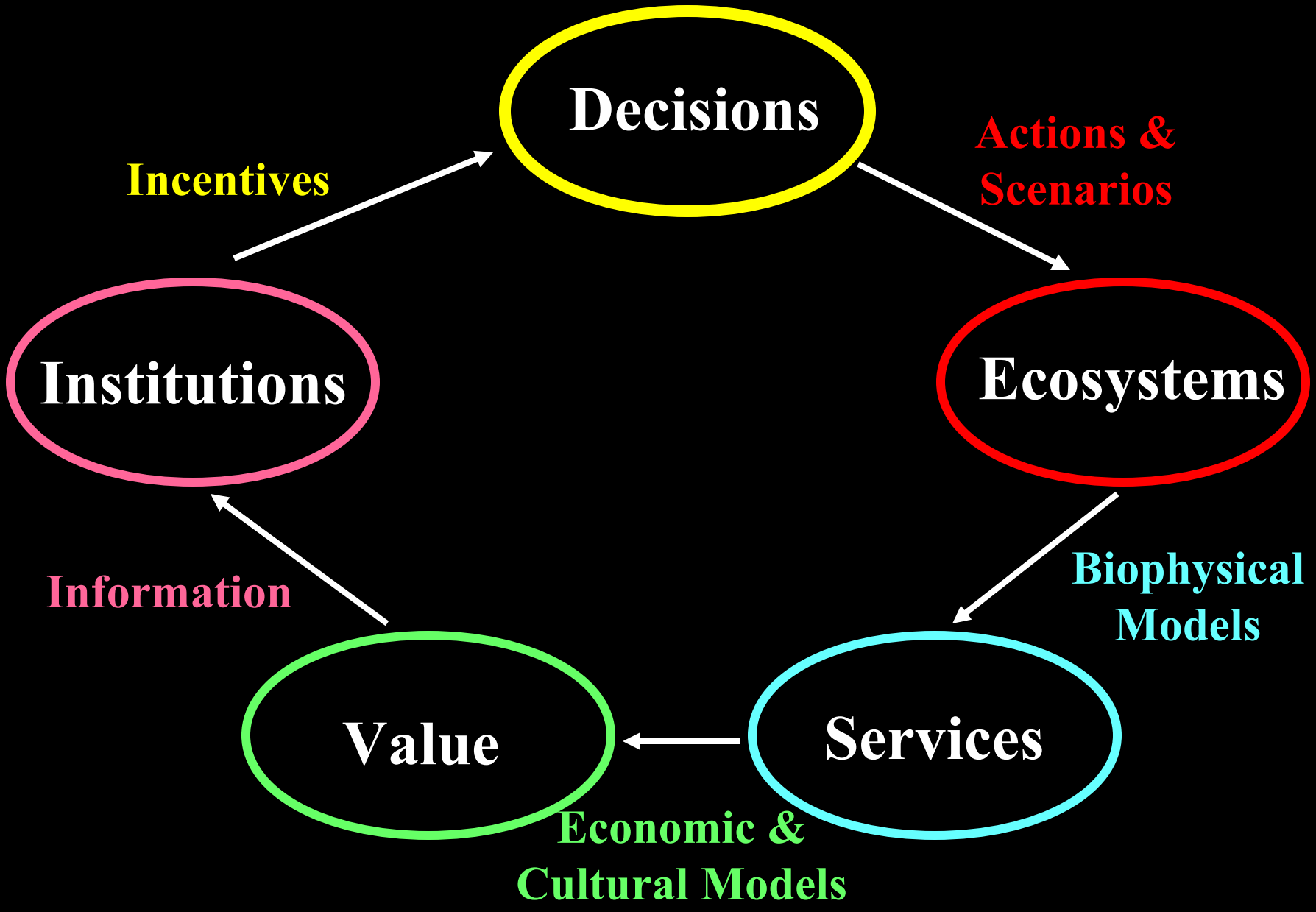
US$20 / acre-yr

Our Challenge

To develop
the scientific & policy tools
for
<u>replicating & scaling</u>
models of success


Decisions
Ecosystems
Services
Value
Institutions


Decisions
Actions &
Scenarios
Ecosystems
Biophysical
Models
Services
Economic &
Cultural Models
Value
Information
Institutions
Incentives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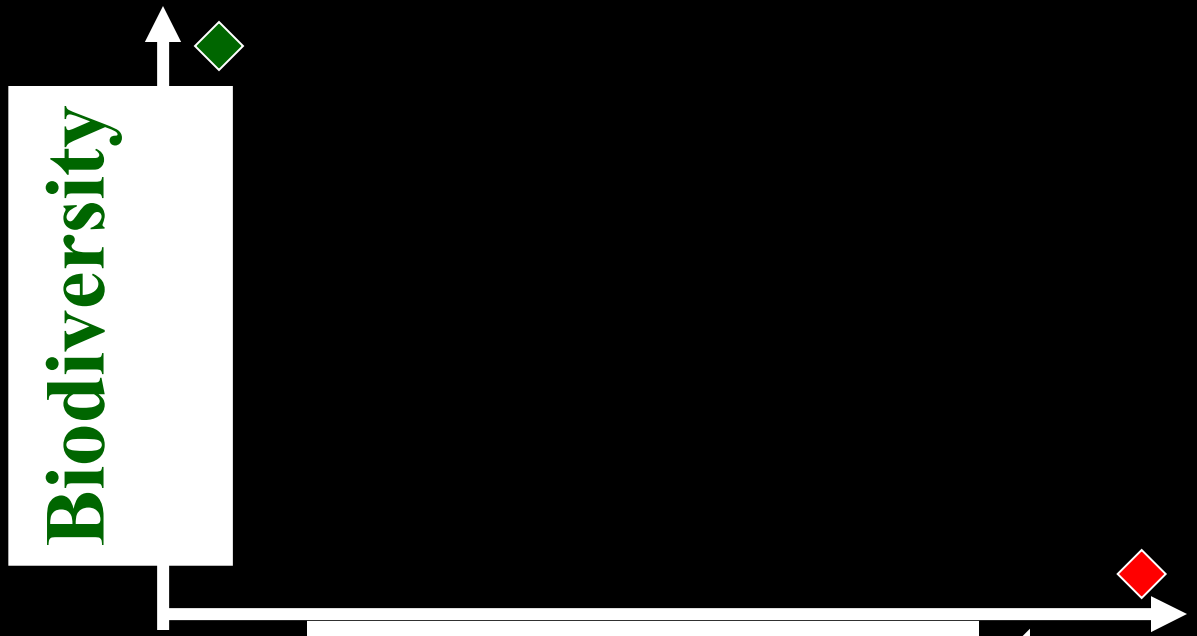
A New Business Model

beyond reserves

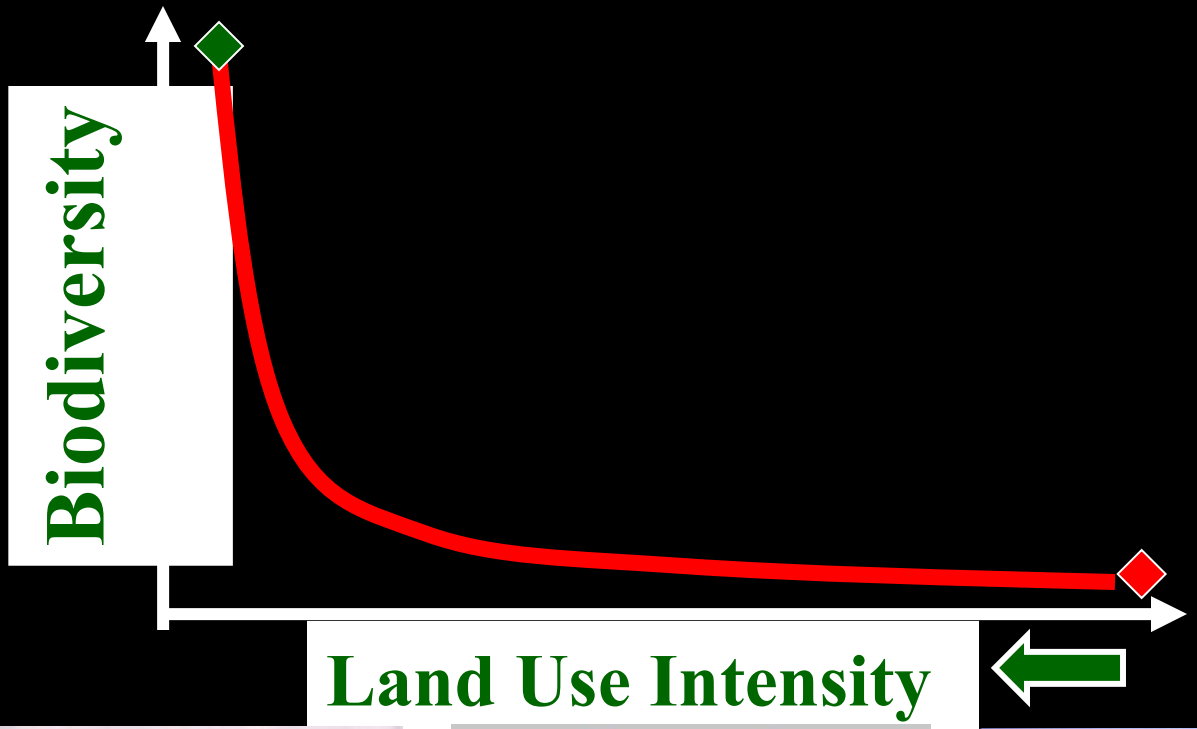
beyond charity

beyond biodiversity

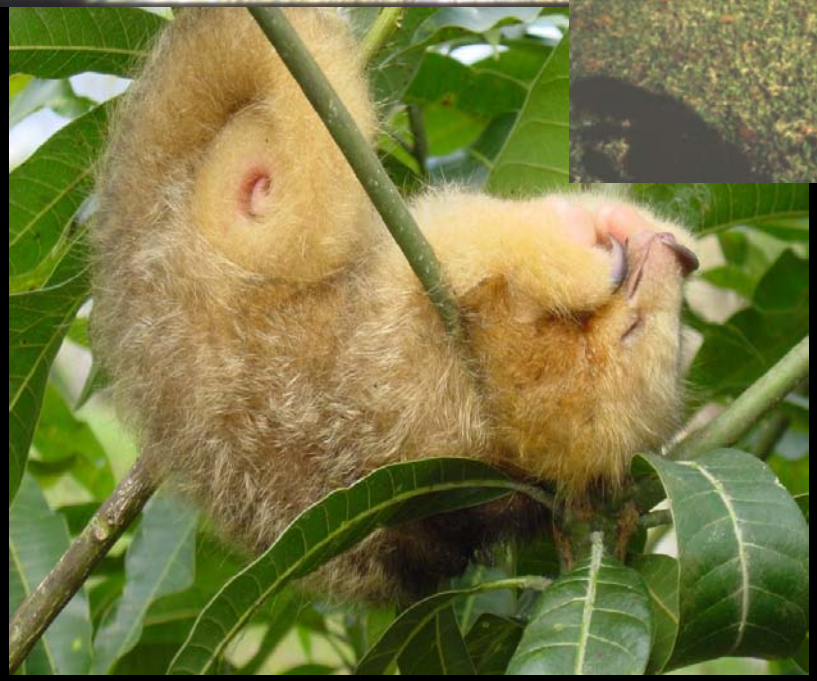
Biodiversity in Countryside



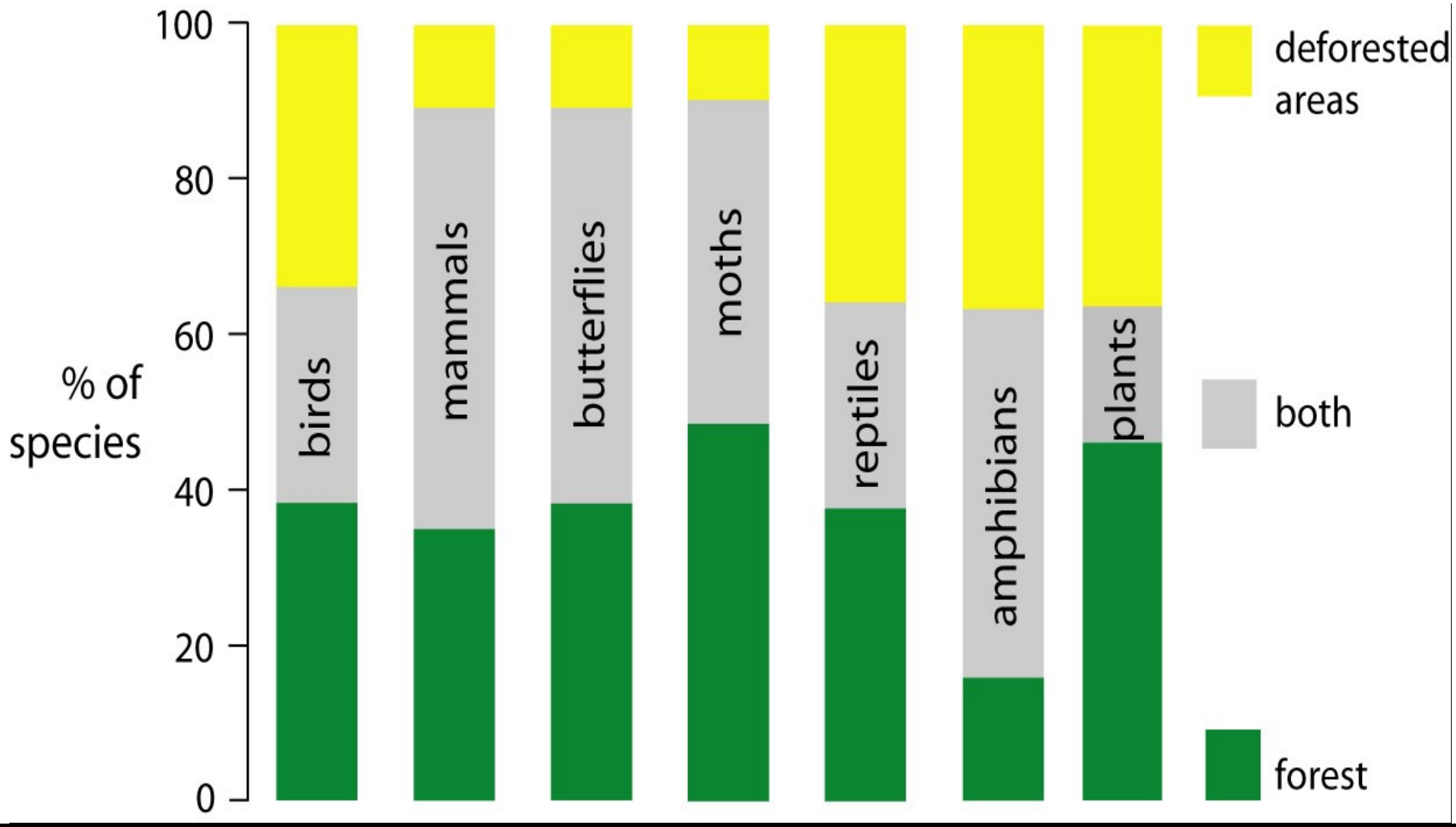
Biodiversity in Countryside



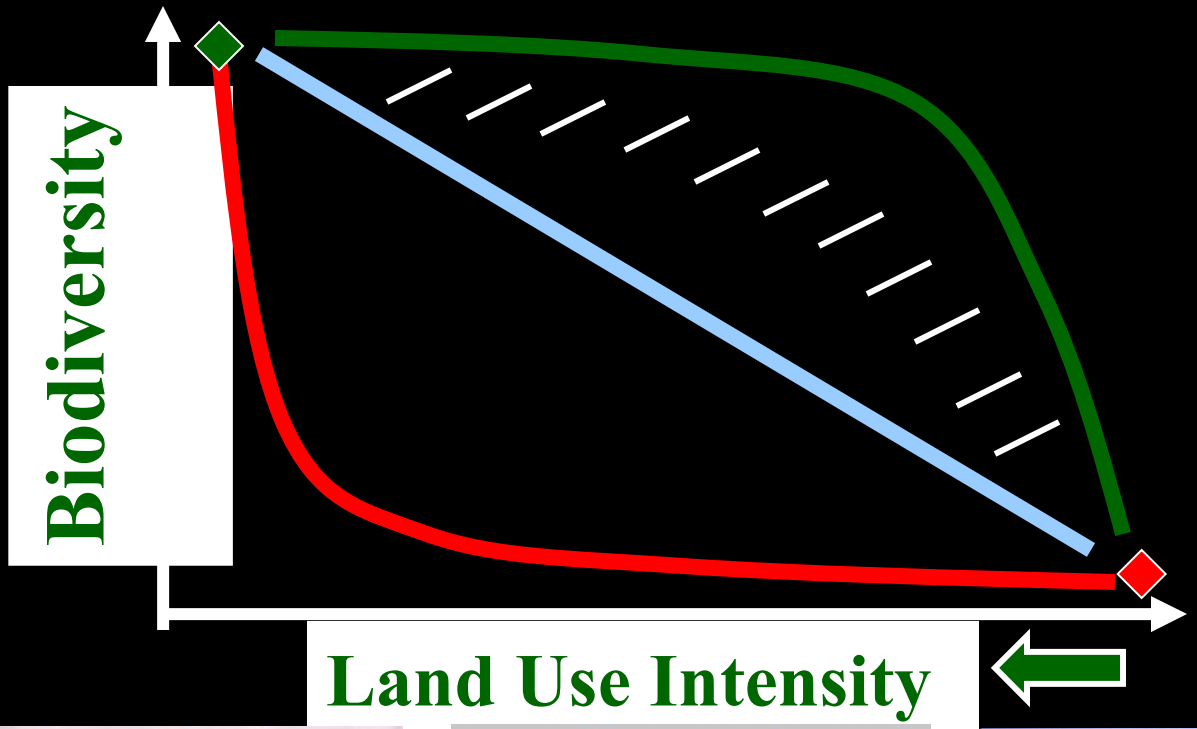



Biodiversity in Costa Rican Countryside



Short-term Outlook: Good




New Delhi
NEPAL
PAKISTAN
Long-term Outlook?
India
Calcutta
Bombay
Hyderabad
Western Ghats
STUDY SITE
Bangalore
Madras
SRI LANKA


Production Forest


Forest


Shrub

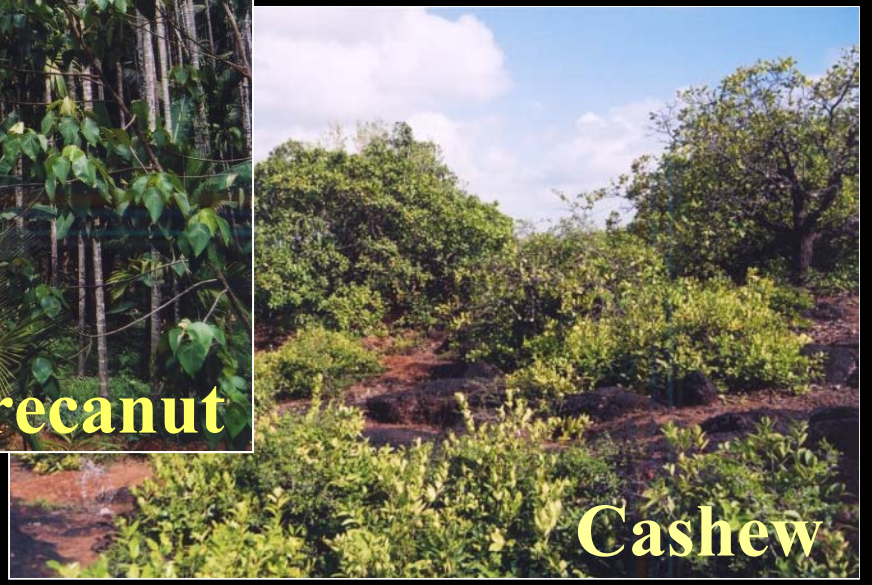

Cashew


Production Forest

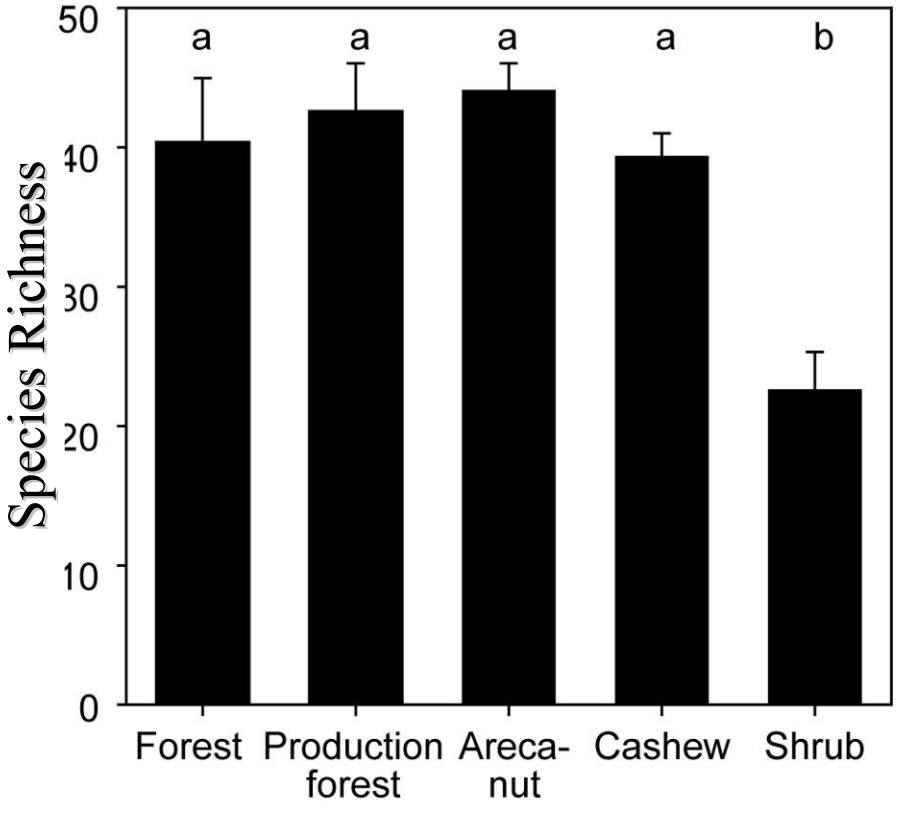

Forest


Arecanut

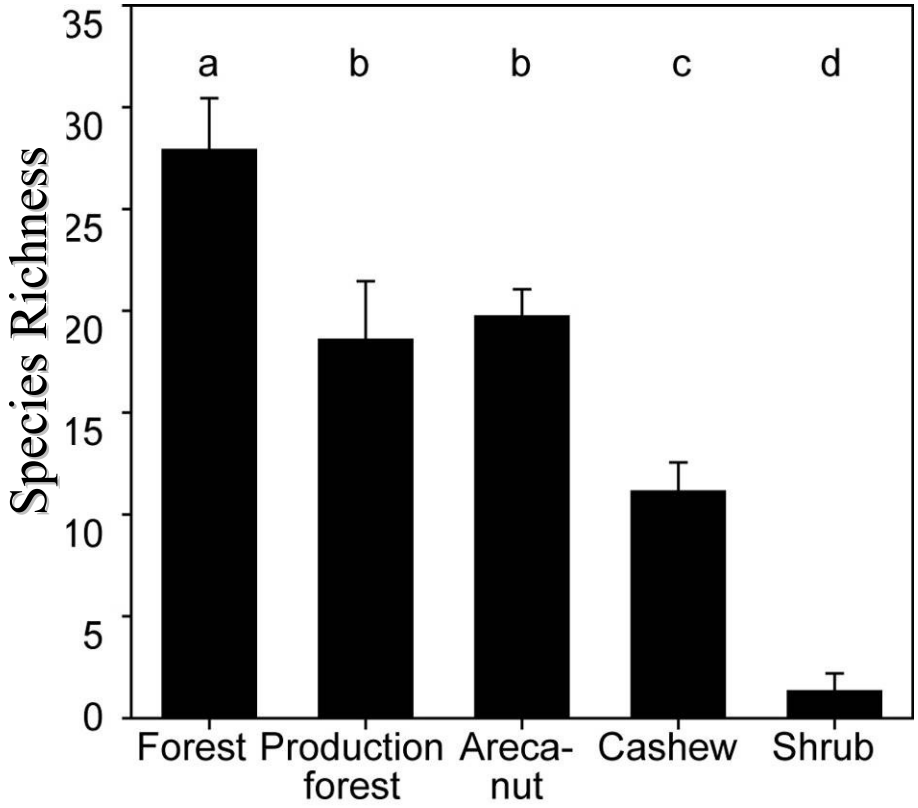

Shrub


Cashew

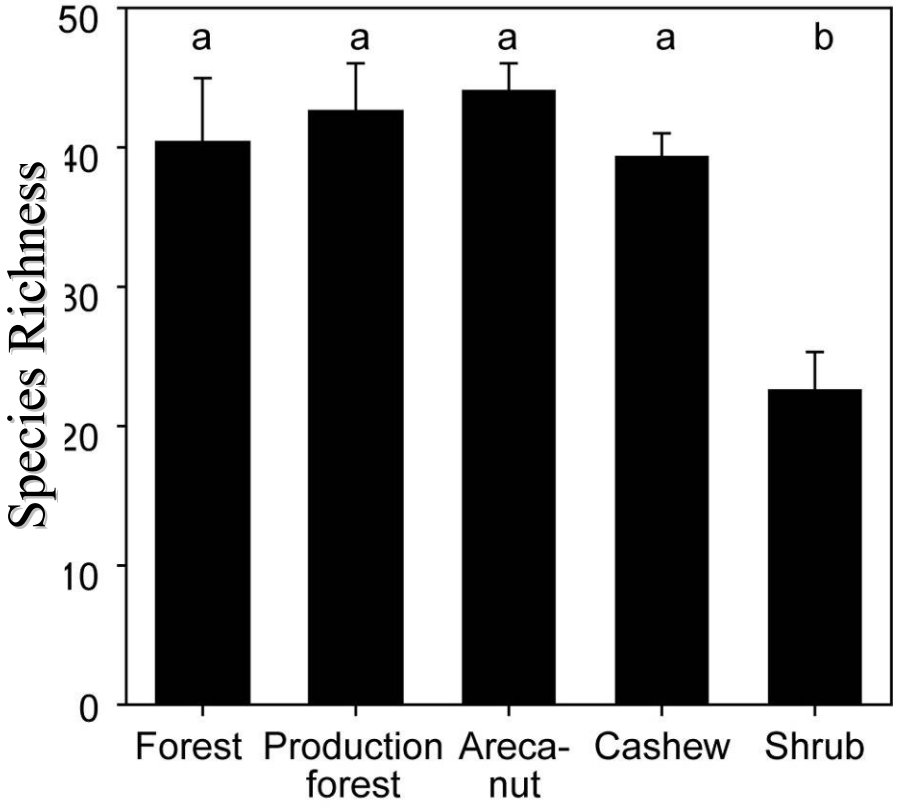
All Birds



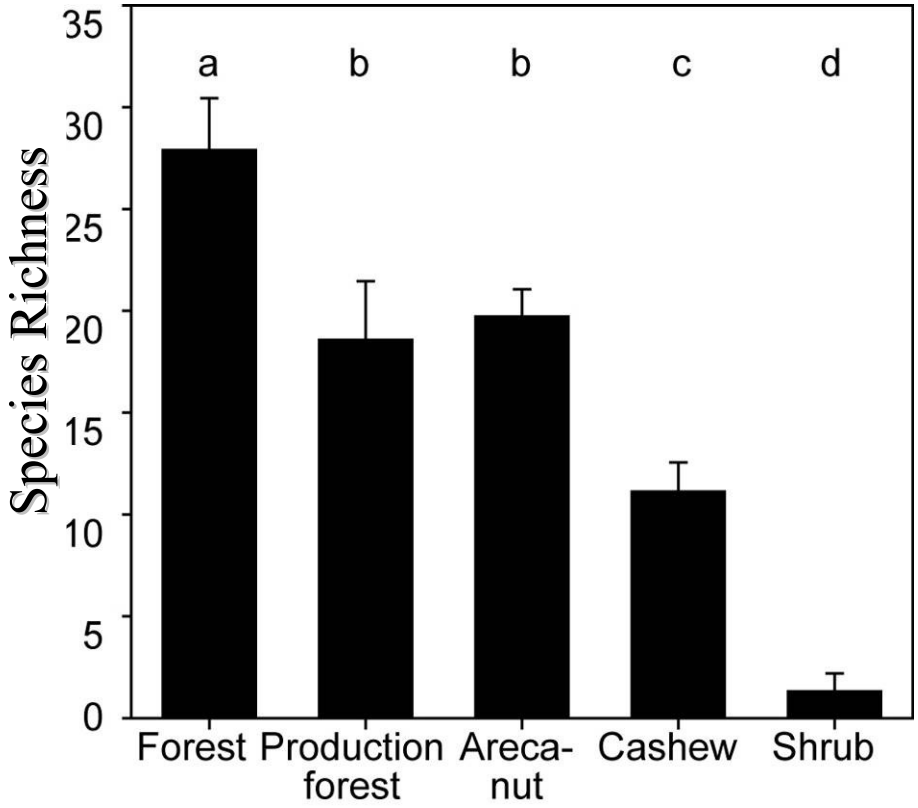
Forest Birds



All Birds



Forest Birds



- 96% of all species detected outside of Forest
- 86% of forest species in Production Forest & Arecanut

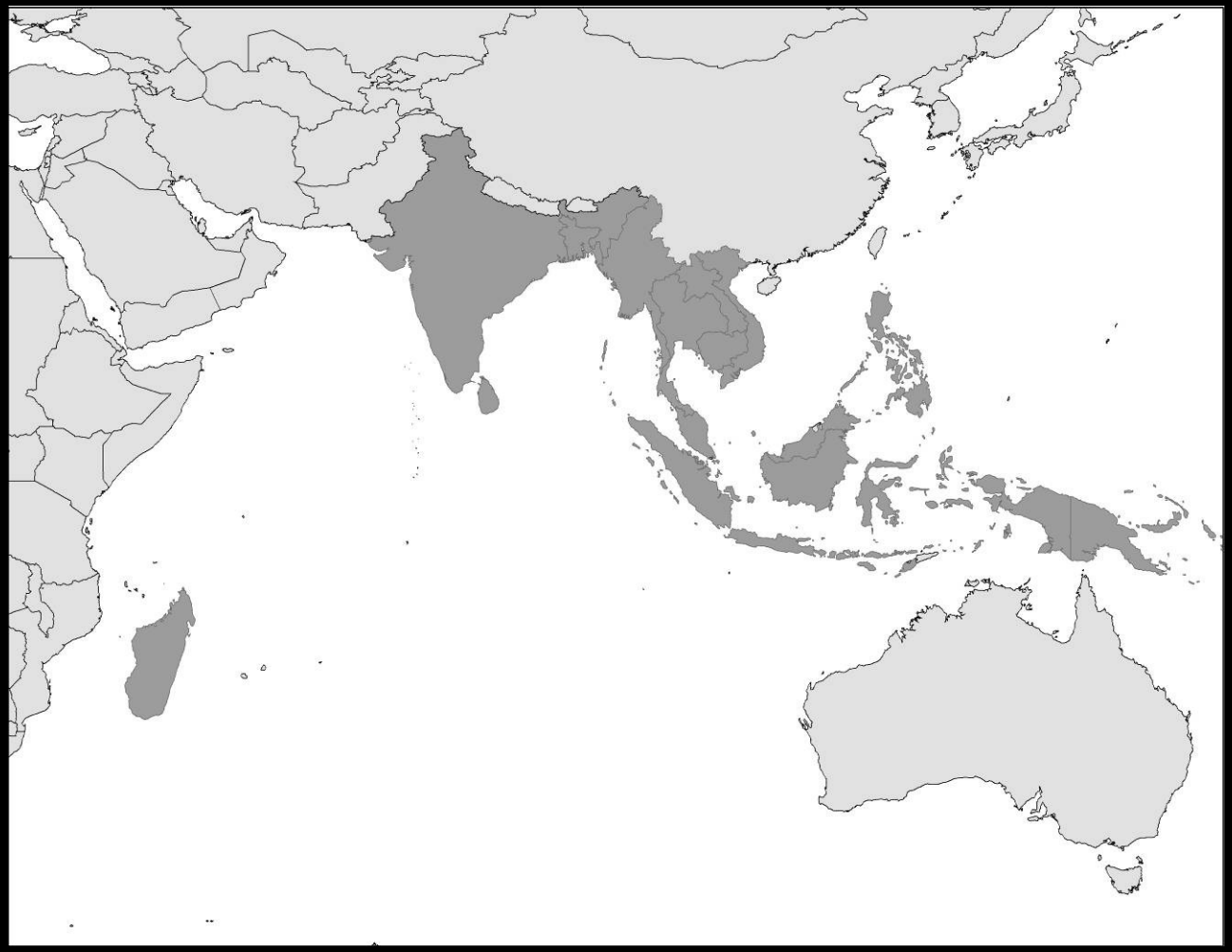
Great Hornbill

Photo credit: D. Behrens

Malabar Grey Hornbill

Photo credit: M.S. Ashok

Countries with Significant Arecanut Cultivation



Beyond Reserves

- No substitute for native habitat

Protected areas key

- High potential conservation value in many widespread production systems

Window of opportunity

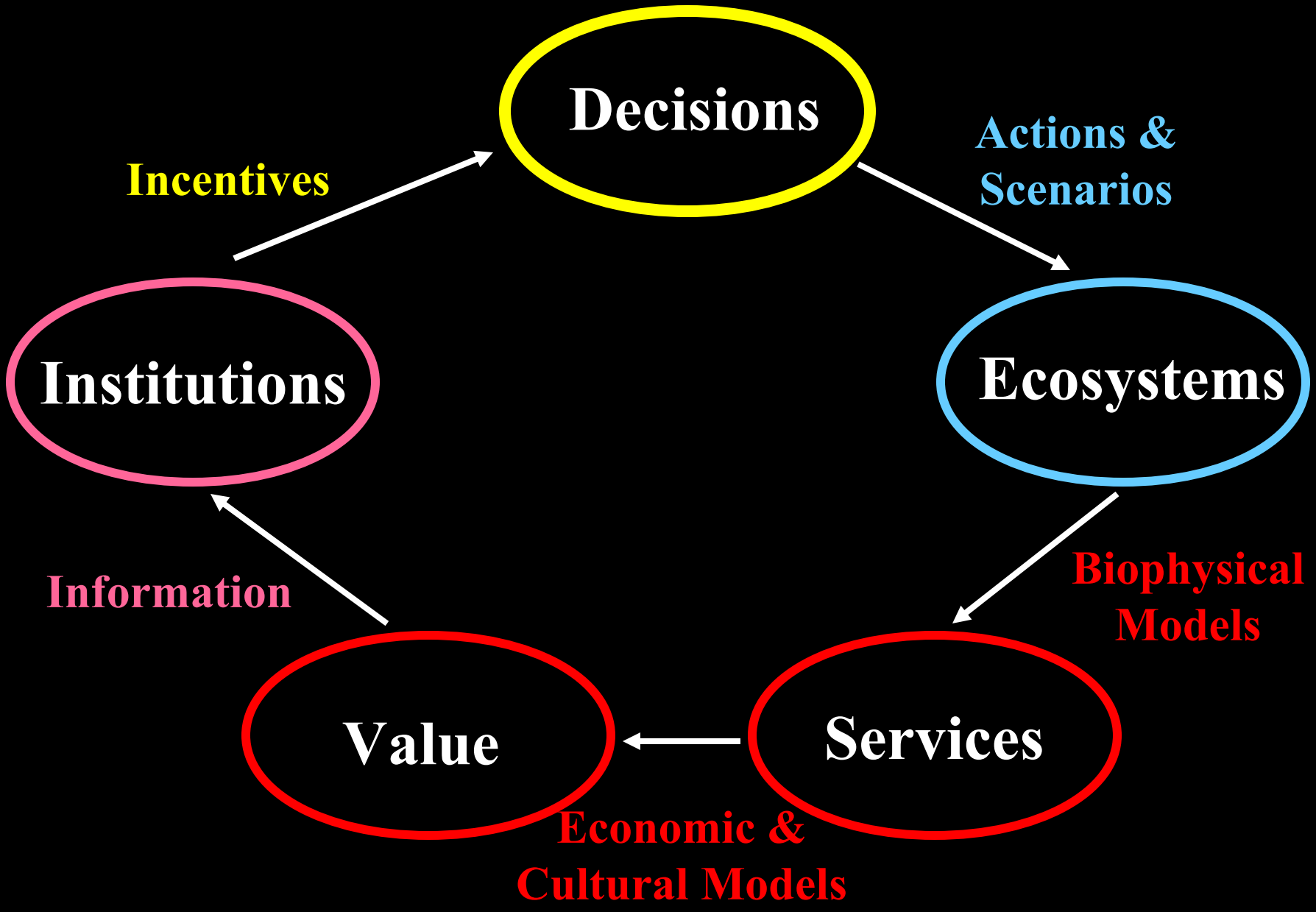
A New Business Model

beyond reserves

beyond charity

beyond biodiversity

Mainstream


Decisions
Actions &
Scenarios
Incentives
Institutions
Ecosystems
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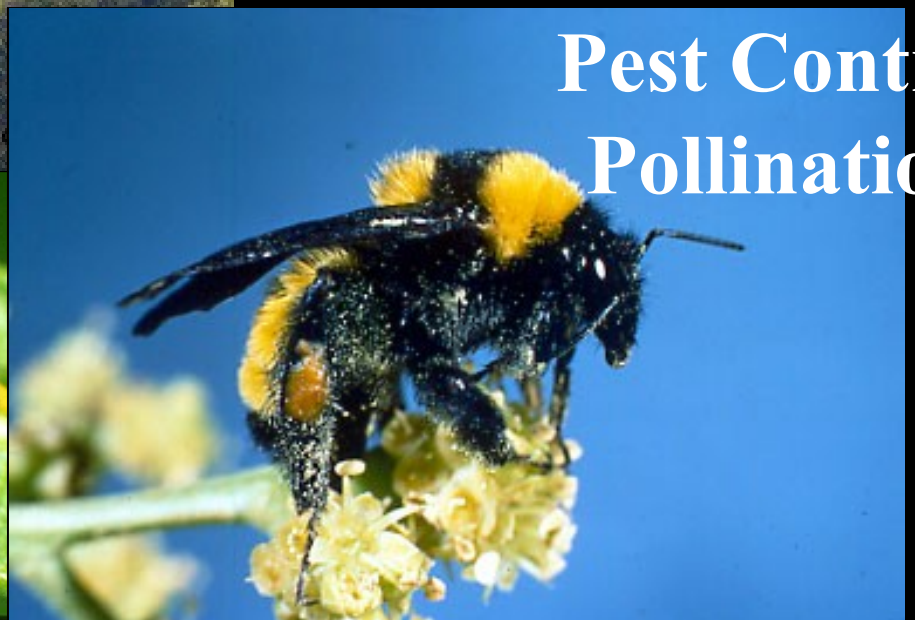
Biophysical
Models
Value
Services
Economic &
Cultural Models

1. Provisioning Services

Seafood
Crops & Livestock
Forest Products

2. Regulating Services



Climate Stabilization
Water Supply
Fire Prevention
Flood Control
Sedimentation Control
Pest Control
Pollination

3. Cultural Services

Spiritual Values
Inspiration
Aesthetic Values
Knowledge Systems
Educational Values
Sense of Place
Recreation
Ecotourism

4. Supporting Services & Preservation of Options

Primary Production

Biodiversity

Resilience

Satoyama

Provisioning
Regulating
Cultural &
Supporting
Services

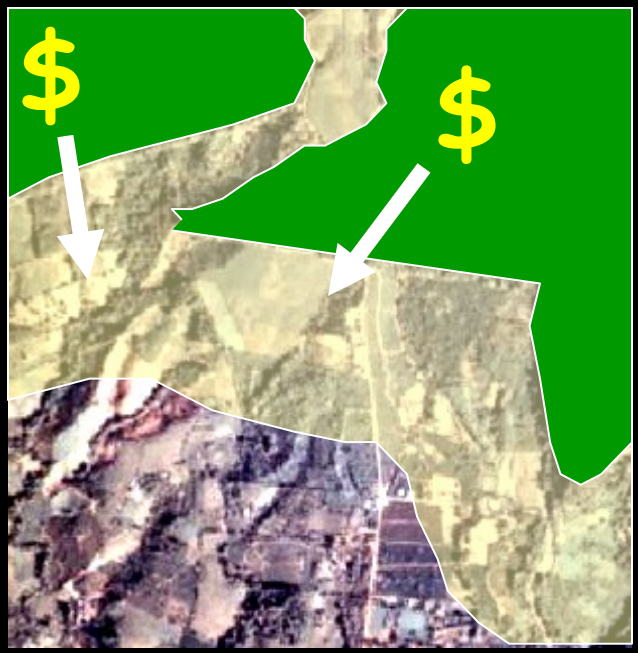
& Options

Photo ~ Tokai no Inaka

Valuing Ecosystem Services

Global
Synthetic

Valuing Ecosystem Services

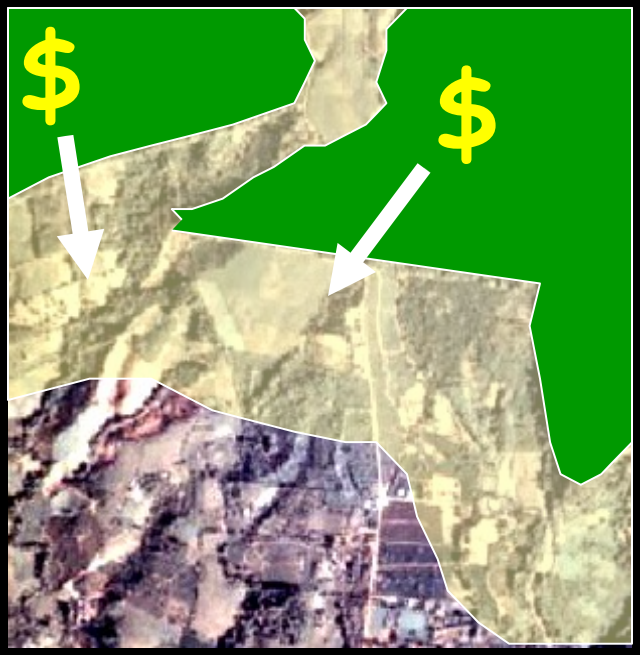


Local
Specific

Value of rainforest:
US$ 60,000/year
to 1 farm
(Ricketts et al. 2004 *PNAS*)

Valuing Ecosystem Services

Global
Synthetic



Local
Specific

<u>Value of rainforest</u>:
US$ 60,000/year
to 1 farm
(Ricketts et al. 2004 *PNAS*)

The Natural Capital Project

STANFORD UNIVERSITY

1. Science → new tools
2. Demonstration in sites / sectors globally
3. Engaging leaders

InVEST

Integrated Valuation of Ecosystem Services & Tradeoffs

Scenario Tool

How will ecosystem service values change…

With climate change?

With population growth?

With a new policy or program?

What is the Return on Investment of restoring riparian habitat, in terms of

agricultural revenues

drinking water quality

erosion control

carbon sequestration

& *biodiversity*?

InVEST 1.0 Beta can map

Biodiversity

Water pollution regulation

Carbon sequestration & storage

Managed timber production

Crop pollination

Avoided reservoir sedimentation

The next version of InVEST will add

- Tourism & recreation
- Agricultural production
- Flood mitigation
- Hydropower production
- Irrigation
- Open access products

Marine InVEST

Data inputs on natural capital

Land Use

Soil type

Topography

Data inputs on built capital

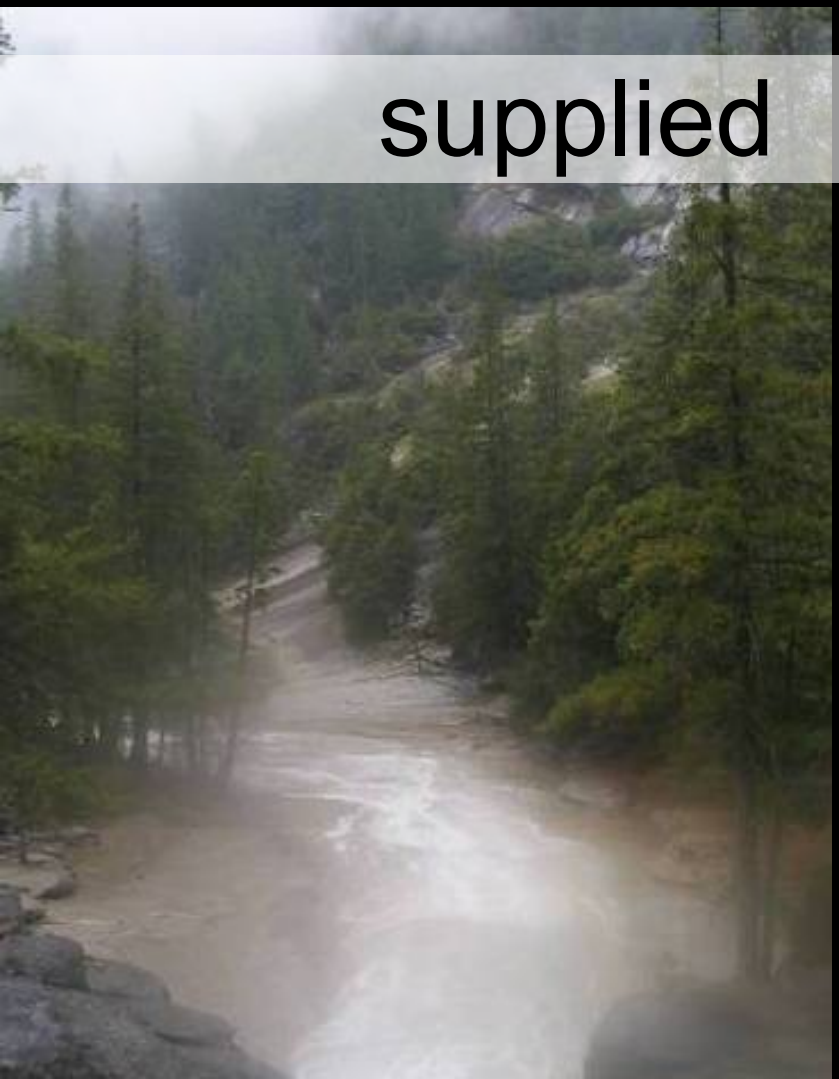
Roads

Cities

Infrastructure

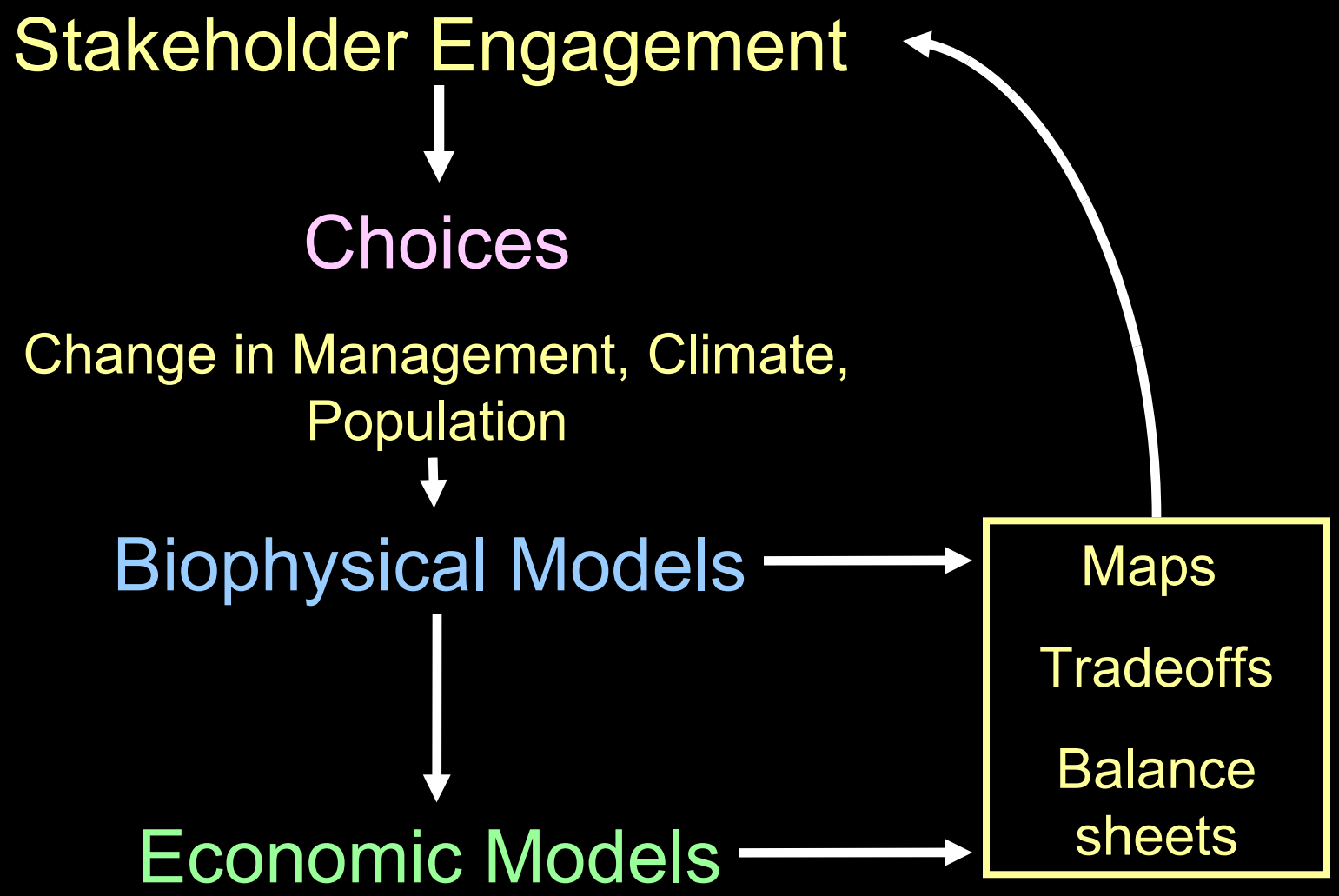
Outputs of ecosystem service levels

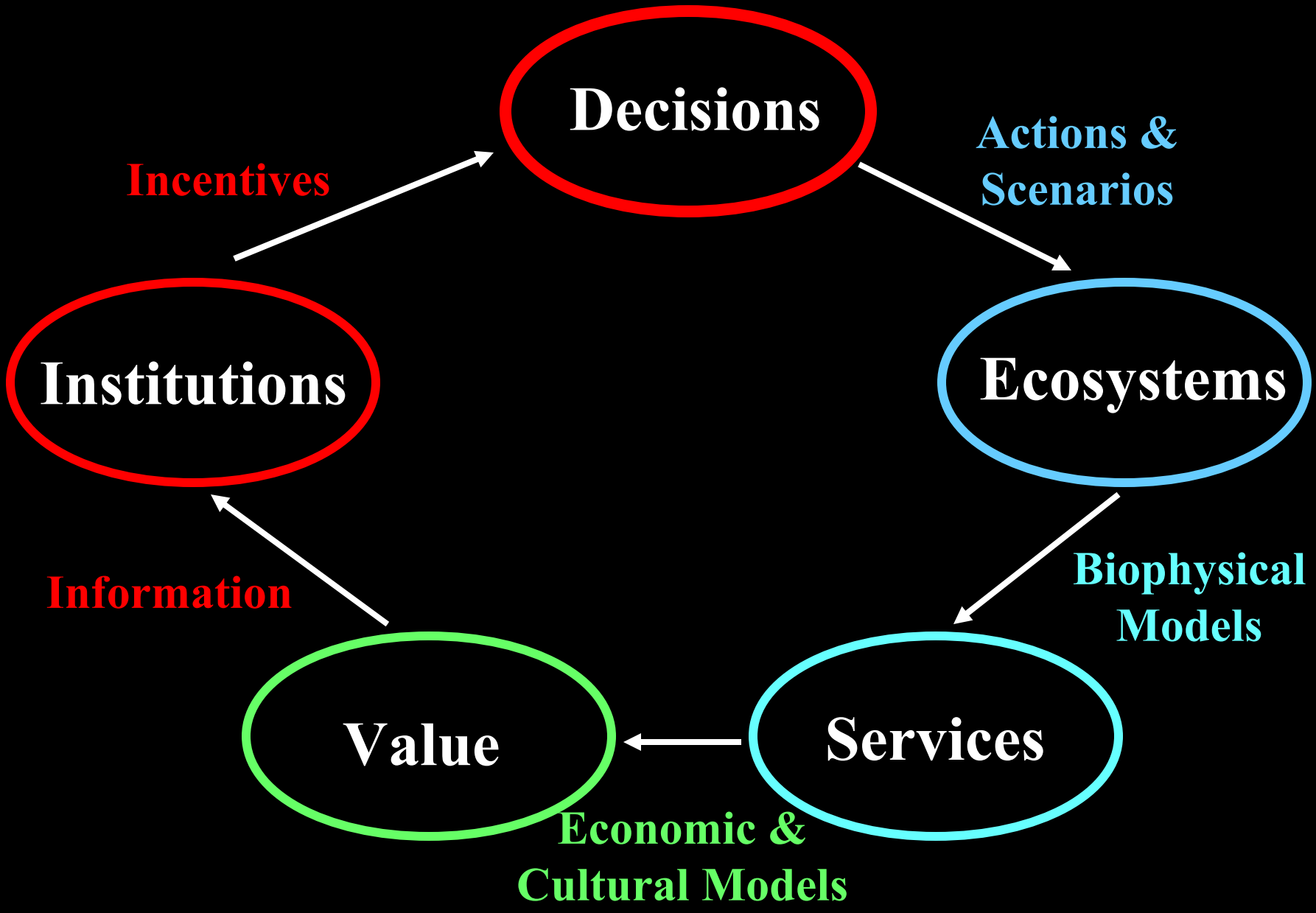
supplied and demanded



Economic Valuation

- Market valuation
  - Carbon
  - Timber
- Avoided damage costs
  - Water treatment
  - Flood risk
  - Reservoir maintenance
- Production economics
  - Water for irrigation
  - Crop pollination


Stakeholder Engagement
Choices
Change in Management, Climate, Population
Biophysical Models
Economic Models
Maps
Tradeoffs
Balance sheets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The Natural Capital Project

The Nature Conservancy

WWF

STANFORD UNIVERSITY

Land Use Planning in Oregon

The Nature Conservancy

WWF

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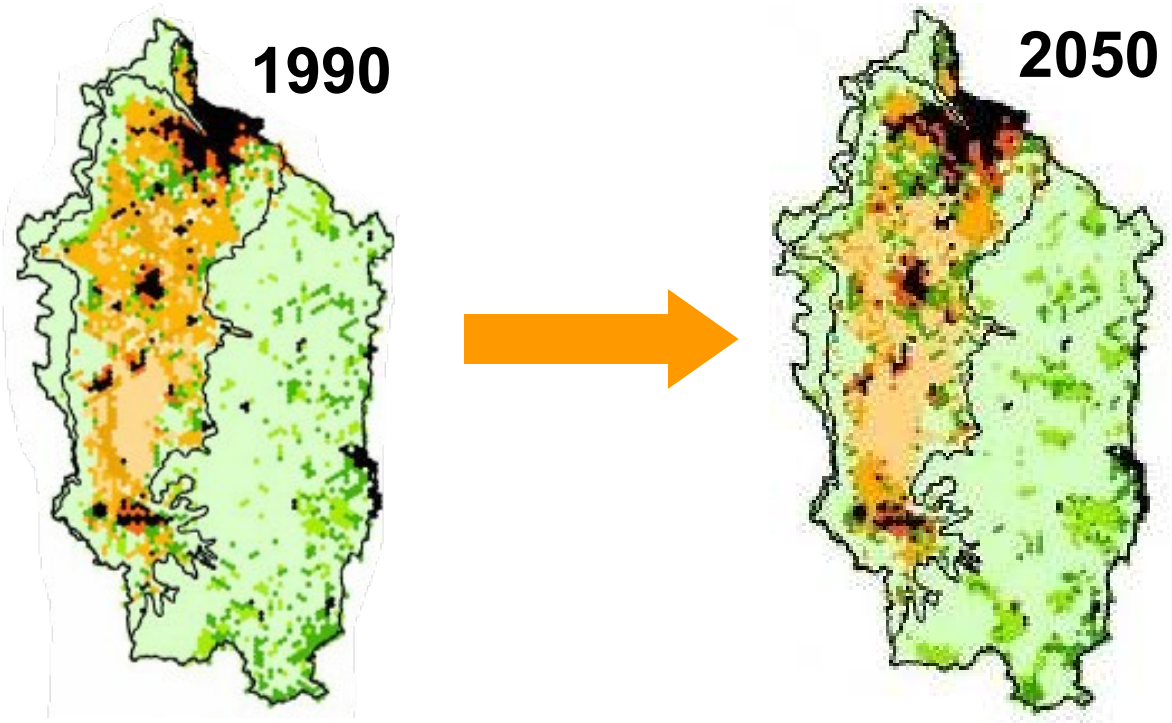
- How to balance goals?
- How to stabilize climate?

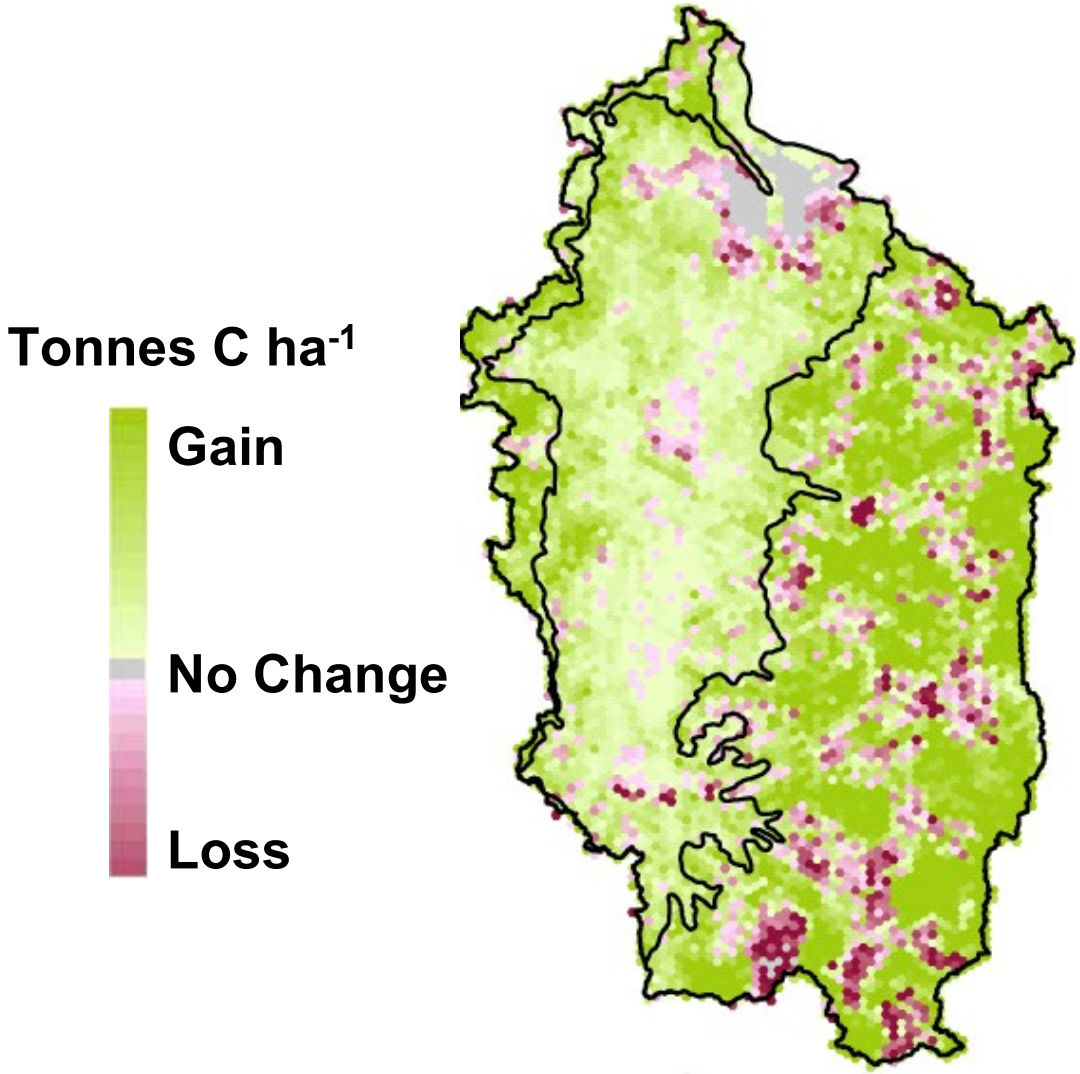
Willamette Basin

Scenarios and Decisions

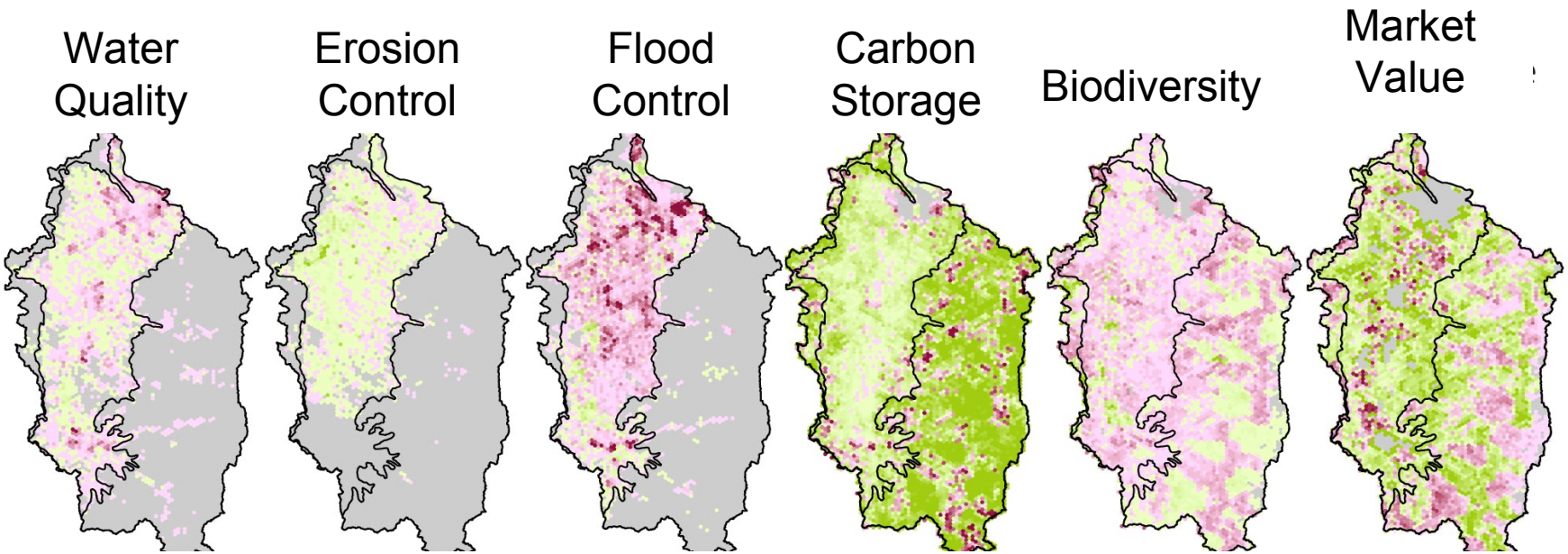
Population doubling and development in the Basin over the next 50 years:



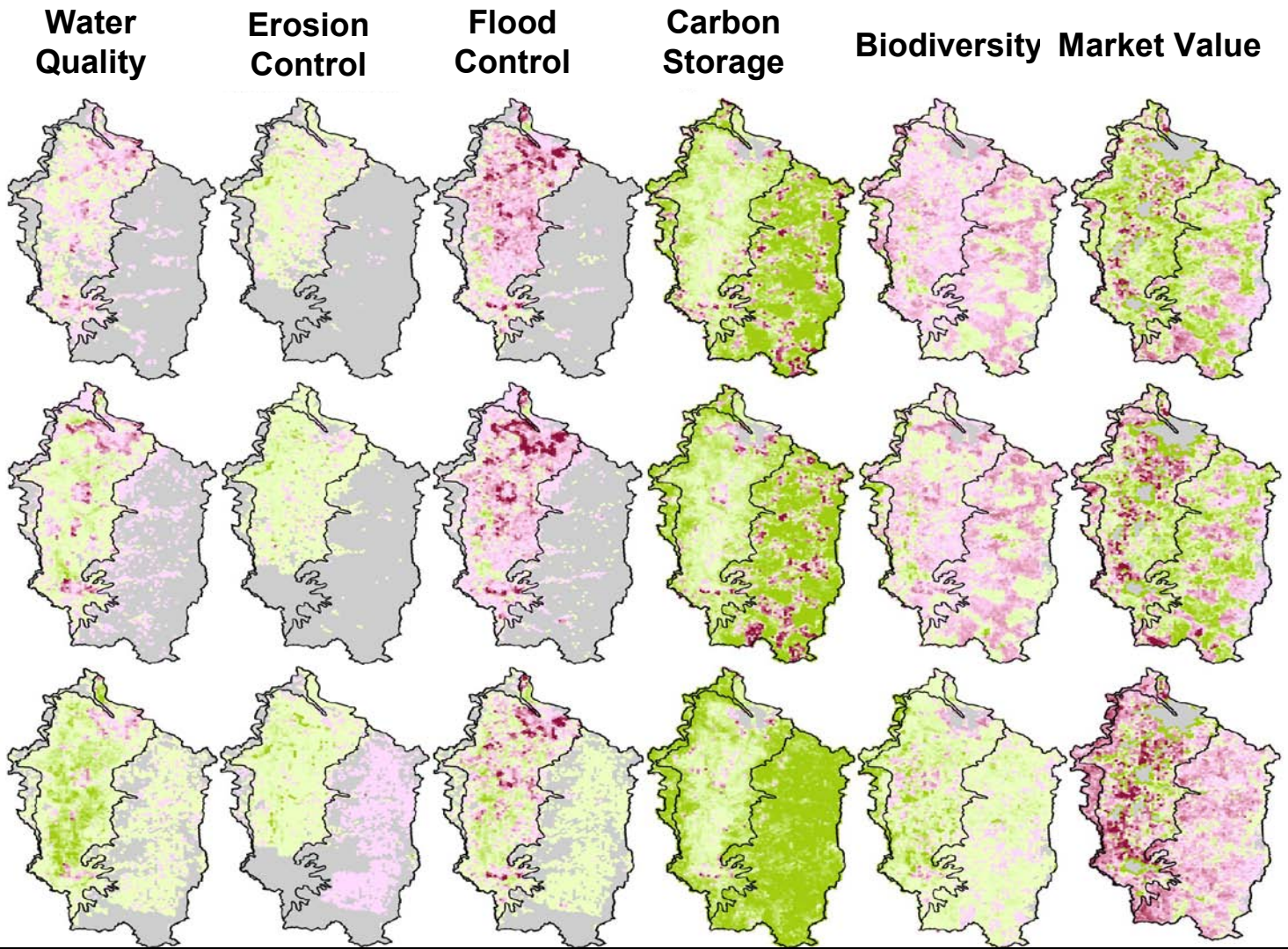
Change in carbon storage



Changes in multiple services

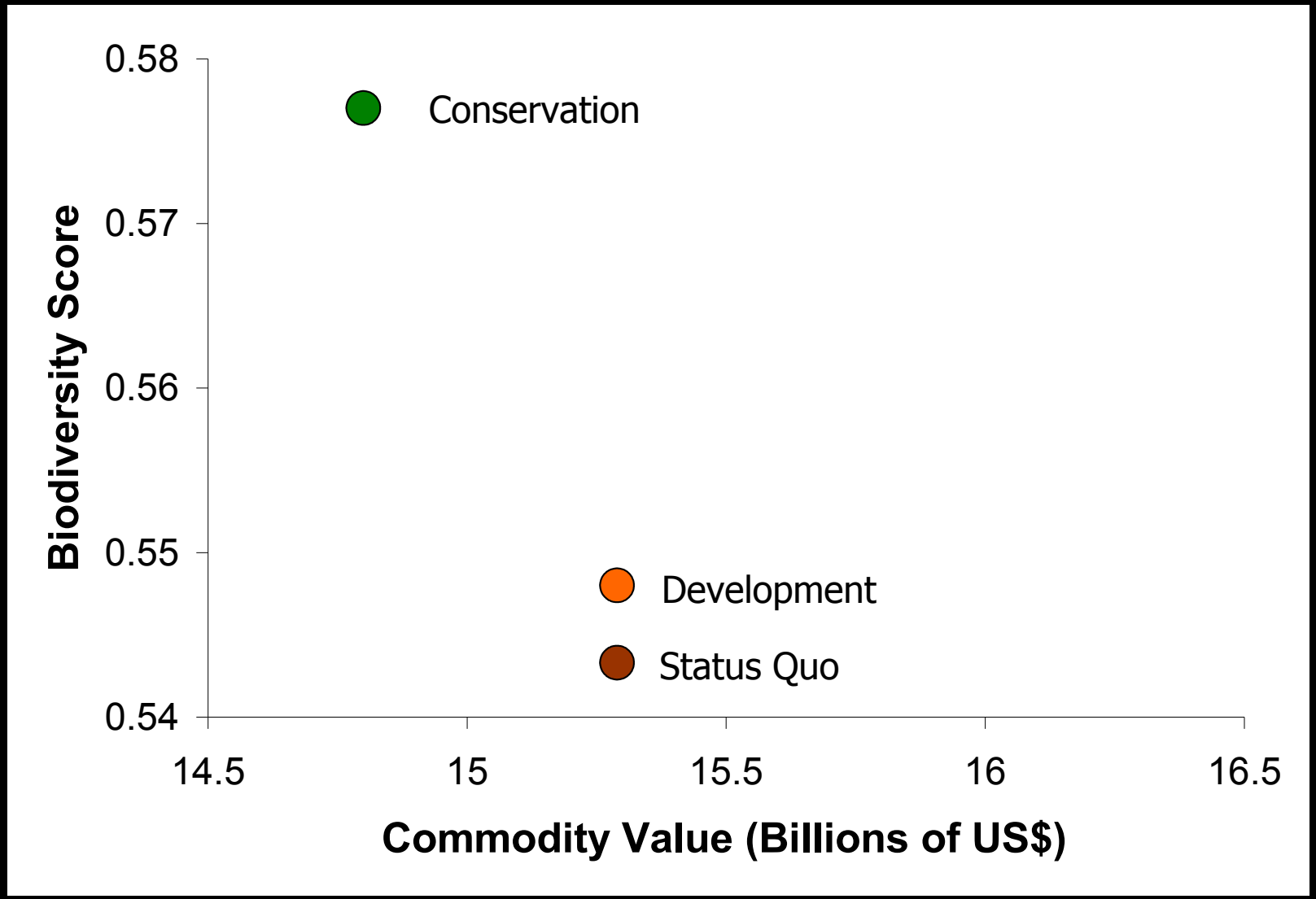


Analysis of alternative futures



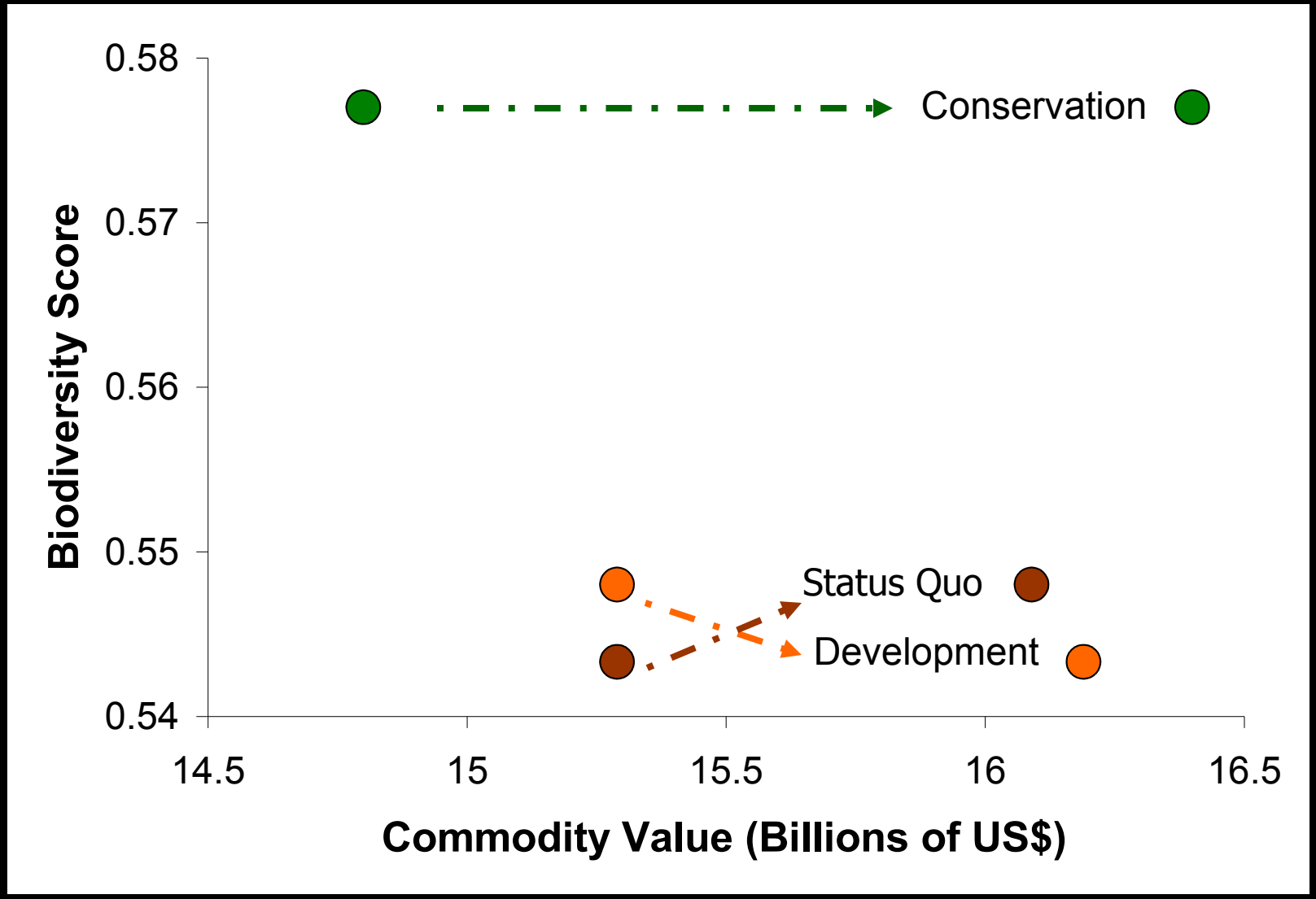
Formal Carbon Market

Without



Formal Carbon Market

Without ***With***



Land Use Planning in Hawai'i

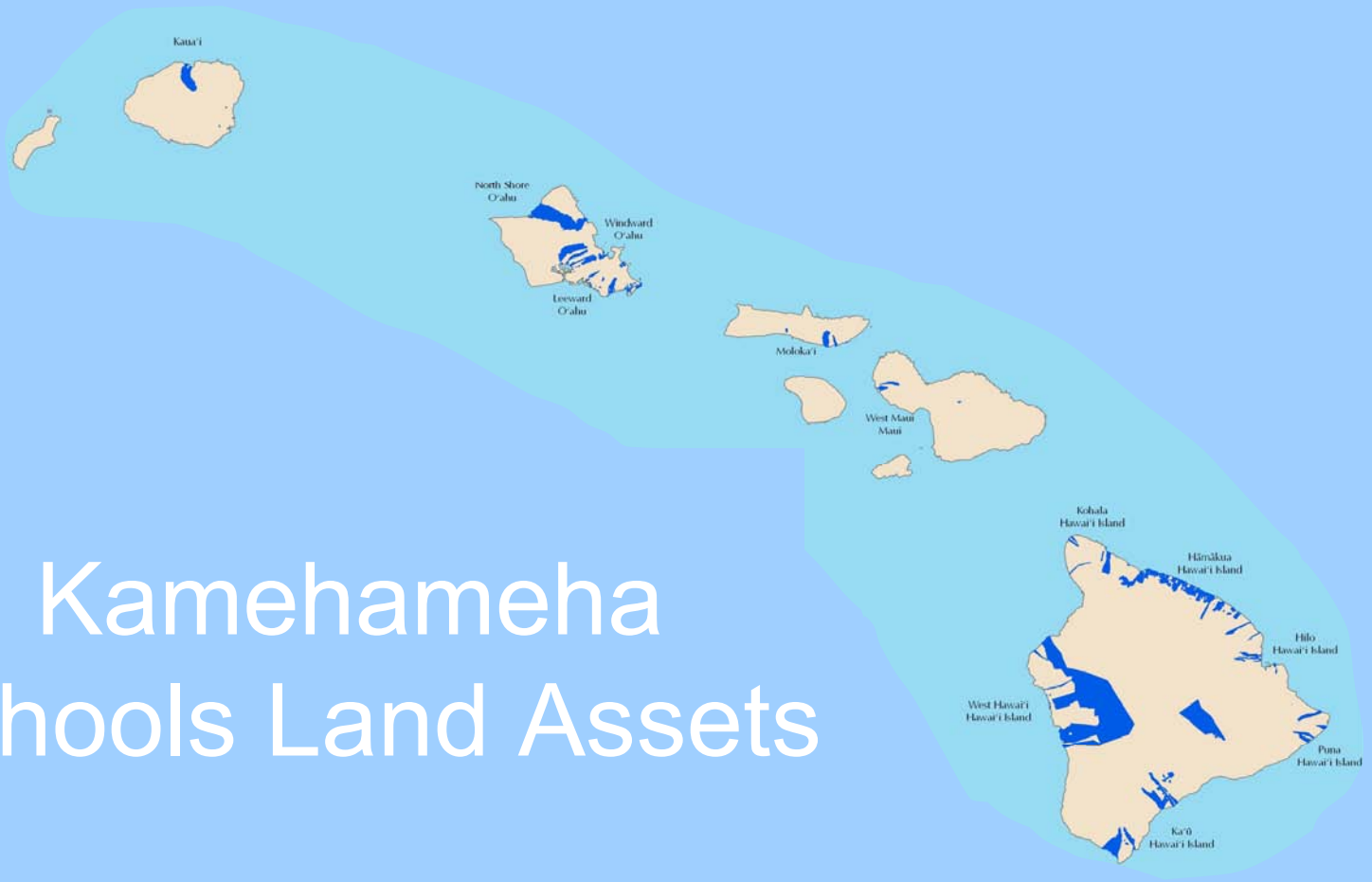
The Nature Conservancy

WWF

STANFORD UNIVERSITY

- How to balance goals?
- How to stabilize climate?

Kamehameha Schools Land Assets



A new approach, balancing

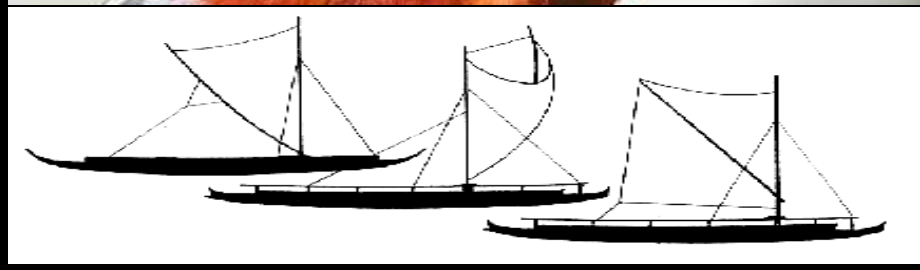
Economic value

Environmental value

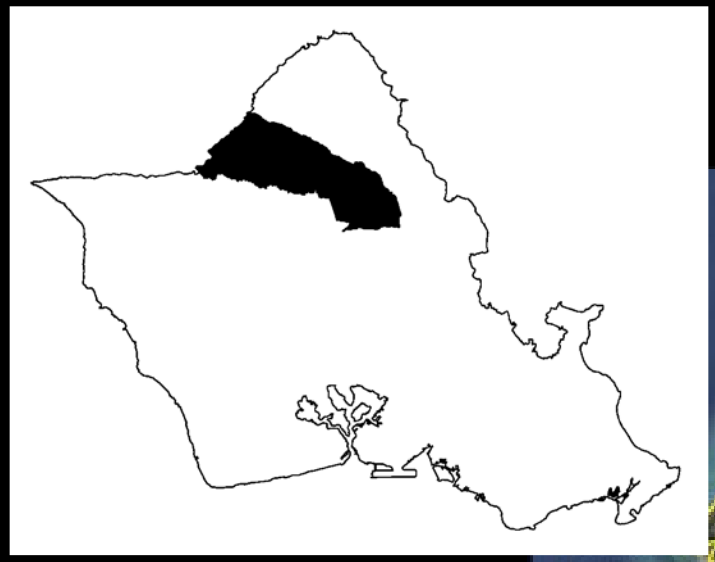
Cultural value

Educational value

Community value

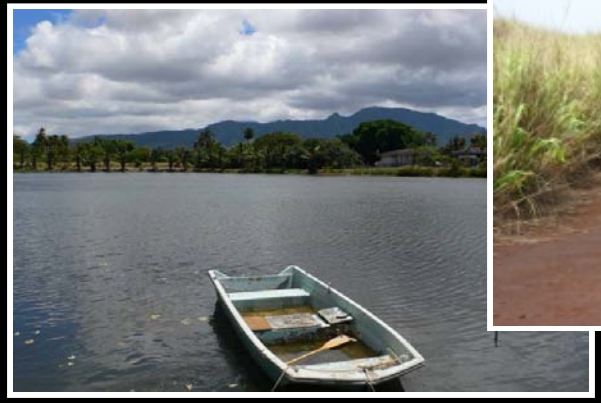


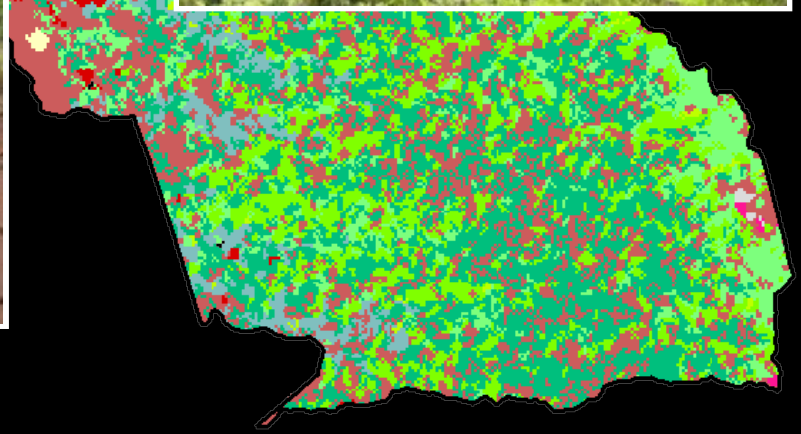
Kamehameha Schools
Land Use Planning



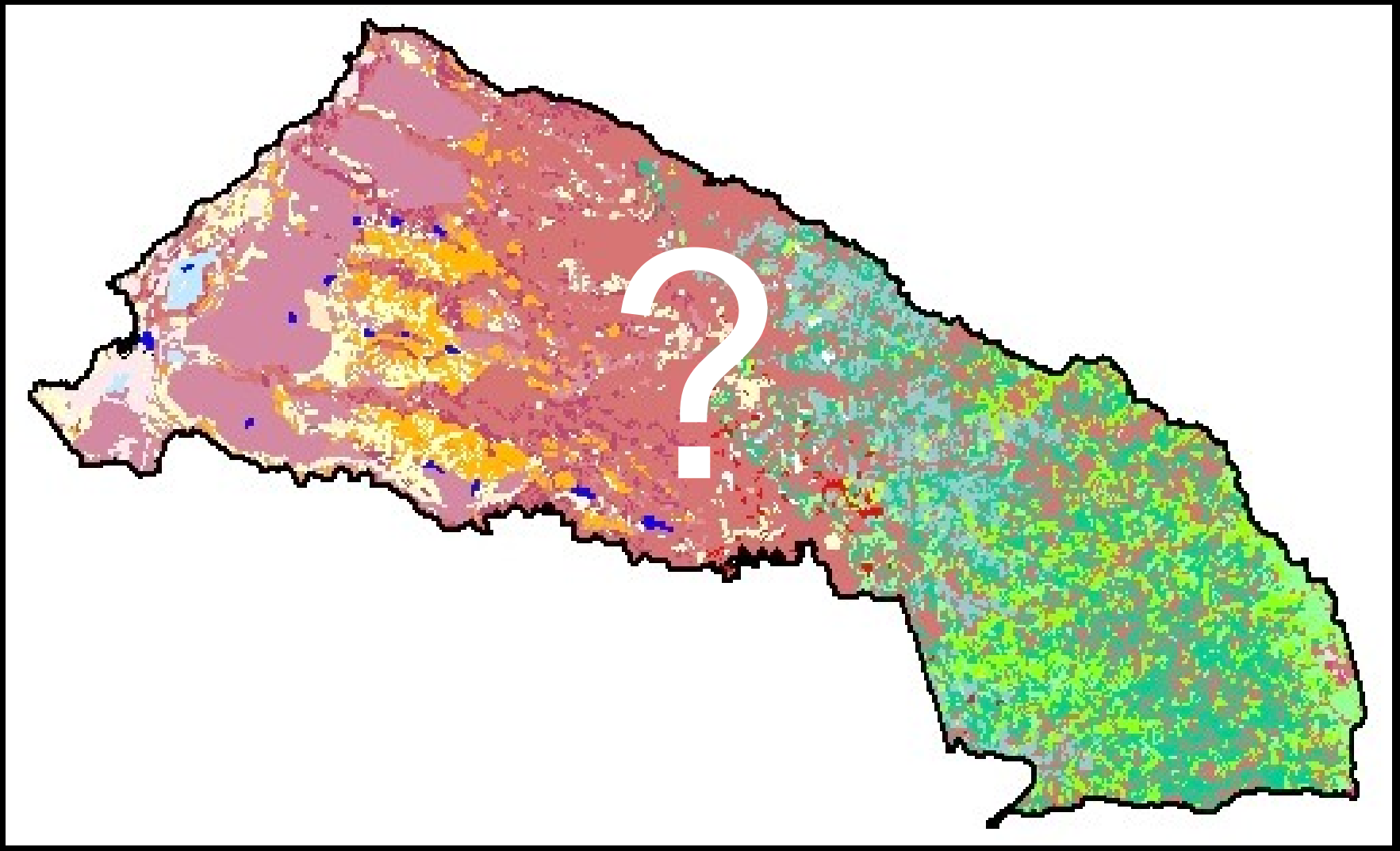
Island of O`ahu

Current Landscape



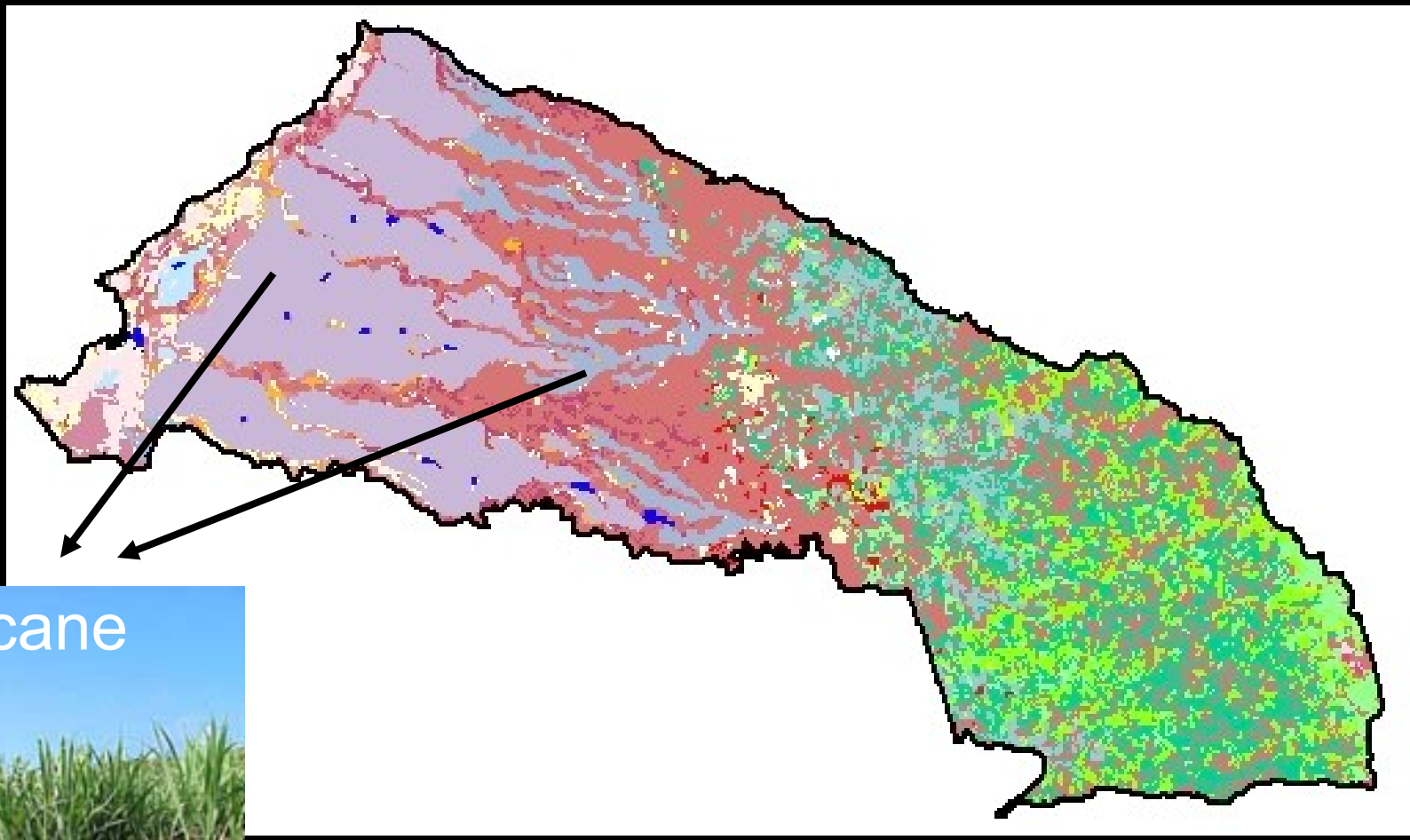


But, what should this landscape look like in the future to balance these goals?

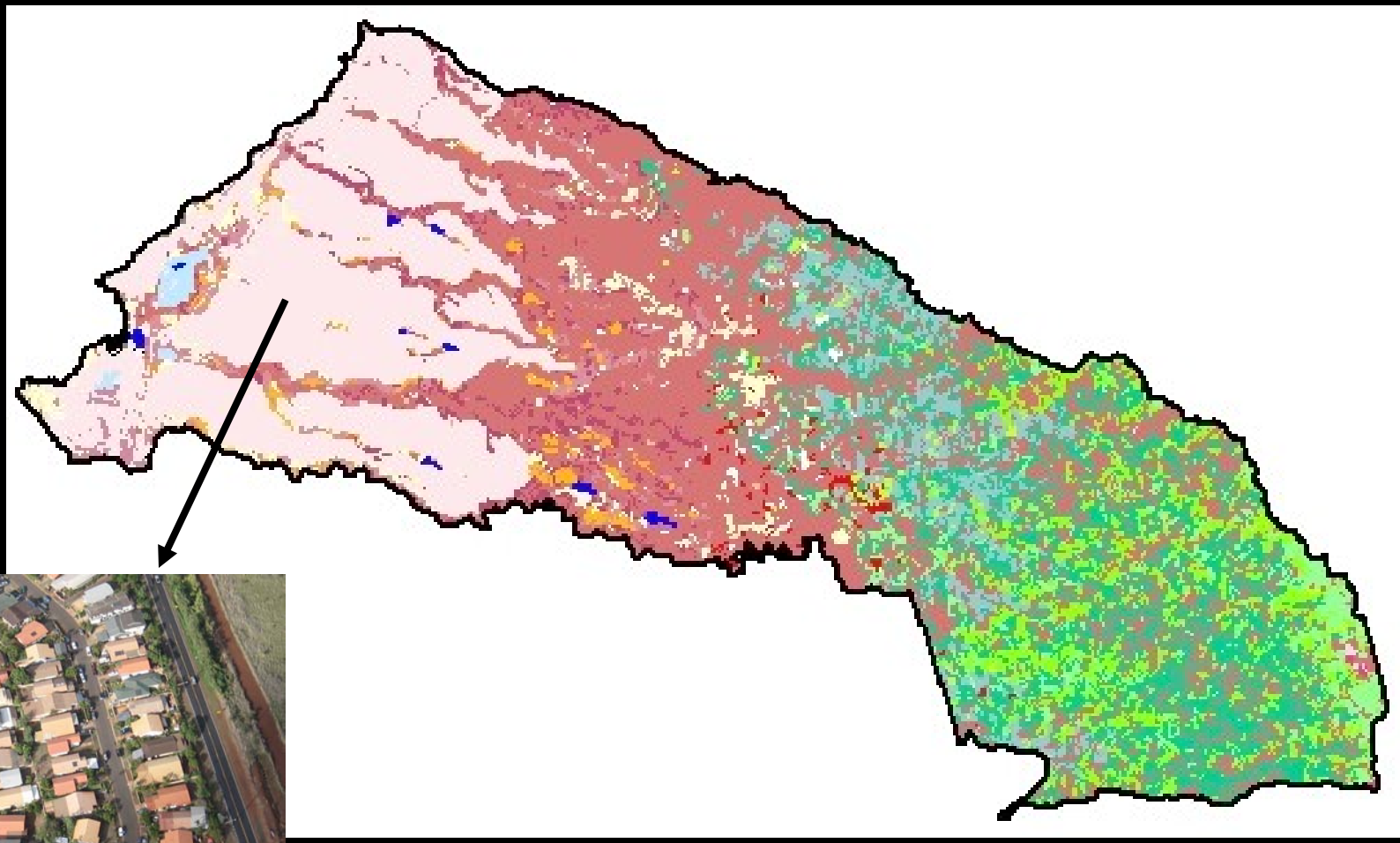


Developing scenarios

Growing a biofuels feedstock



Expanding residential development



Housing

Diversified agriculture & forestry

Reforestation

Food crops for local markets

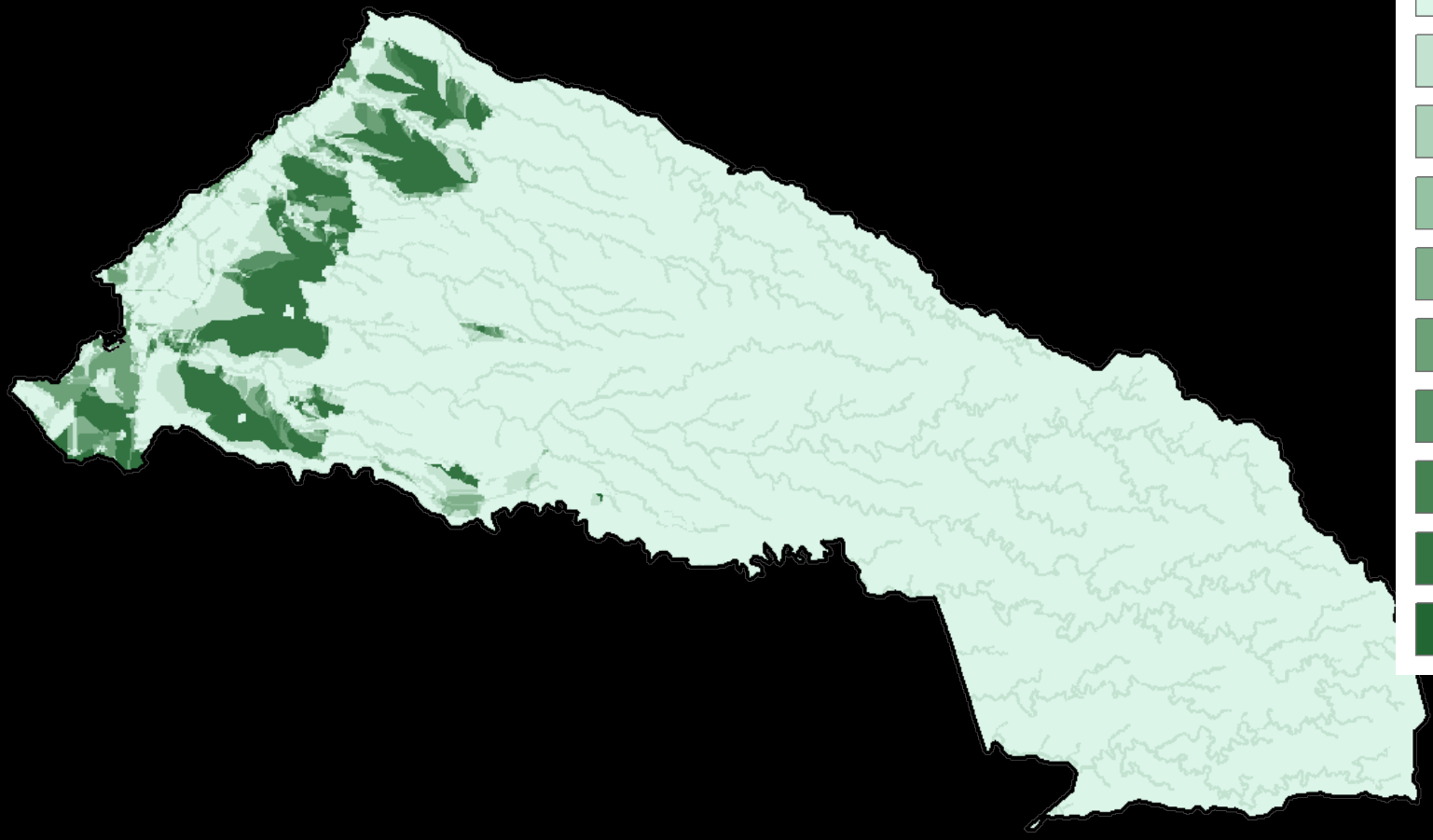
Questions for InVEST

What is the flow of ecosystem services on today's landscape?

How might these service flows change in the future?

Current Landscape: Water Quality

Total Nitrogen Export



Relative Water Quality Score

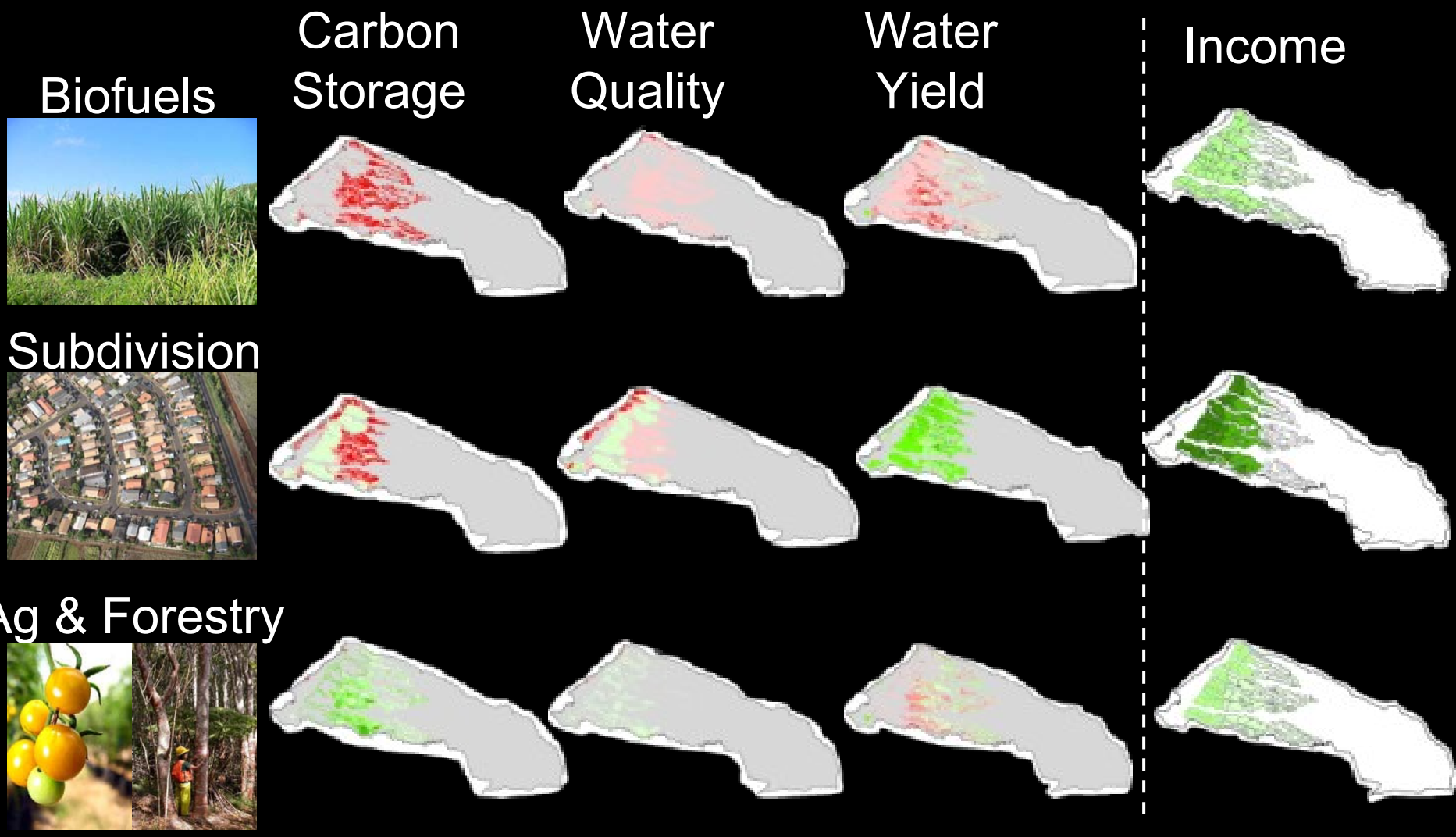
0.2 - 13.98
13.99 - 27.76
27.77 - 41.54
41.55 - 55.32
55.33 - 69.1
69.11 - 82.88
82.89 - 96.66
96.67 - 110.4
110.5 - 124.2
124.3 - 138

Questions for InVEST

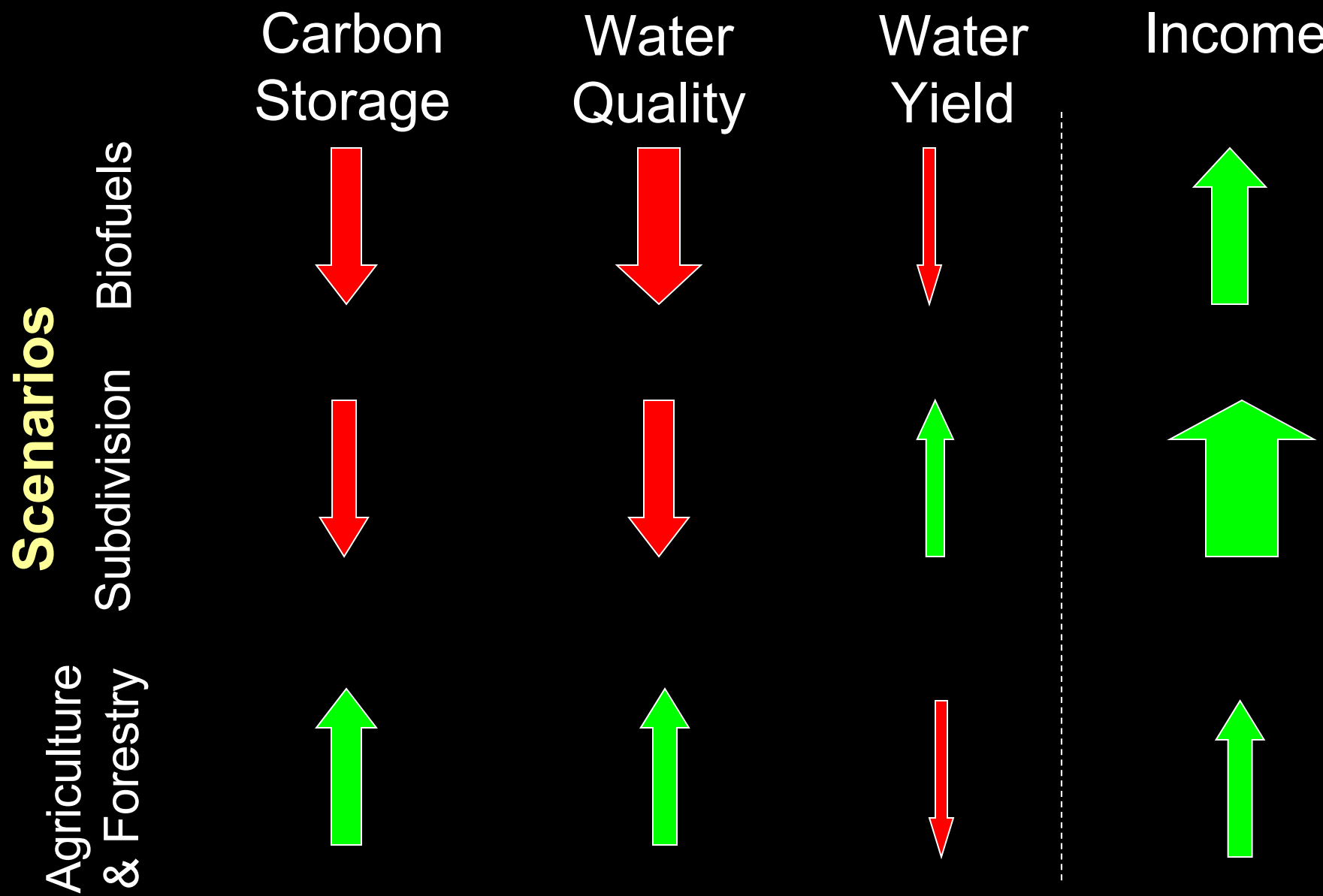
What is the flow of ecosystem services on today's landscape?

How might these service flows change in the future?

Changes in Ecosystem Services



Changes in Ecosystem Services



Diversified agriculture & forestry
~ the desired balance, with income, climate control and clean water benefits.

State Climate & ES Policy

natural capital PROJECT

State of Hawai`i

- Goal?
- Who pays?
- How much?
- To whom?
- For what?
- For how long?

natural capital PROJECT

State of Hawai`i

- Goal?
- Who pays?
- How much?
- To whom?
- For what?
- For how long?

- ↓ GHG emissions
- Consumers
- Tax of US$1 / barrel oil
- Land managers
- C-seq & co-benefits
- ???

The Natural Capital Project

The Nature Conservancy

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- What activities give best returns?
- Where should activities be targeted?

Quito Water Fund

The Natural Capital Project

The Nature Conservancy

WWF

STANFORD UNIVERSITY

- Where should activities be targeted?
- Where and how much should activities be mitigated?

Colombia's Ministry of the Environment

mining

agriculture

transportation

and other major sectors.

The Natural Capital Project

The Nature Conservancy

WWF

STANFORD UNIVERSITY

- Ecosystem Function Conservation Areas
- County Master Planning
- **Payment design**

Looking ahead…

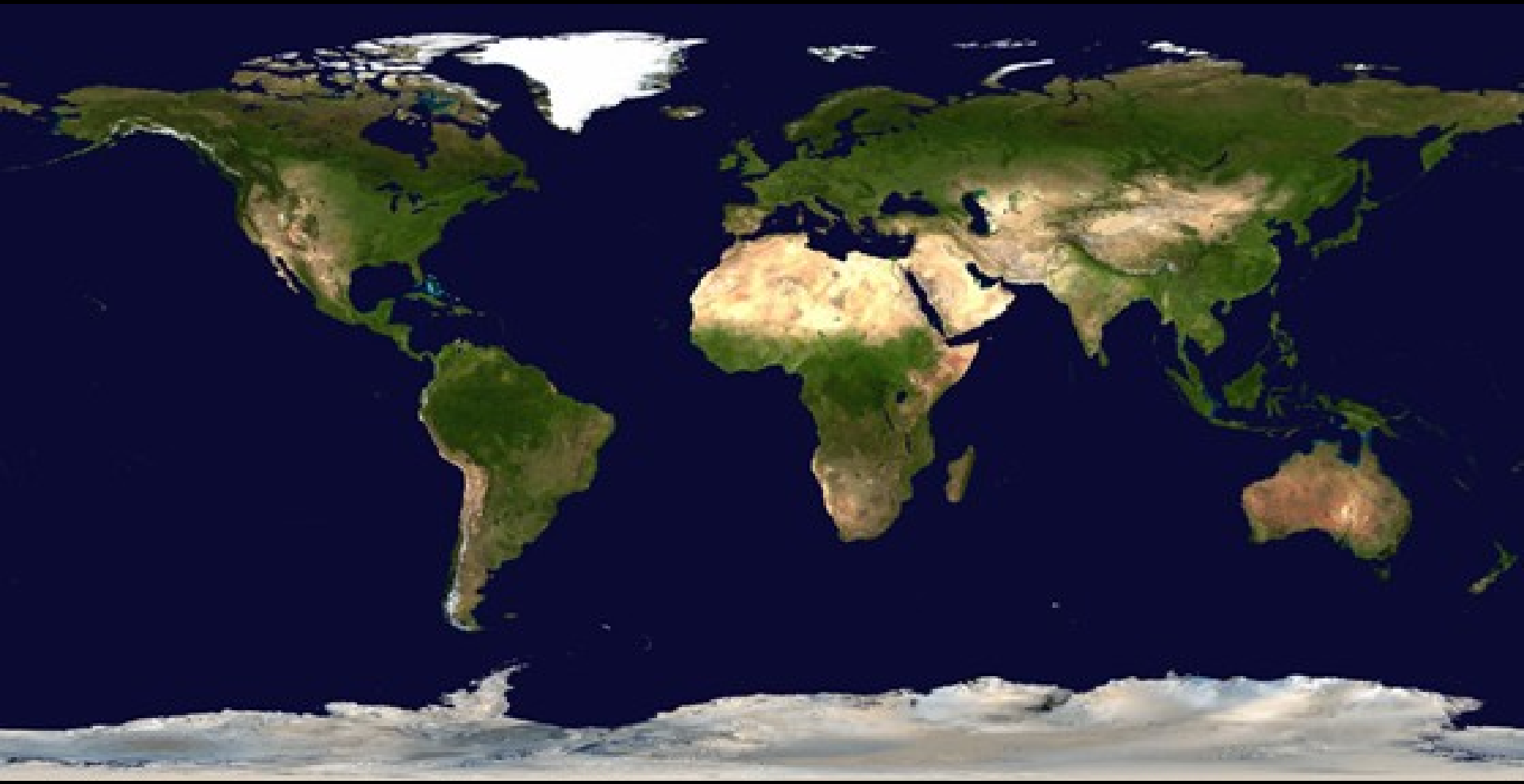

Photo ~ Tokai no Inaka