

LCA in addressing declines in Ecosystem Services Part I: Scoping



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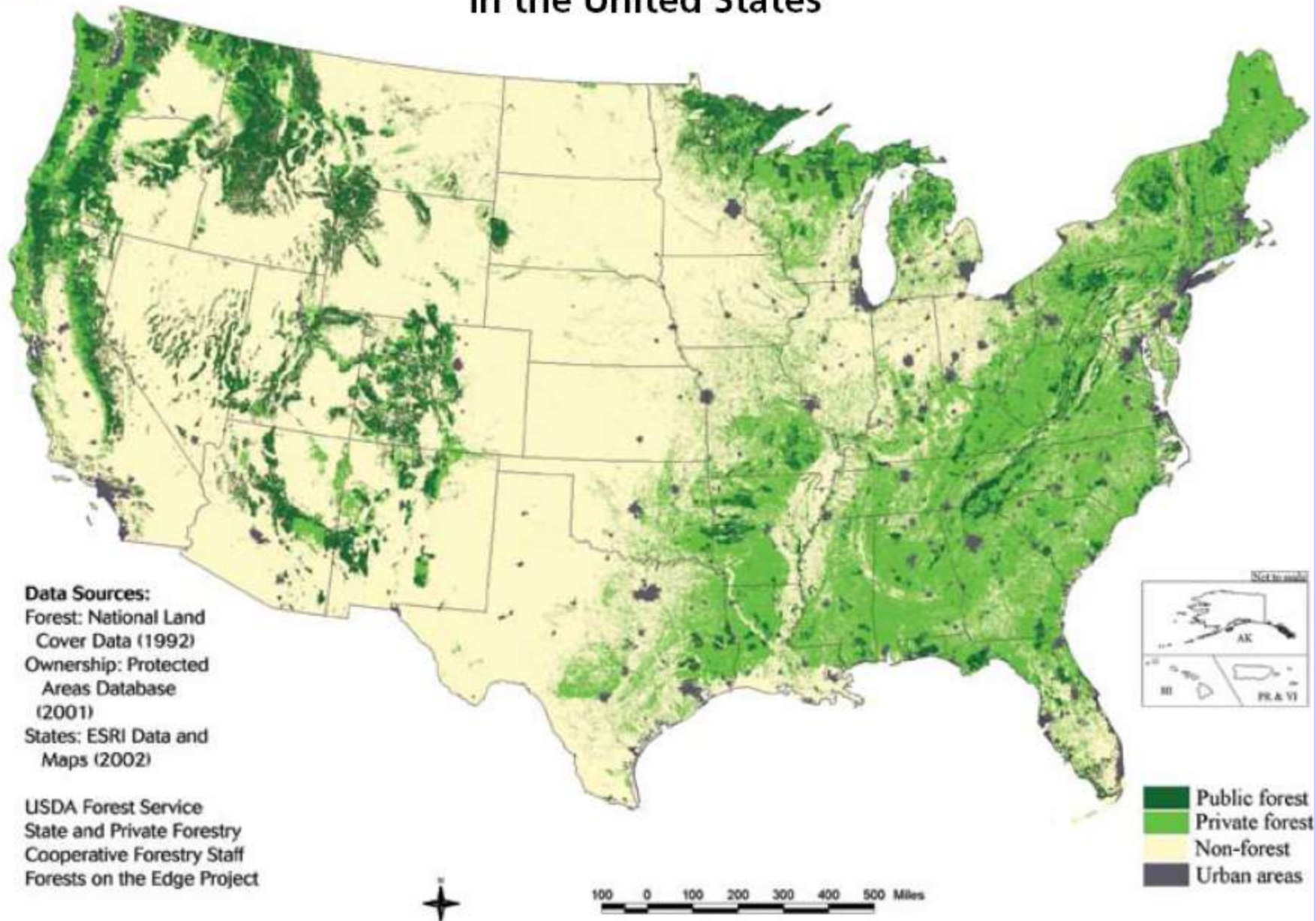
Overview

- I. Forest Service, Ecosystem Services and LCA
- II. Why Ecosystem Services are challenging in LCA
- III. Conditions affecting how appropriate market tools will be to address declines in ecosystem services
- IV. LCA in points of intervention

I. Forest Service, Ecosystem Services and LCA

Public and Private Forest Ownership in the United States

MAP 1



Land area

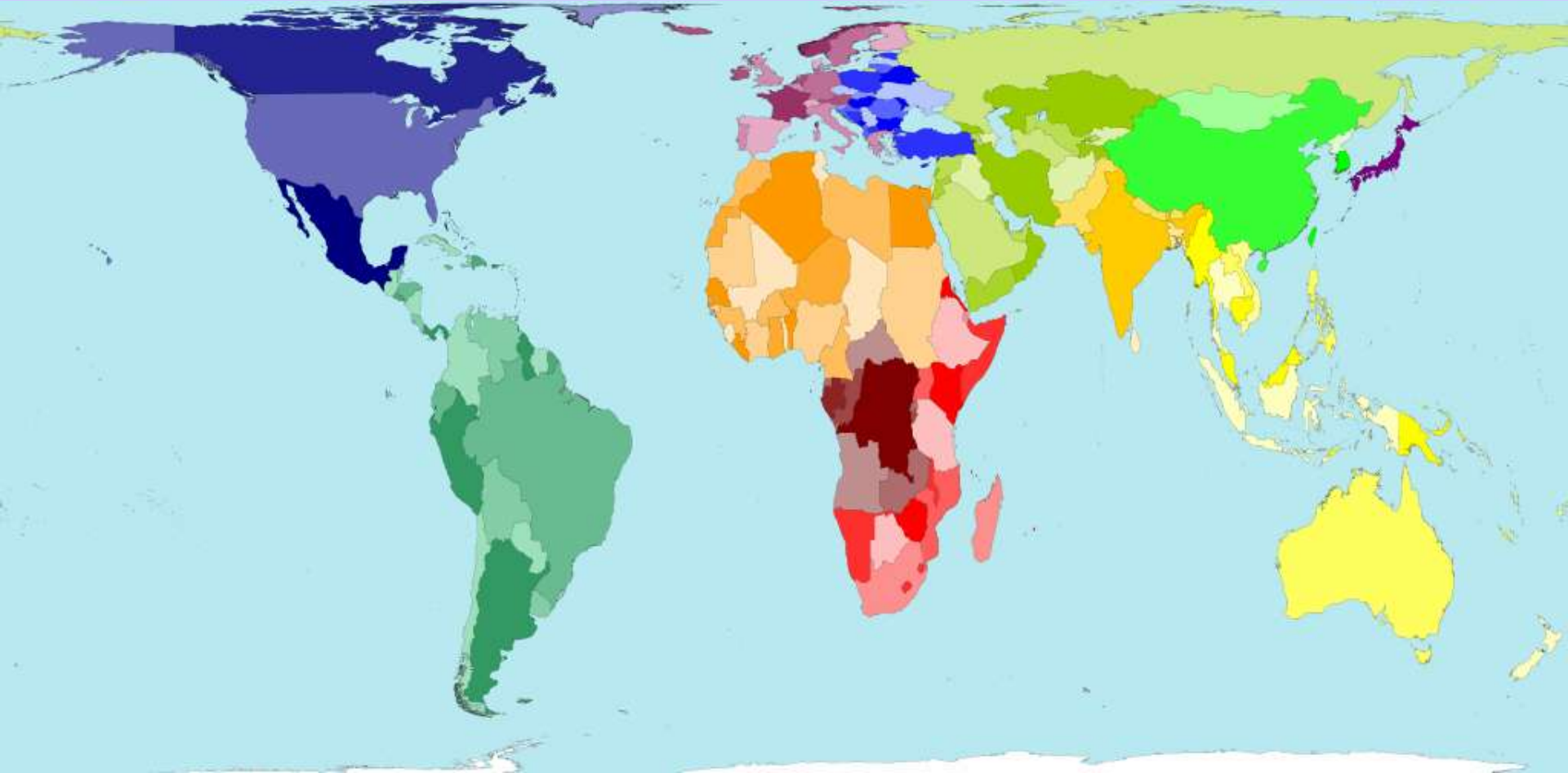


Image:
Worldmapper

Total population

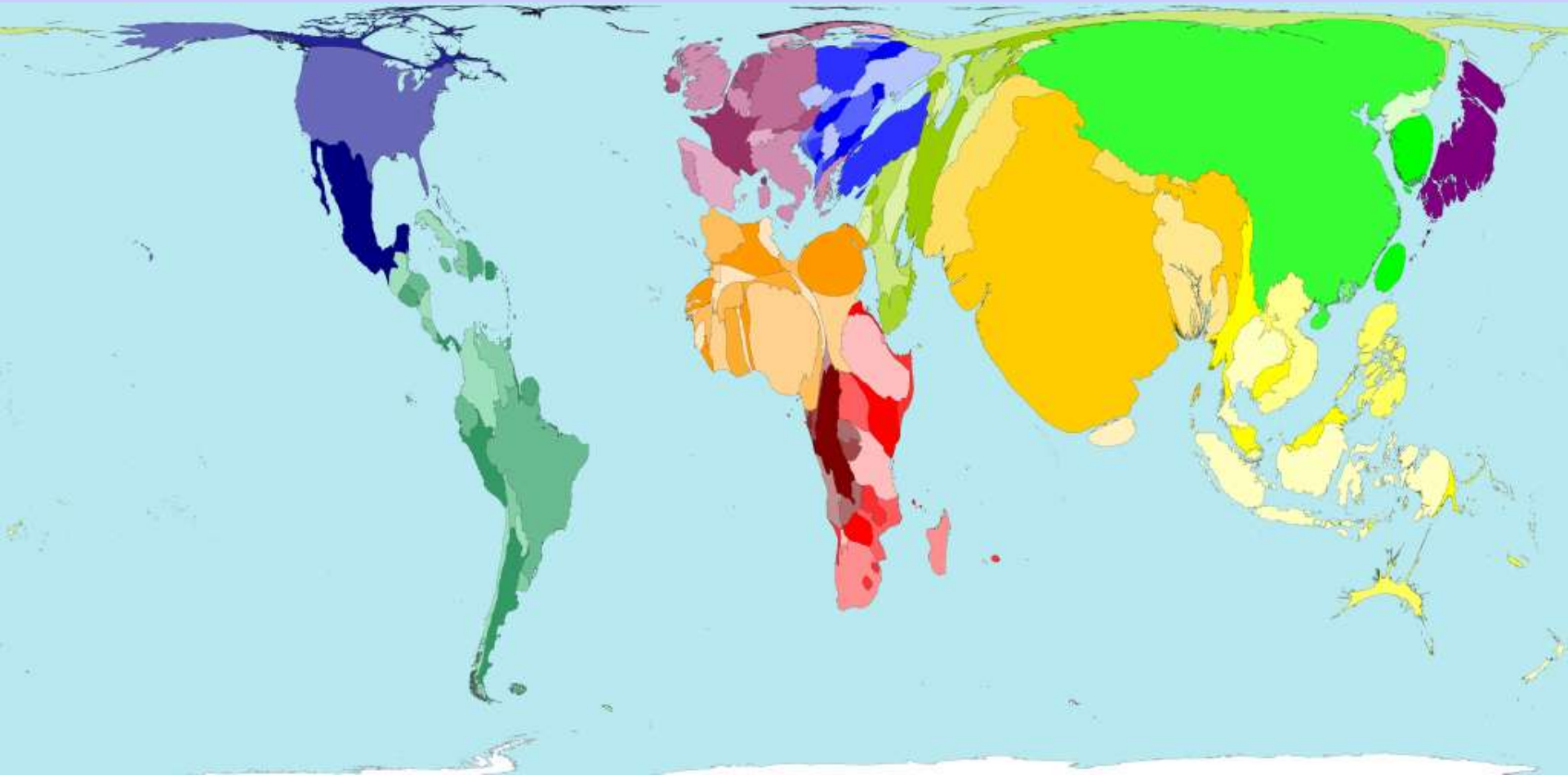


Image:
Worldmapper

Timber Imports

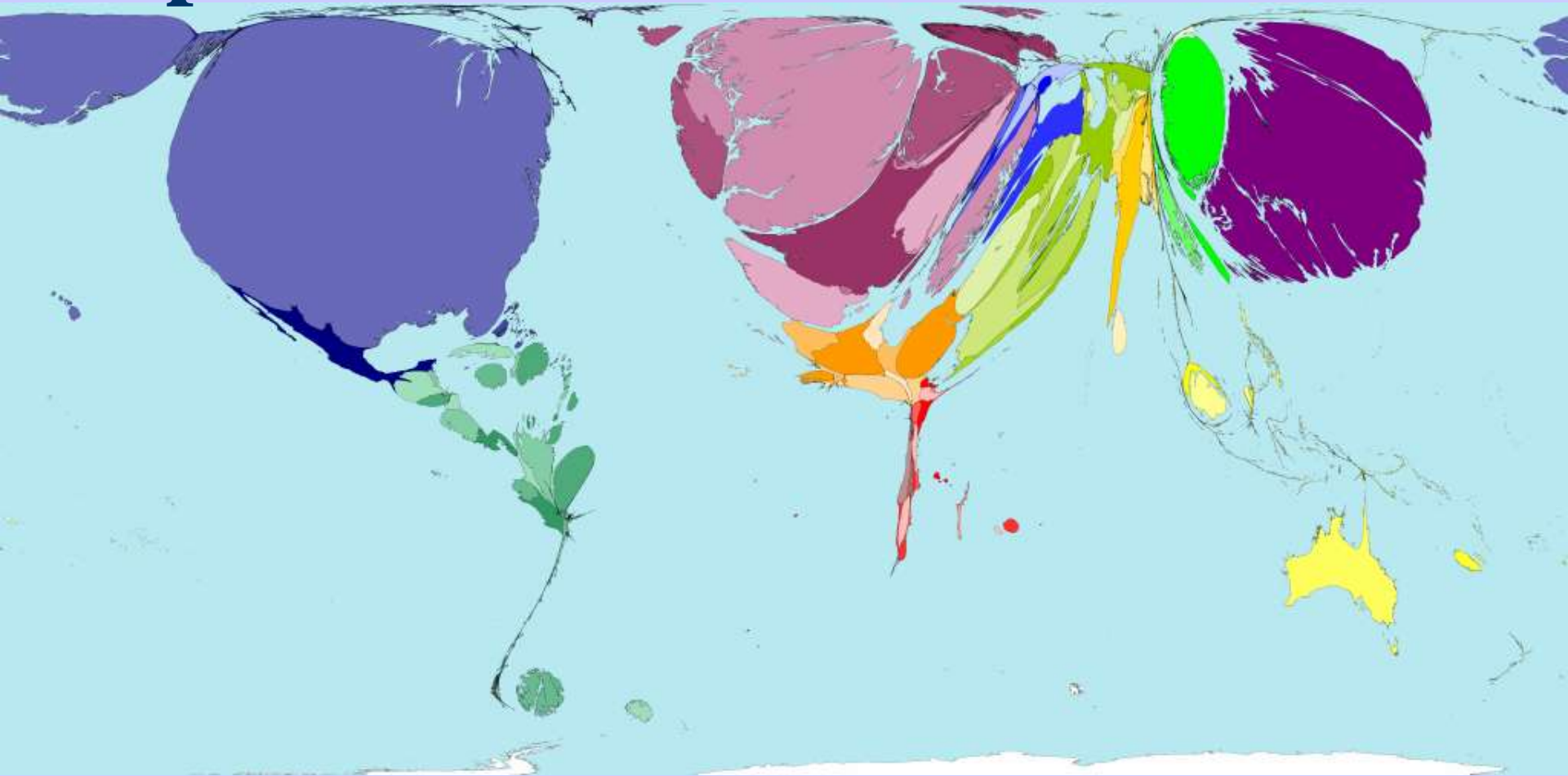


Image:
Worldmapper

Forest Losses

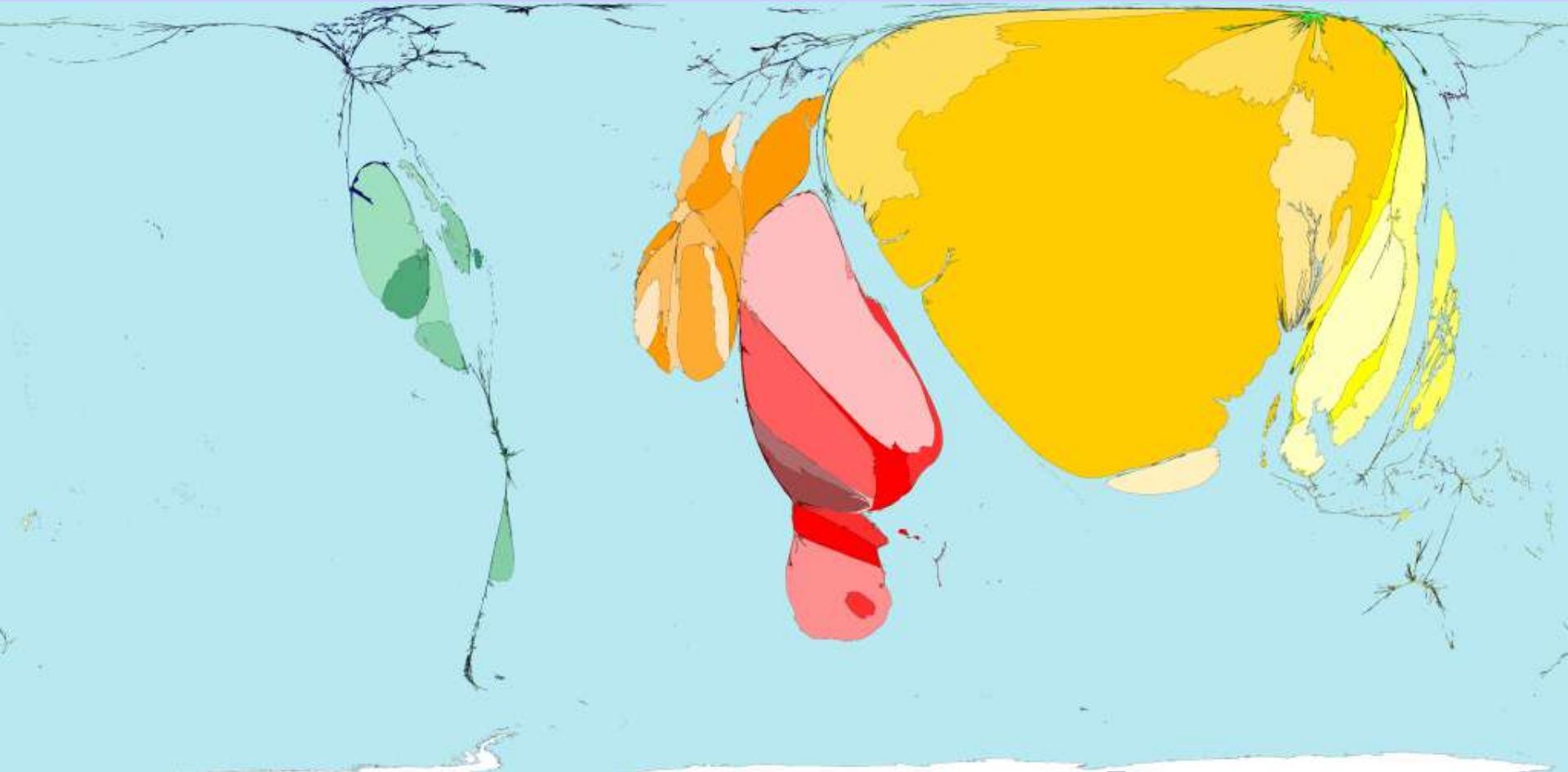


Image:
Worldmapper

Changes within the USFS

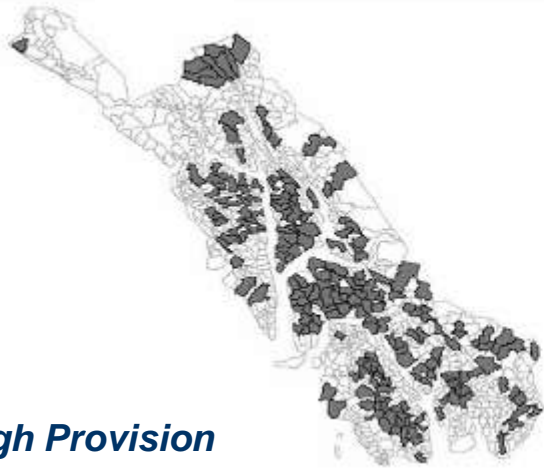
- Urgency

- MEA (2005) reports 60% ES in decline
- Private Forest Losses
- Farm Bill
- Executive Orders

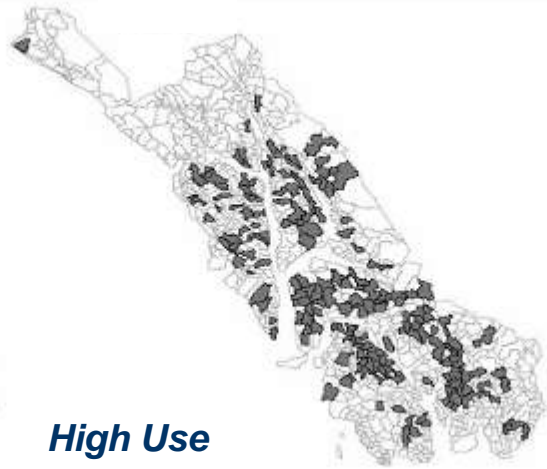
- Changes

- Executive Orders which mandate quantification of agency benchmarks for energy, material, and resource annual use
- EMS
- Sustainable Operations
- Ecosystem Service Management

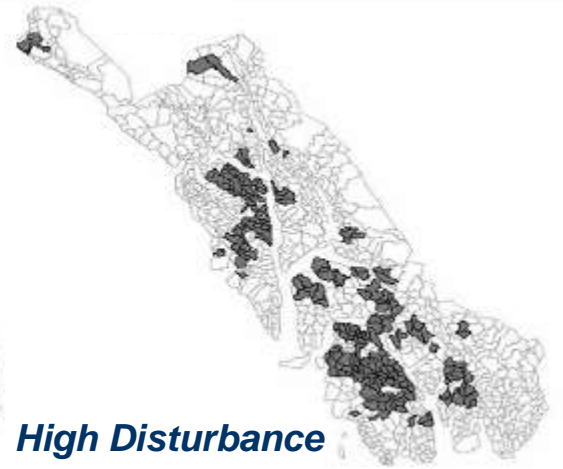
Upper 20% of criteria ranks



High Provision

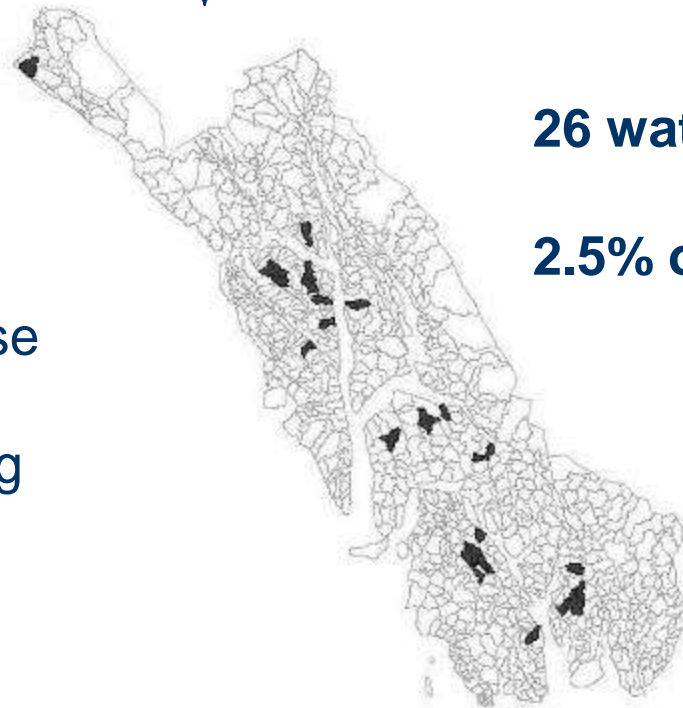


High Use



High Disturbance

- High provision of fish and wildlife
- High fishing, hunting, recreation use
- High degree of logging and roading



26 watersheds

2.5% of region

Beyond Supply....

PROTECTION

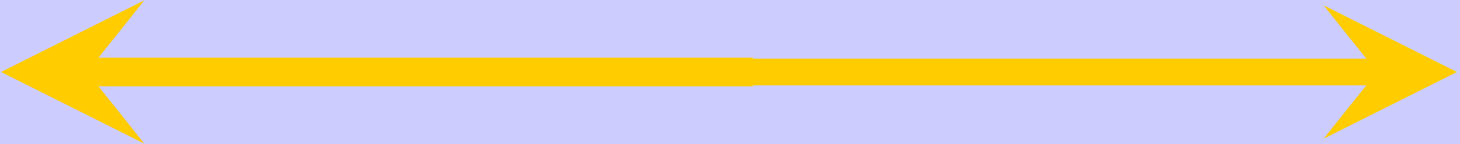
USE (harvest)



PROTECTION

USE (harvest)

CONSUMPTION
(per capita)

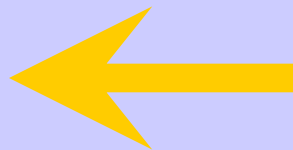
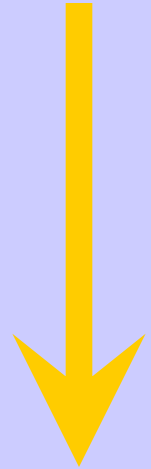


USE

?????

PROVISION

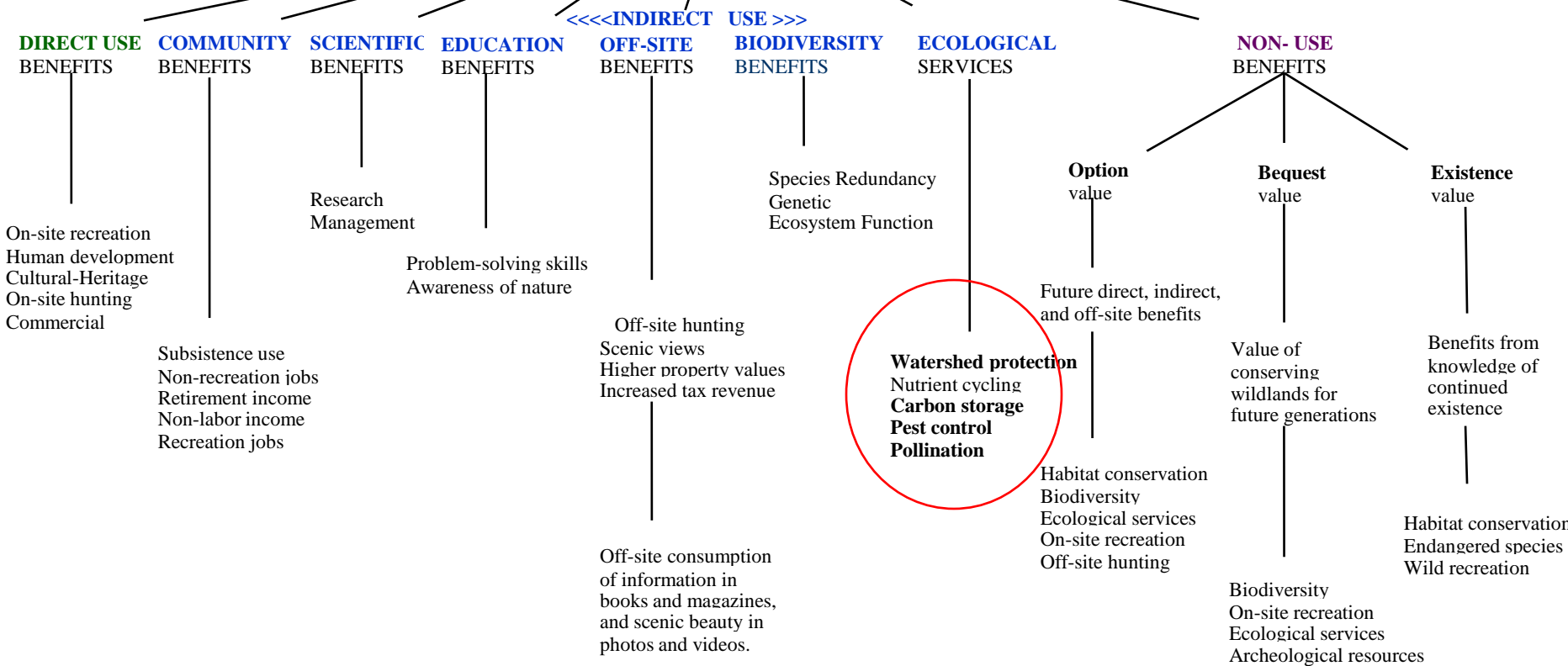
DISTURBANCE



II. Why ES are difficult to incorporate in LCA

- Difficulty in ‘valuing’ the service itself
- Difficulty in designating ‘stocks’ versus ‘flows’ and tracking them over time
- Boundary issues and leakage among them
 - Temporal/spatial/social rebound effects

Total Economic Value



Decreasing “tangibility” of value to individuals

The Various 'Types' of Value

Instrumental (anthropocentric)

“serving some (human) end-use”

Functional (non-anthropocentric)

“contribution one (ecological) entity makes to the existence of another”

e.g nutrients → plant

Ulanowicz (1991) terms it “contributory value”

Intrinsic (non-anthropocentric)

“value in its own right and reference to value of any other entity isn't required”

Distinguishing Stocks and Flows



Temporal challenges: supporting services

Provisioning Services

Food (crops, livestock, wild foods, etc.)
Fiber (timber, cotton/hemp/silk, wood fuel)
Genetic resources
Biochemicals, natural medicines, pharmaceuticals
Fresh water

Regulating Services

Supporting Services

Nutrient cycling
Soil formation
Primary production

Air quality regulation
Climate regulation (global, regional, local)
Water regulation
Erosion regulation
Water purification and treatment
Disease regulation
Pest regulation
Pollination
Natural hazard regulation

Cultural Services

Aesthetic values
Spiritual and religious values
Recreation and ecotourism

Spatial Challenges:

ES are
provisioned
and used at
Multiple
Spatial
Scales



C. State of Perception and Value

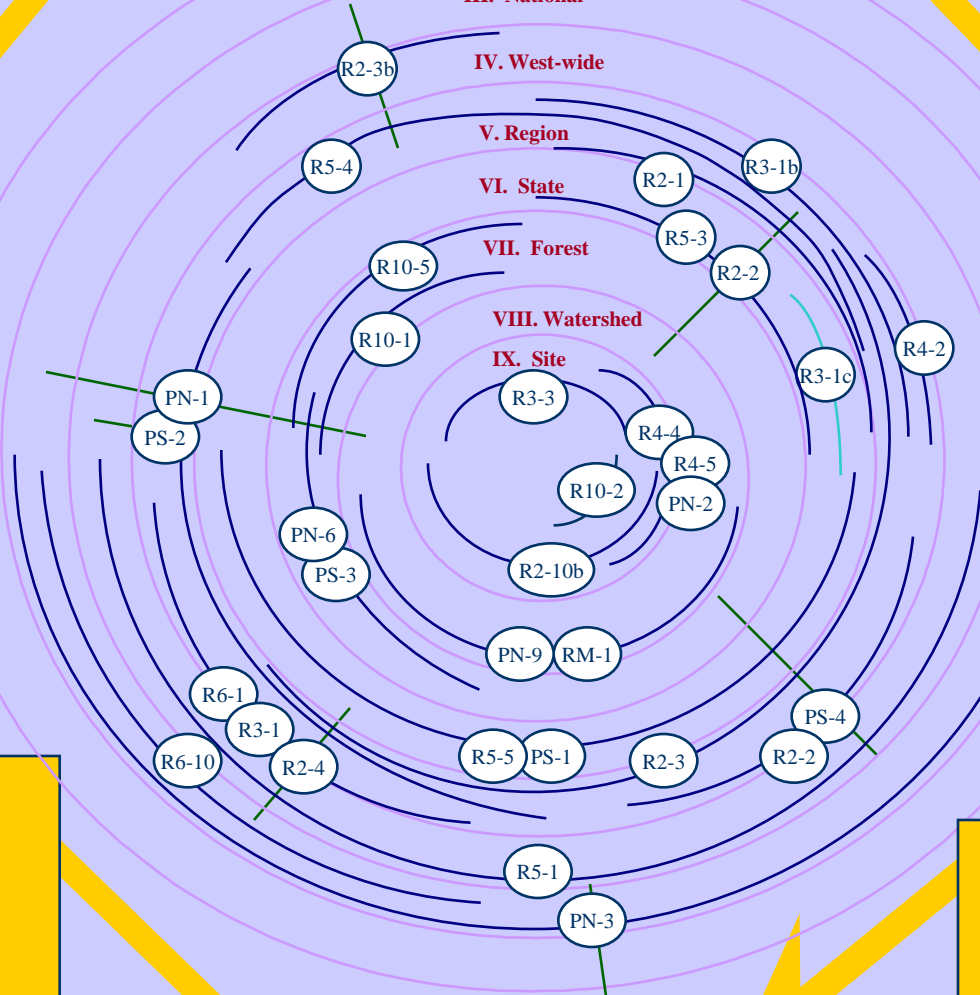
III. Institutional and Market Flexibility

II. Distribution and Scarcity

- I. Global
- II. International
- III. National
- IV. West-wide
- V. Region
- VI. State
- VII. Forest
- VIII. Watershed
- IX. Site

D. Rules, Management Actions, Mechanisms

B. Direct and Indirect Utility



IV. Net Ecological Impact

I. Flow of Ecosystem Goods and Services

A. Stock of Natural Capital

III. Conditions affecting how appropriate market tools will be to address declines in ecosystem services

Market Based Mechanisms

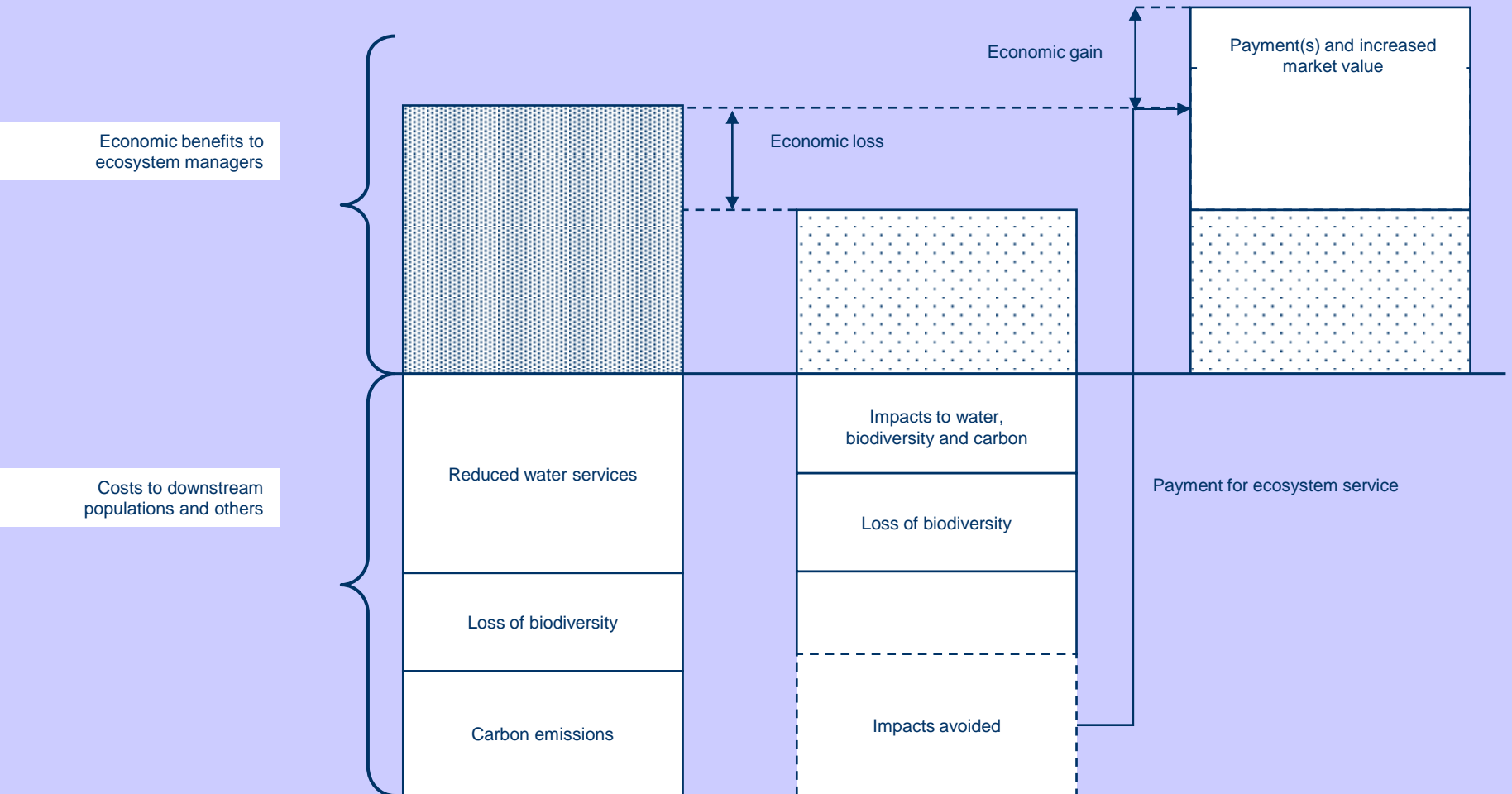
- **Carbon Trading**
- **Wetland mitigation banking**
- **Biodiversity markets**
- **Water markets**
- **Park benefit/habitat transfer**
- **Certification**
- **Tax/tariff breaks**

PES creates economic incentives to reduce ecological impact

Traditional timber harvest

Selective timber harvest

Selective timber harvest with PES/
increased market value



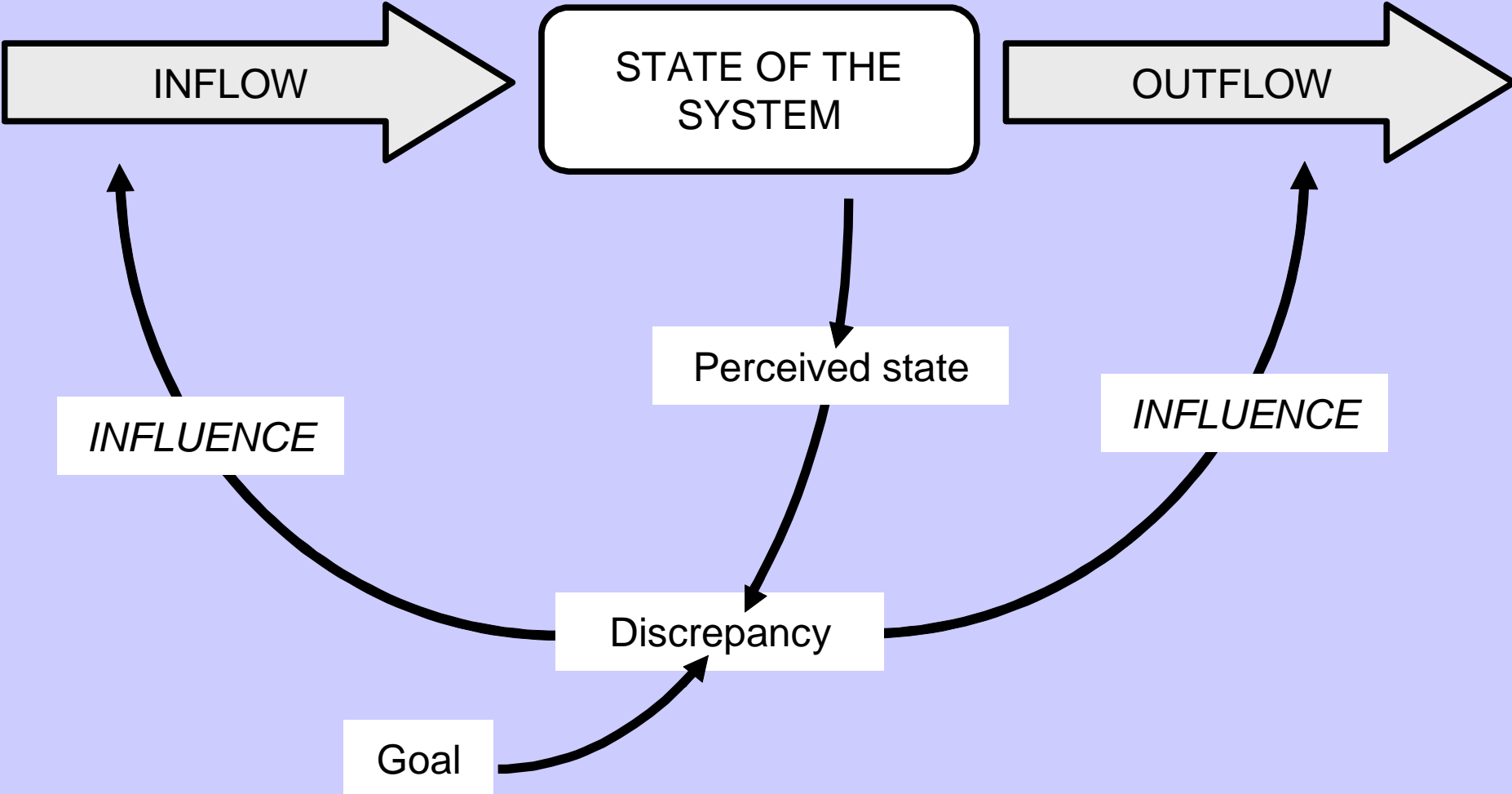
	EXCLUDABLE	NON-EXCLUDABLE
RIVAL	MARKET GOOD (a latte, housing, cars)	Open access good (ocean fisheries, coffee at Juneau FSL)
NON-RIVAL	Potential market good (computer wireless, a scenic view)	PURE PUBLIC GOOD (most ecosystem serv)

Pure public goods are in everyone's interest to consume, and no-one's interest to produce.

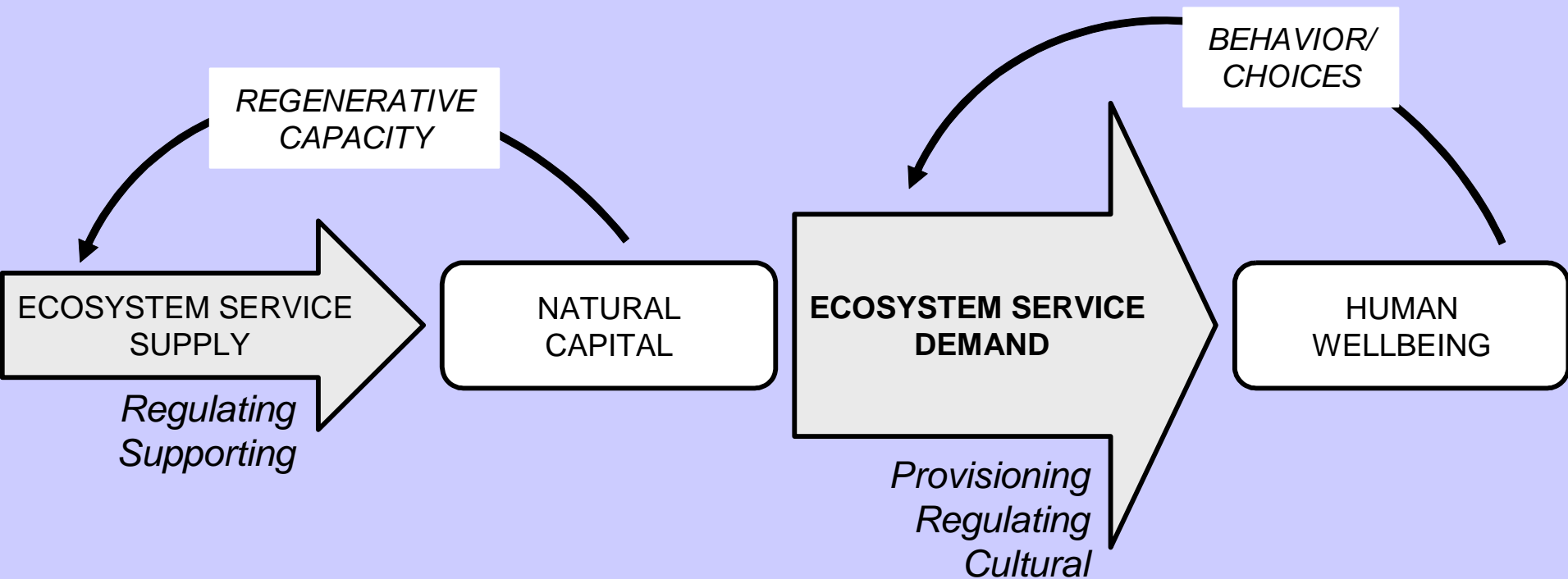
Farley & Daly 2004

IV. LCA in points of intervention

Targeted system level intervention



Declines in Natural Capital and thus Ecosystem Services are a consequence of demand outstripping supply.

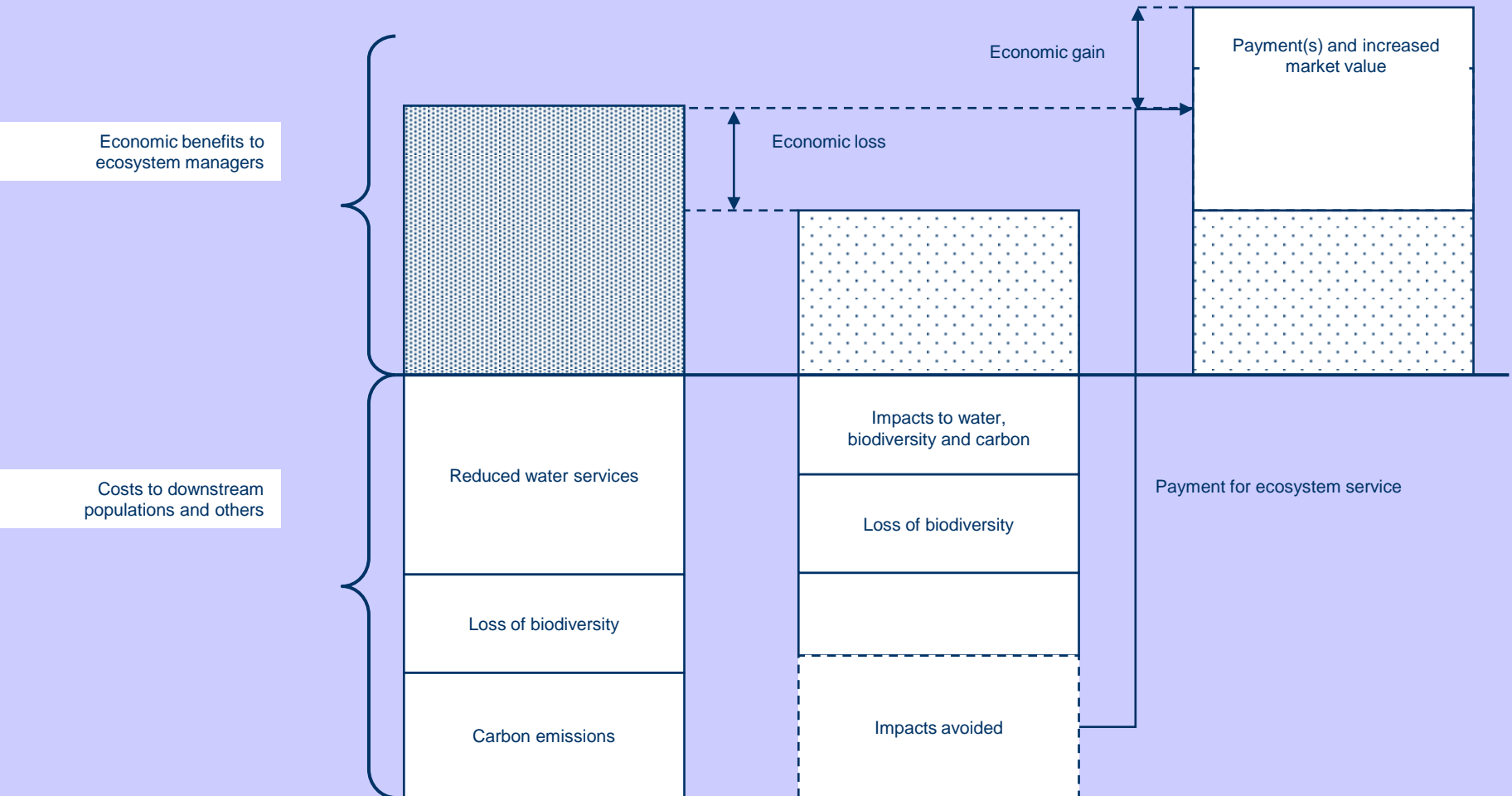


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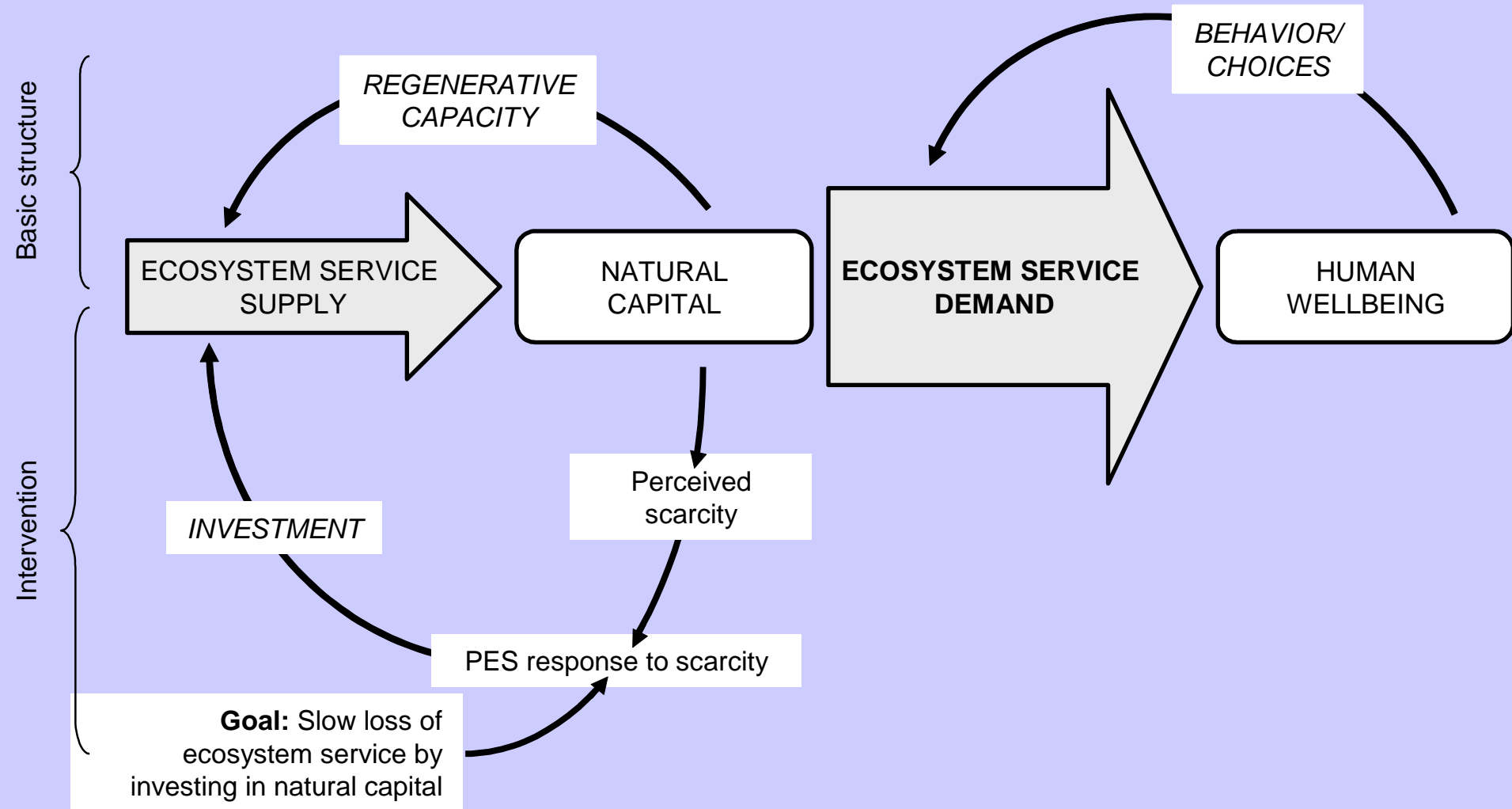
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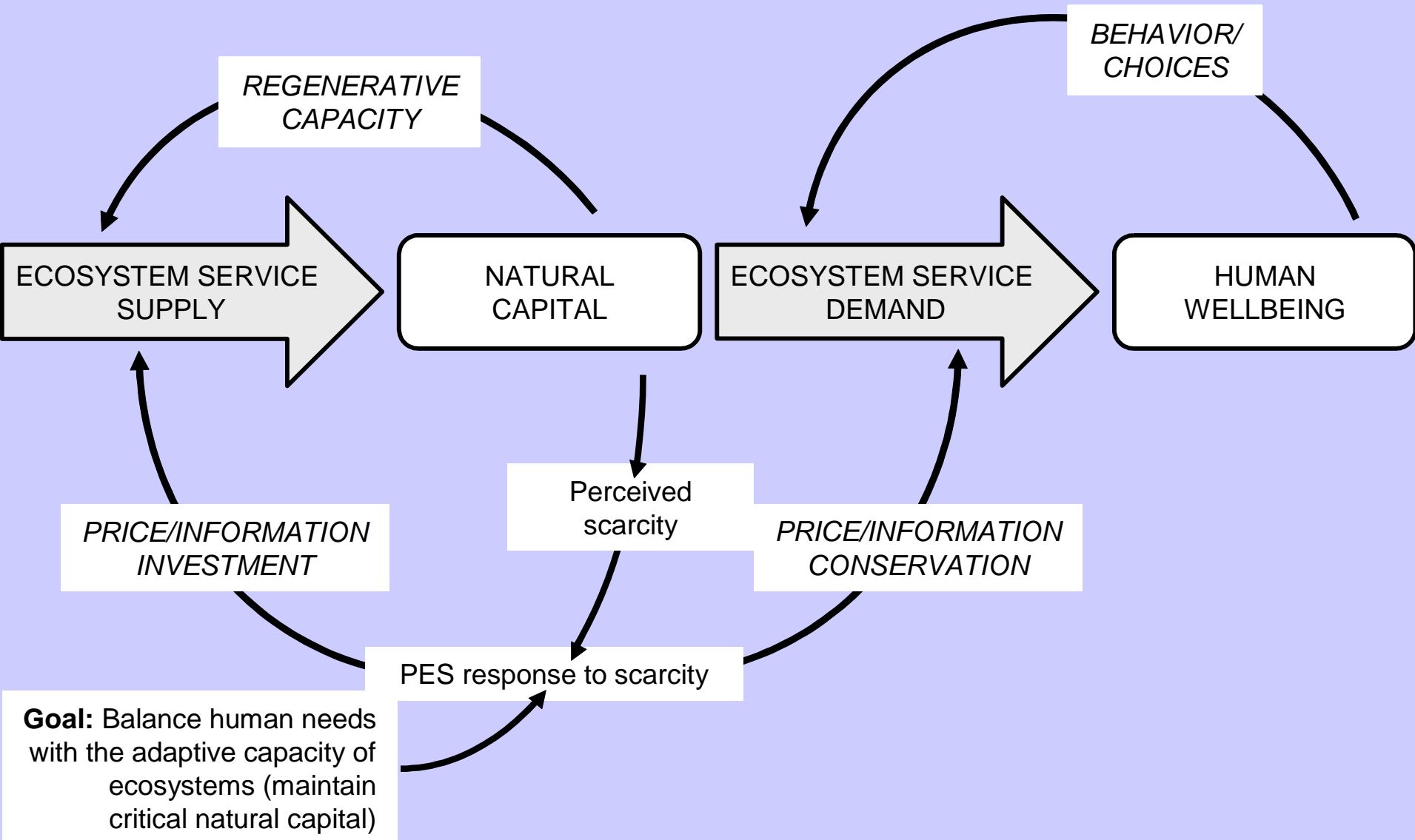
Selective timber harvest with PES/
increased market value



PES as a supply side intervention



Incorporating demand side into PES interventions



Review

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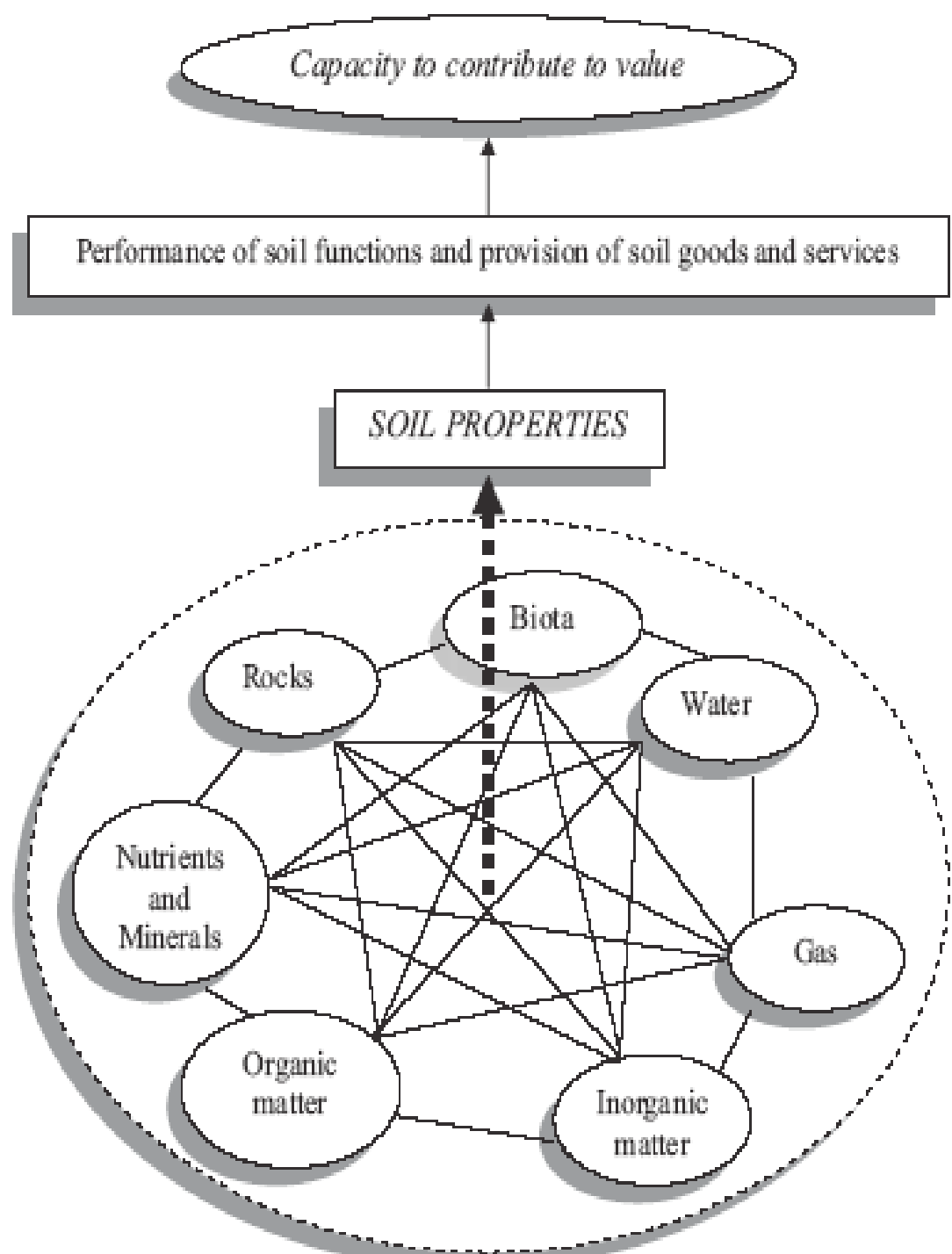


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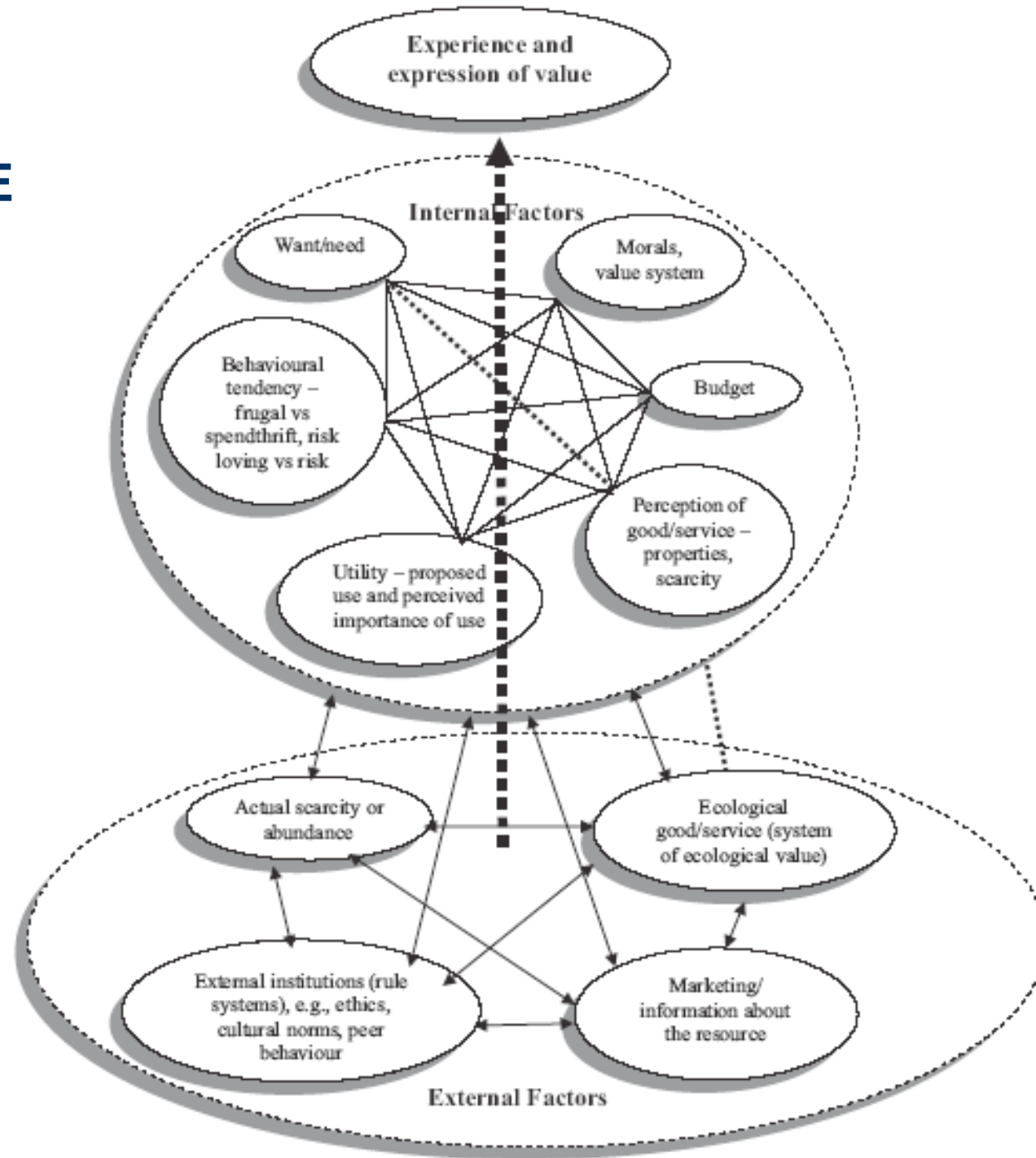
www.usda.ecosystemservices.gov

SUPPLY SIDE



**Straton
(2005)**

DEMAND SIDE



Straton (2005)

