



# Millennium Ecosystem Assessment: Implications for the Americas

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14 September 2006



# Contents

- Background of the MA
- Main findings
- Latin America in the global context
- MA sub-global assessments
- Implications for Latin America



# Ecosystem services







# Question

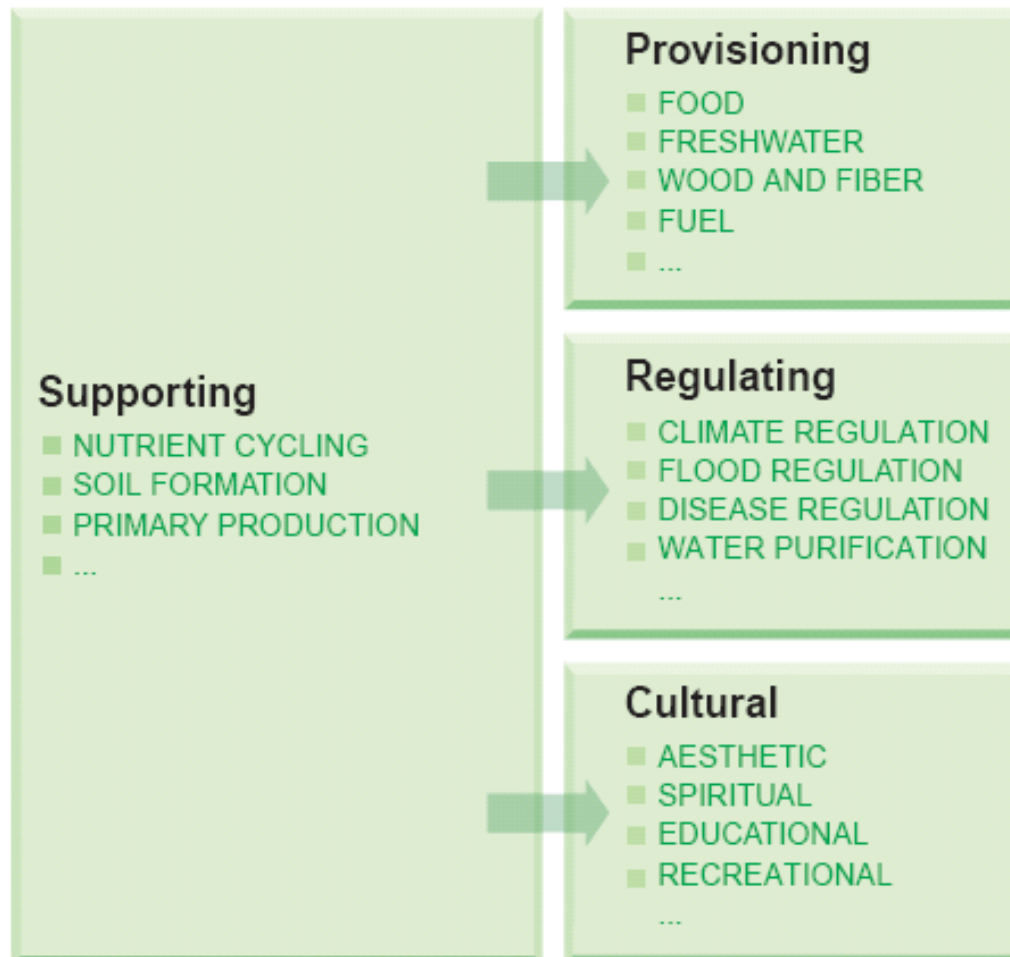
What are the conditions and trends in ecosystems and the services they provide, and the consequences for human well-being?



# Focus: Ecosystem Services

The benefits people obtain from ecosystems

## ECOSYSTEM SERVICES





# Coastal Ecosystems Work



**Indirect Drivers of Change**

- Demographic**
- Economic** (globalization, trade, market and policy framework)
- Sociopolitical** (governance and institutional framework)
- Science and Technology**
- Cultural and Religious**

**Direct Drivers of Change**

- Changes in land use**
- Species introduction or removal**
- Technology adaptation and use**
- External inputs** (e.g., irrigation)
- Resource consumption**
- Climate change**
- Natural physical and biological drivers** (e.g., volcanoes)



# MA Working Groups

<b>Condition and Trends</b>	<b>Scenarios</b>	<b>Responses</b>
<ul style="list-style-type: none"><li>■ What is the current condition and historical trends of ecosystems and their services?</li><li>■ What have been the consequences of changes in ecosystems for human well-being?</li></ul>	<ul style="list-style-type: none"><li>■ Given plausible changes in primary drivers, what will be the consequences for ecosystems, their services, and human well-being?</li></ul>	<ul style="list-style-type: none"><li>■ What can we do to enhance well-being and conserve ecosystems?</li></ul>

<b>Sub-Global</b>	<ul style="list-style-type: none"><li>■ All of the above, at regional, national, local scales</li></ul>
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# Assessment Panel

- Harold A. Mooney (*co-chair*), **Stanford University, United States**
- Angela Cropper (*co-chair*), **Cropper Foundation, Trinidad and Tobago**
- Doris Capistrano, **Center for International Forestry Research, Indonesia**
- Stephen R. Carpenter, **University of Wisconsin, United States**
- Kanchan Chopra, **Institute of Economic Growth, India**
- Partha Dasgupta, **University of Cambridge, United Kingdom**
- Rik Leemans, **Wageningen University, Netherlands**
- Robert M. May, **University of Oxford, United Kingdom**
- Prabhu Pingali, **Food and Agriculture Organization of the U.N., Italy**
- Rashid Hassan, **University of Pretoria, South Africa**
- Cristián Samper, **Smithsonian National Museum of Natural History, U.S.**
- Robert Scholes, **Council for Scientific and Industrial Research, South Africa**
- Zhao Shidong, **Chinese Academy of Sciences, China**
- Robert T. Watson, **World Bank, United States (*ex officio*)**
- A. H. Zakri, **United Nations University, Japan (*ex officio*)**
- MA Director:
  - Dr. Walter Reid, **Millennium Ecosystem Assessment**
- Editorial Board Chairs:
  - José Sarukhán, **Universidad Nacional Autónoma de México, Mexico**
  - Anne Whyte, **Mestor Associates Ltd., Canada**



# Largest assessment of the health of the planet's ecosystems

- Experts and Review Process
  - Prepared by 1360 experts from 95 countries
  - 80-person independent board of review editors
  - Review comments from 850 experts and governments
- Governance
  - Called for by UN Secretary General in 2000
  - Partnership of UN agencies, conventions, business, non-governmental organizations with a multi-stakeholder board of directors
- Funding
  - \$ 23 million over five years



# Defining Features

- Demand-driven
- Assessment of current state of knowledge
- Authoritative information
- Policy relevant not policy prescriptive
- Multi-scale assessment



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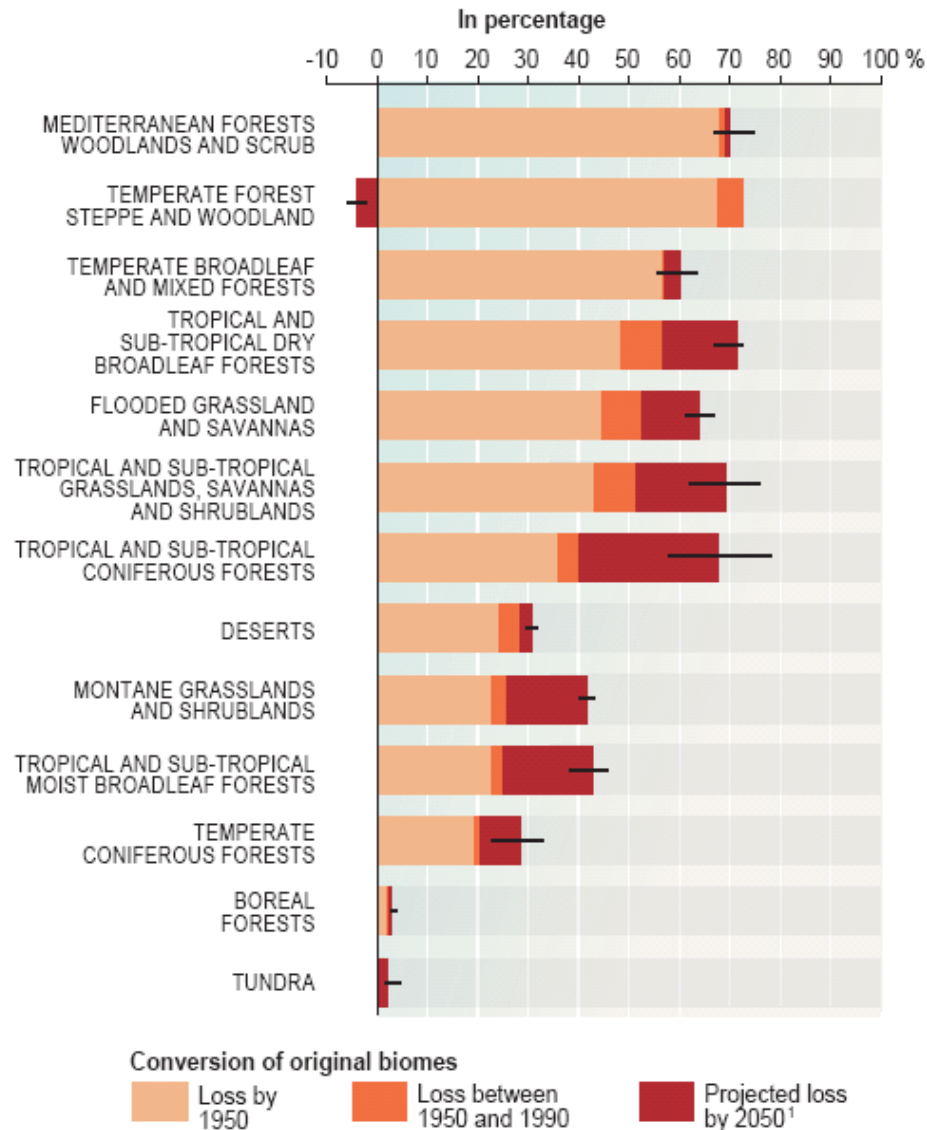


# Finding #1

- Over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period of time in human history
- This has resulted in a substantial and largely irreversible loss in the diversity of life on Earth



# Ecosystem Change





## Finding #2

- The changes that have been made to ecosystems have contributed to substantial net gains in human well-being and economic development, but these gains have been achieved at growing costs
- These problems will substantially diminish the benefits that future generations obtain from ecosystems.

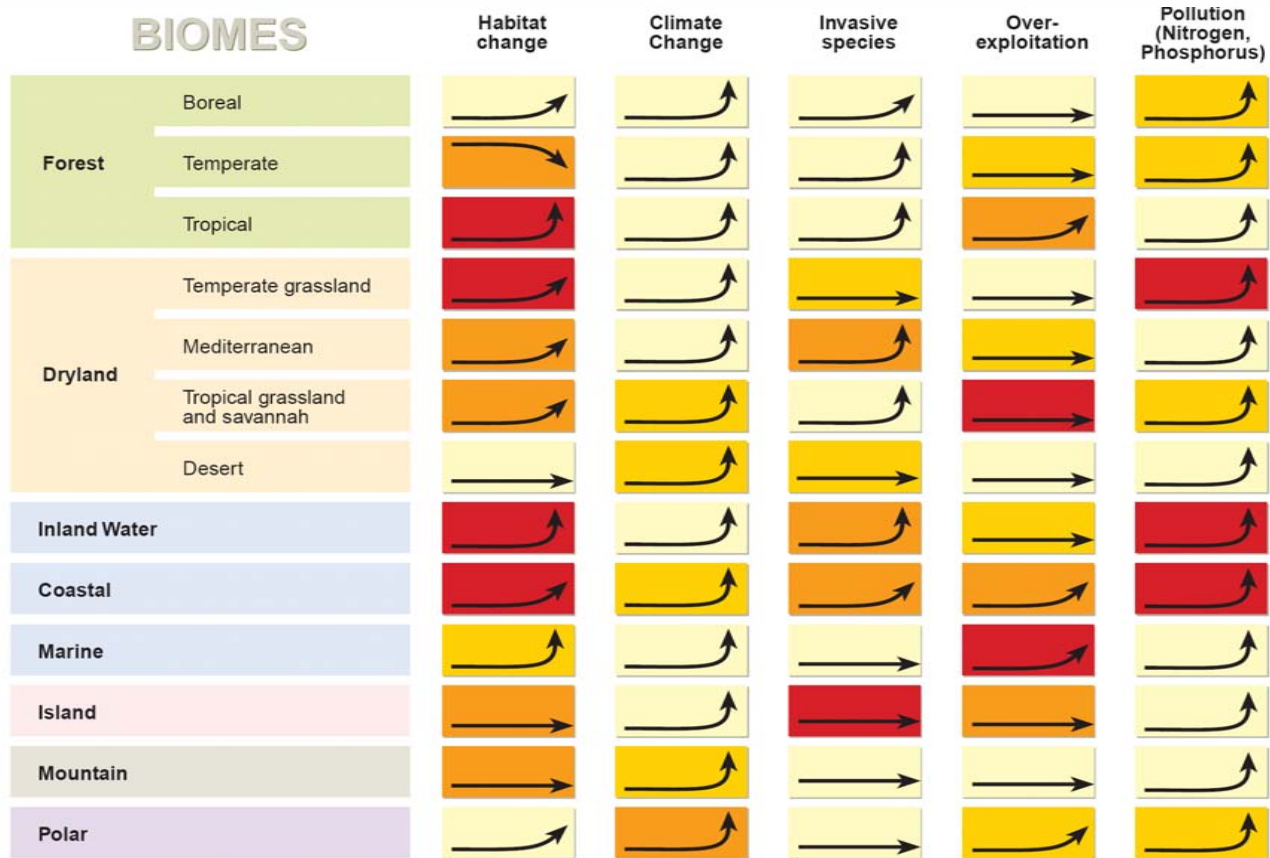


## Finding #3:

- The degradation of ecosystem services could grow significantly worse during the first half of this century and is a barrier to achieving the Millennium Development Goals

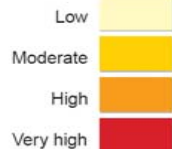


# Direct drivers growing in intensity



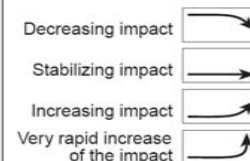
## RESULT OF PAST EVOLUTION

Driver's impact on biodiversity over the last century



## WHAT HAPPENS TODAY

Driver's actual trends



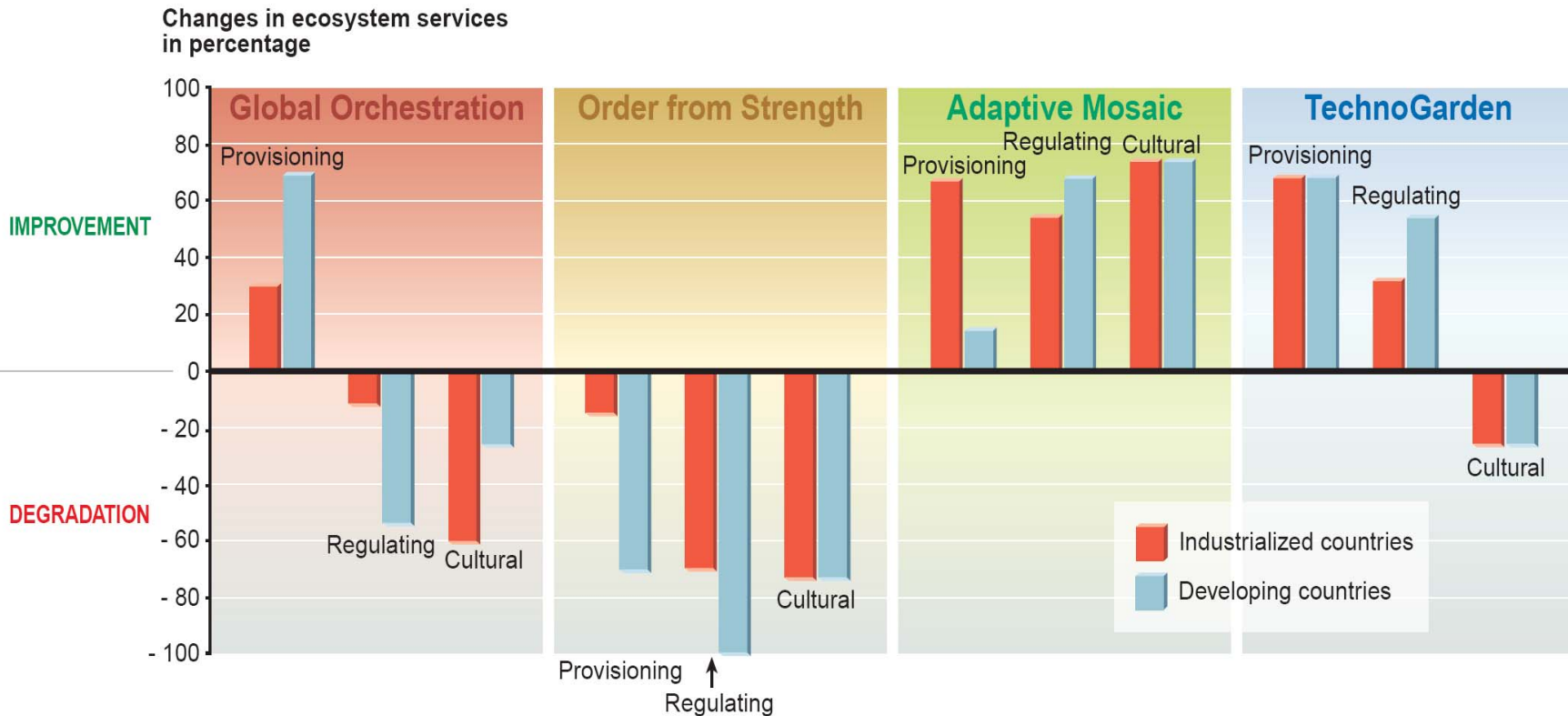


## Finding #4:

- Many options exist to conserve or enhance specific ecosystem services in ways that reduce negative trade-offs or that provide positive synergies with other ecosystem services



# Improvements in services can be achieved by 2050



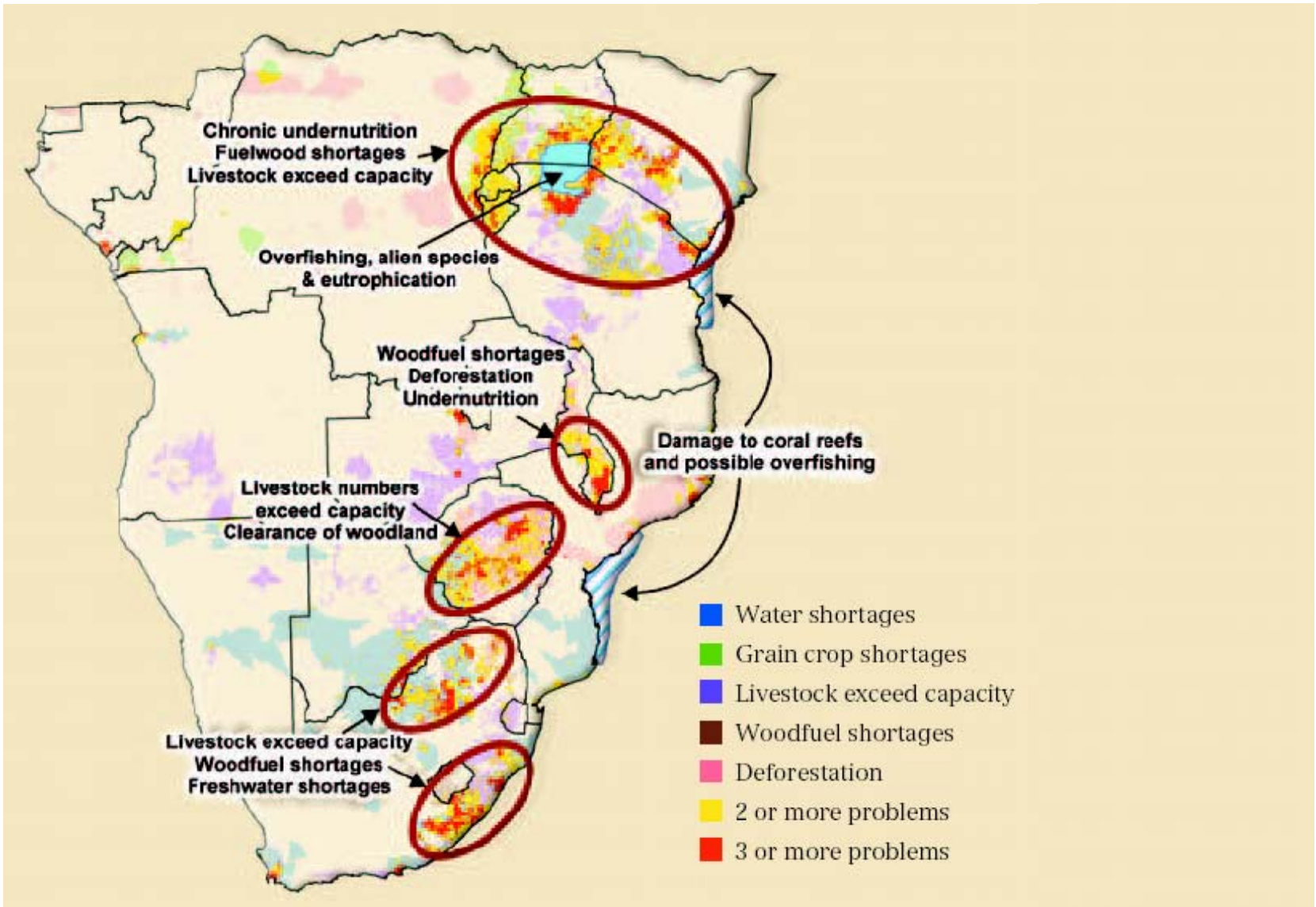


## Finding # 5

- The scale of analysis has an important effect on assessment results, and the relative importance of services changes with scale.
- The use of different knowledge systems can provide useful insights that might otherwise be missed, and is most important at local scales



# Places where ecosystem services fail are also centers of conflict



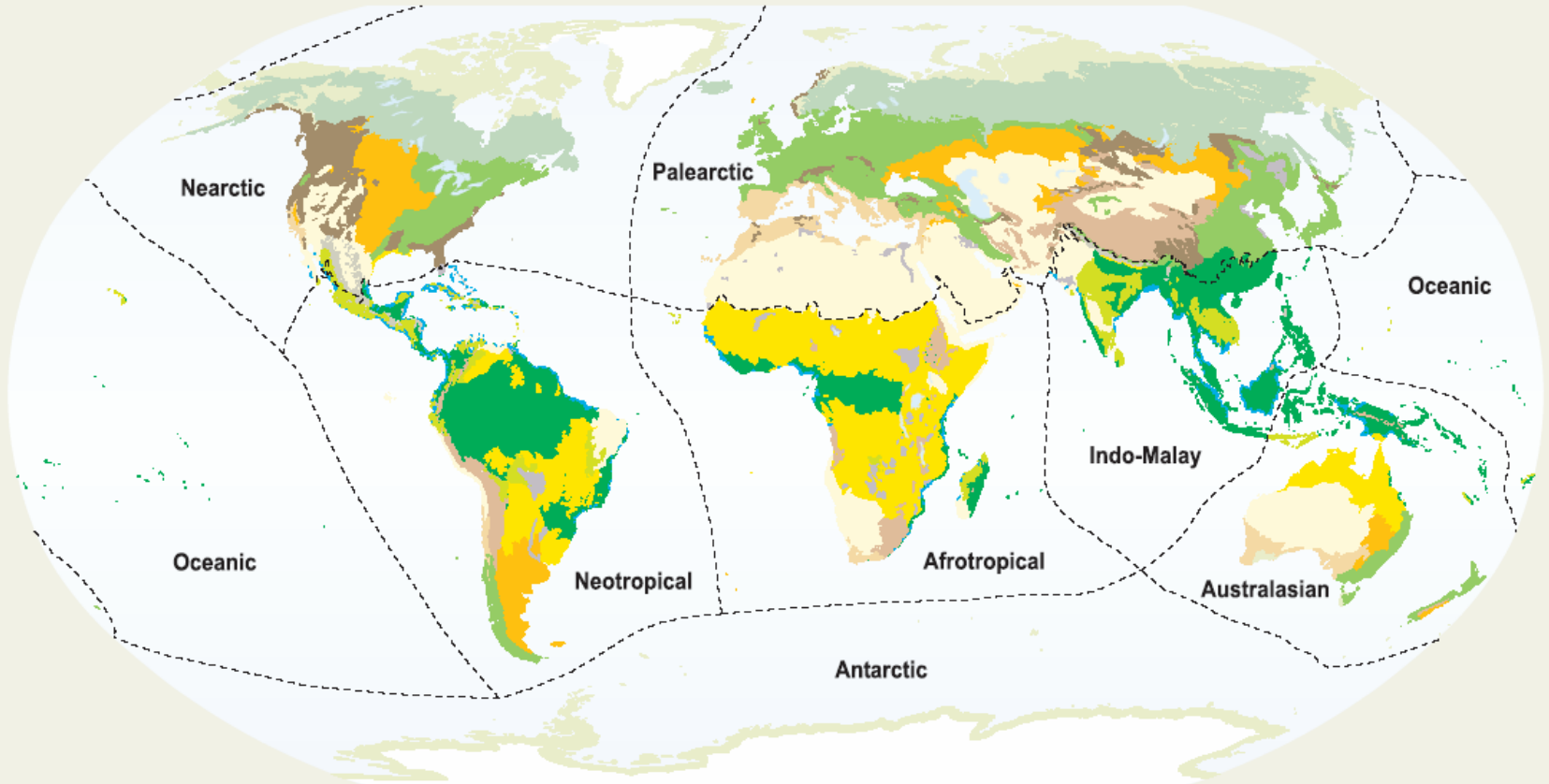


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# Biogeography and biomes



## Terrestrial biomes

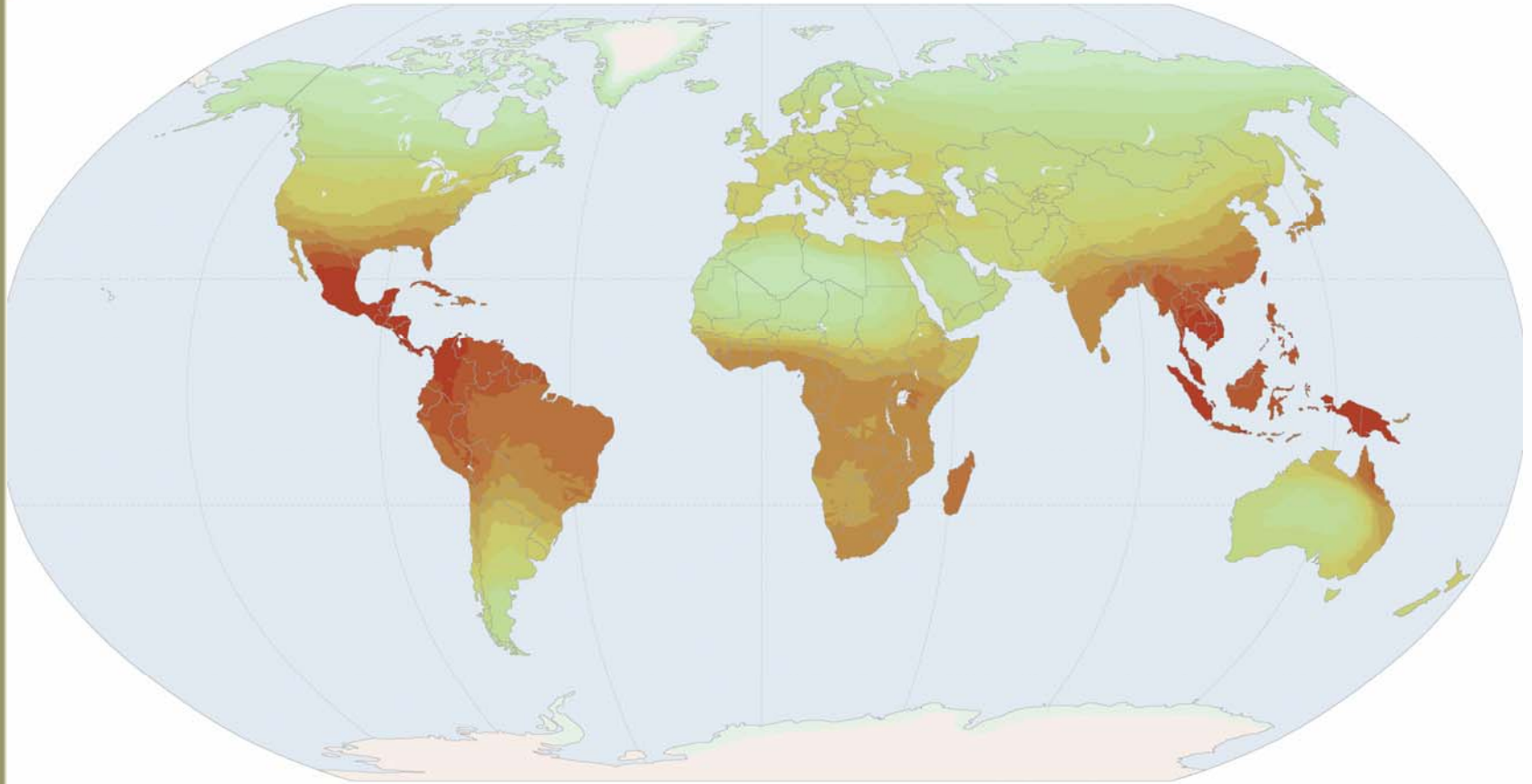
- Tropical and sub-tropical moist broadleaf forests
- Tropical and sub-tropical dry broadleaf forests
- Tropical and sub-tropical coniferous forests
- Temperate broadleaf and mixed forests
- Temperate coniferous forests
- Boreal forests / Taiga
- Tundra
- Mediterranean forests, woodlands, and scrub

- Tropical and sub-tropical grasslands, savannas, and shrublands
- Temperate grasslands, savannas, and shrublands
- Montane grasslands and shrublands
- Flooded grasslands and savannas
- Mangroves
- Deserts and Xeric shrublands
- Rock and ice

----- **Realm boundaries**



# Flowering plant family density



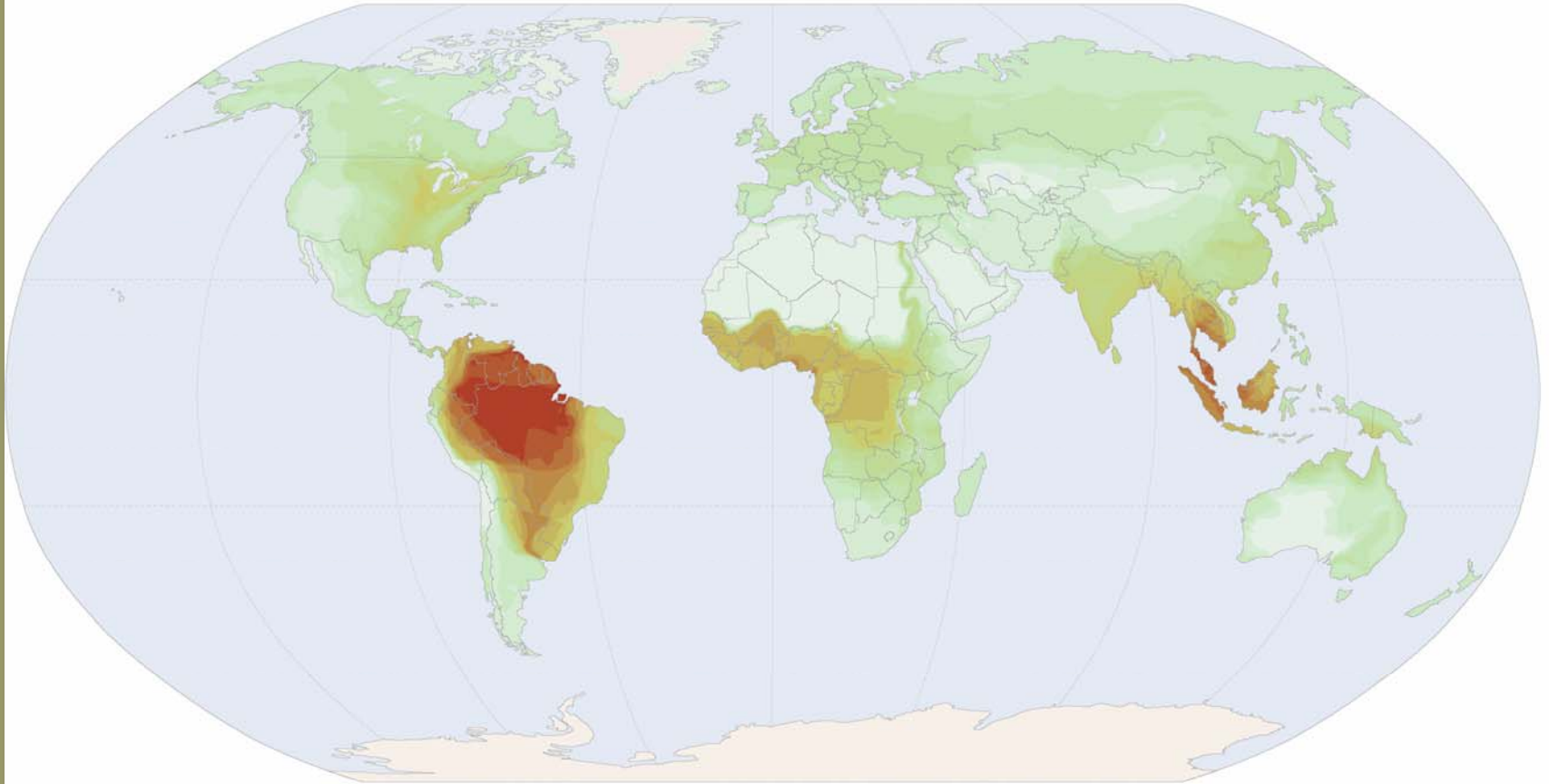
UNEP

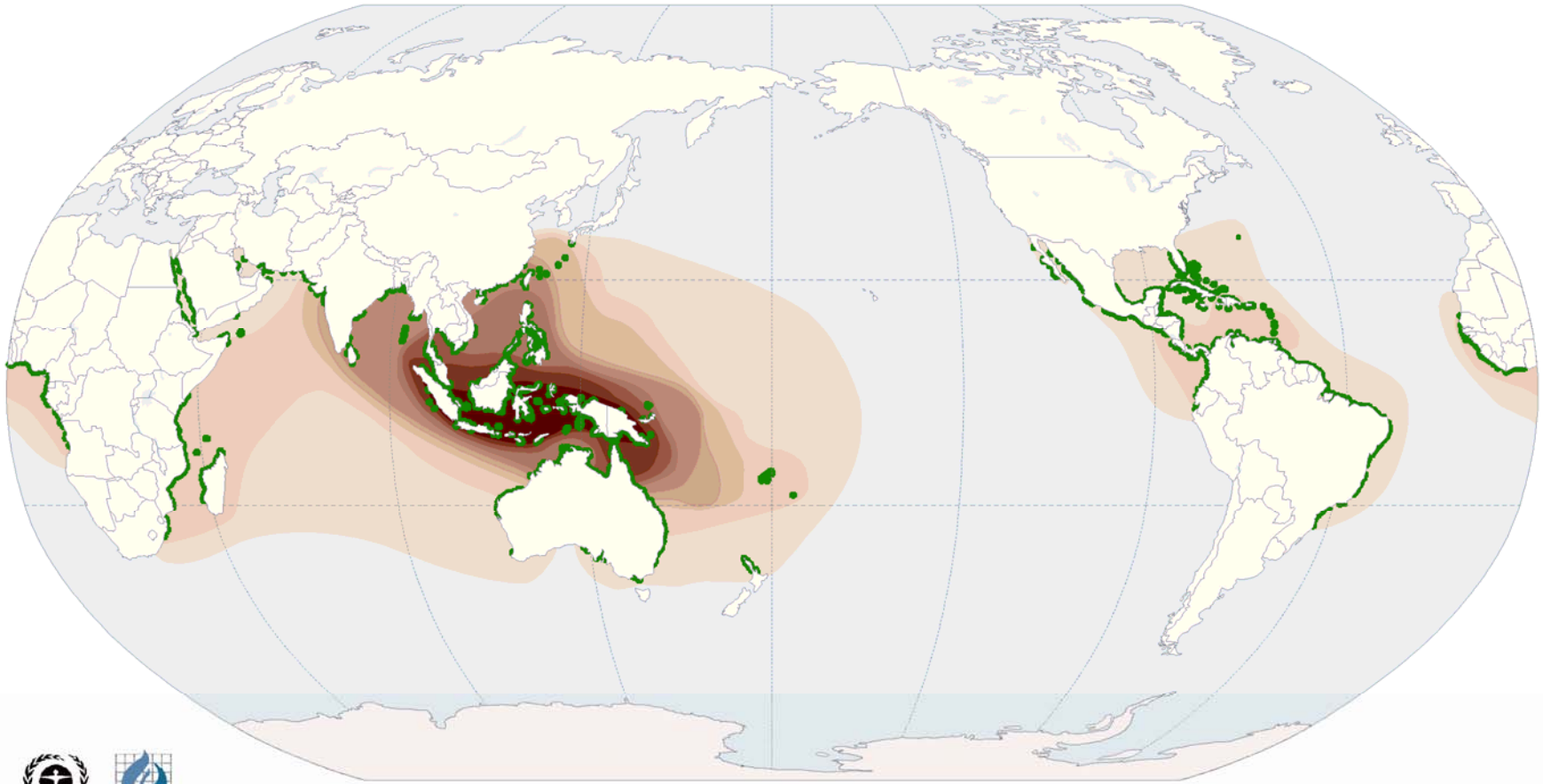


WCMC



# Freshwater fish family density





● mangrove forest



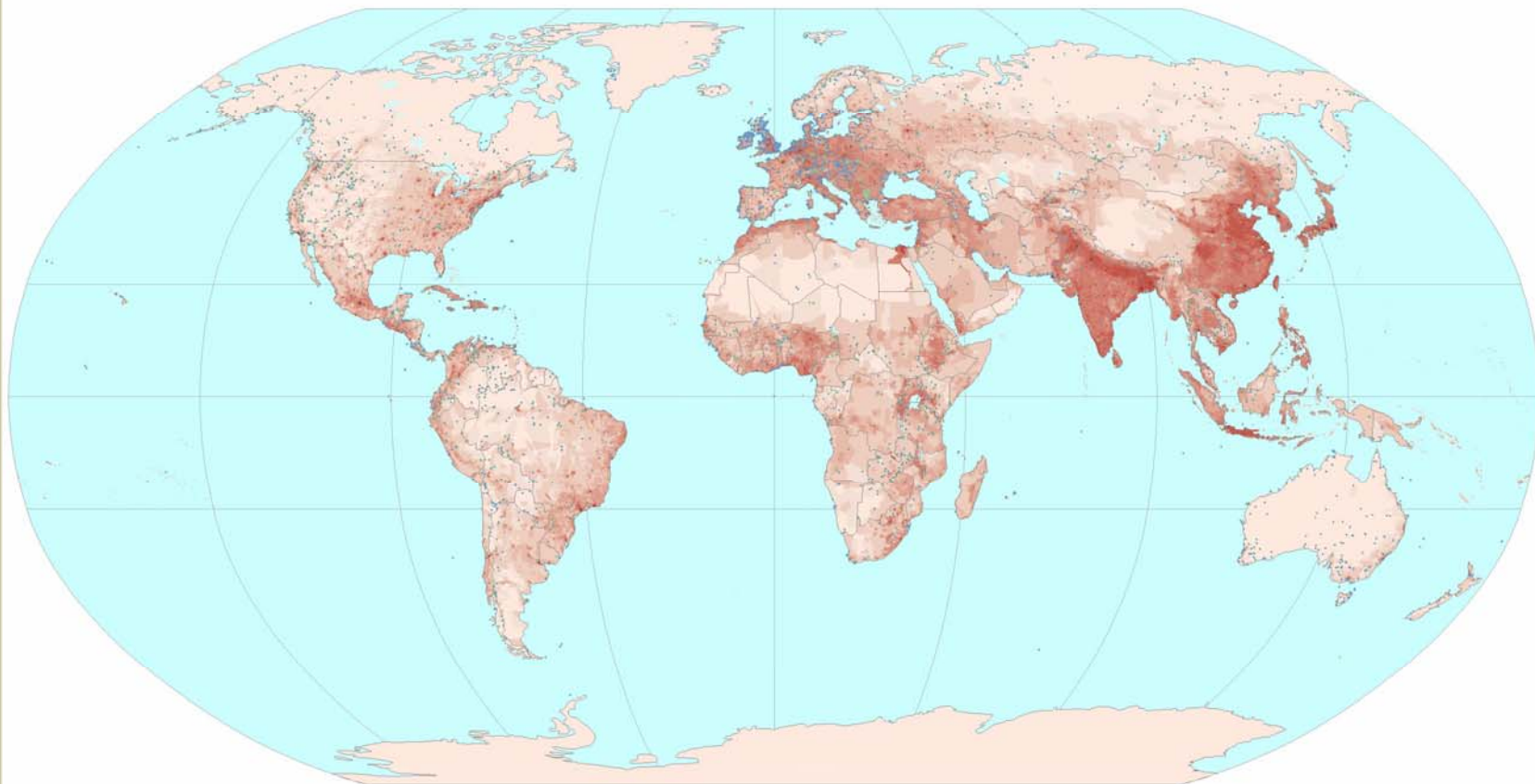
## Mangrove diversity

This map shows the location of existing mangrove forest, together with contours representing gradients of mangrove species richness. Note that graphic presentation at this scale enormously exaggerates actual forest area.

Source: reproduced by permission, with modification, from Spalding (1998).



# Human Population Density



Legend  
International Projections  
Area (km<sup>2</sup>)  
- 1000 km<sup>2</sup>  
- 10000 km<sup>2</sup>  
- 100000 km<sup>2</sup>  
- 1000000 km<sup>2</sup>  
- 10000000 km<sup>2</sup>  
Country Boundaries  
Outline  
- 1000000 km<sup>2</sup>  
- 10000000 km<sup>2</sup>  
- 100000000 km<sup>2</sup>  
Human Population Density



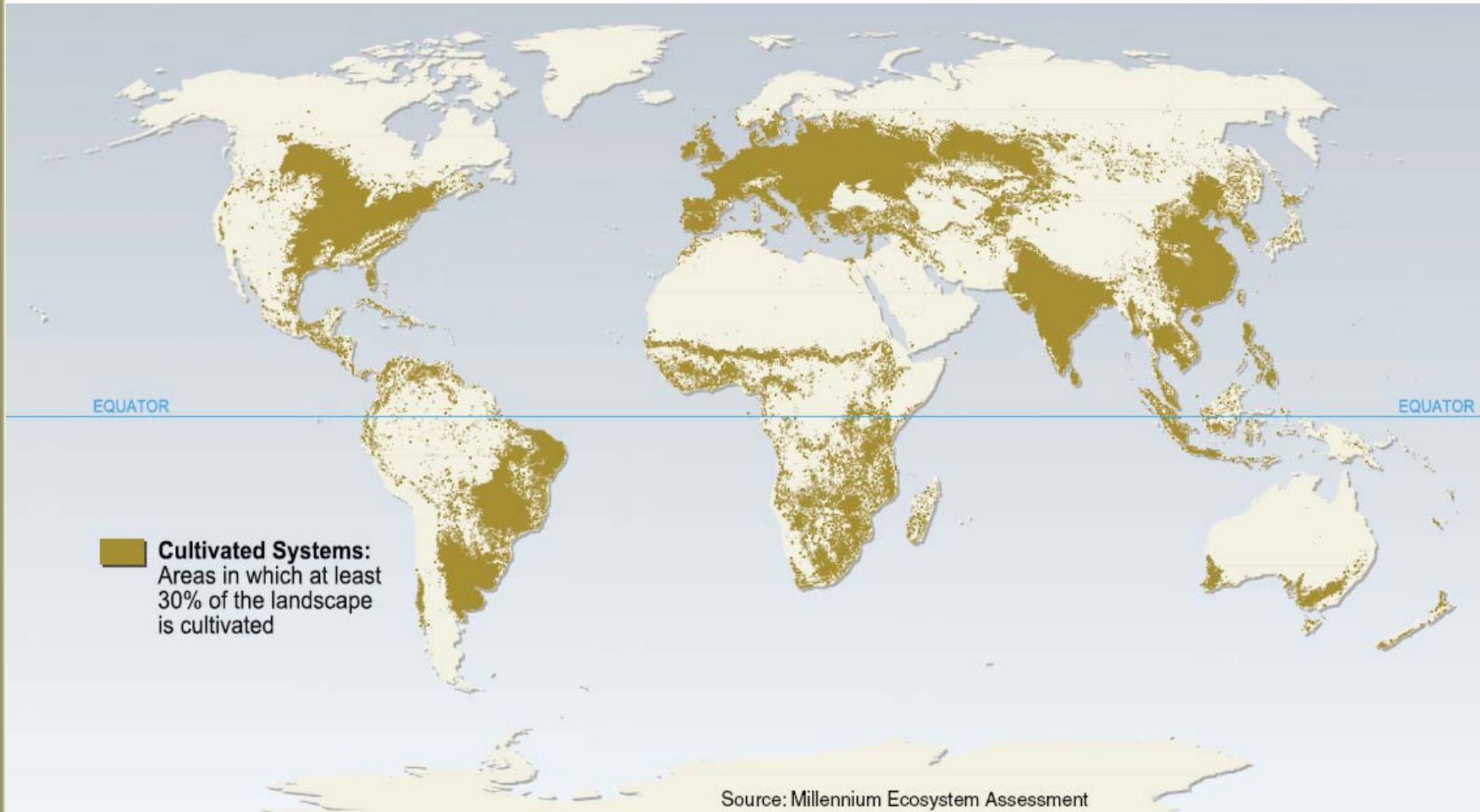
UNEP



WCMC

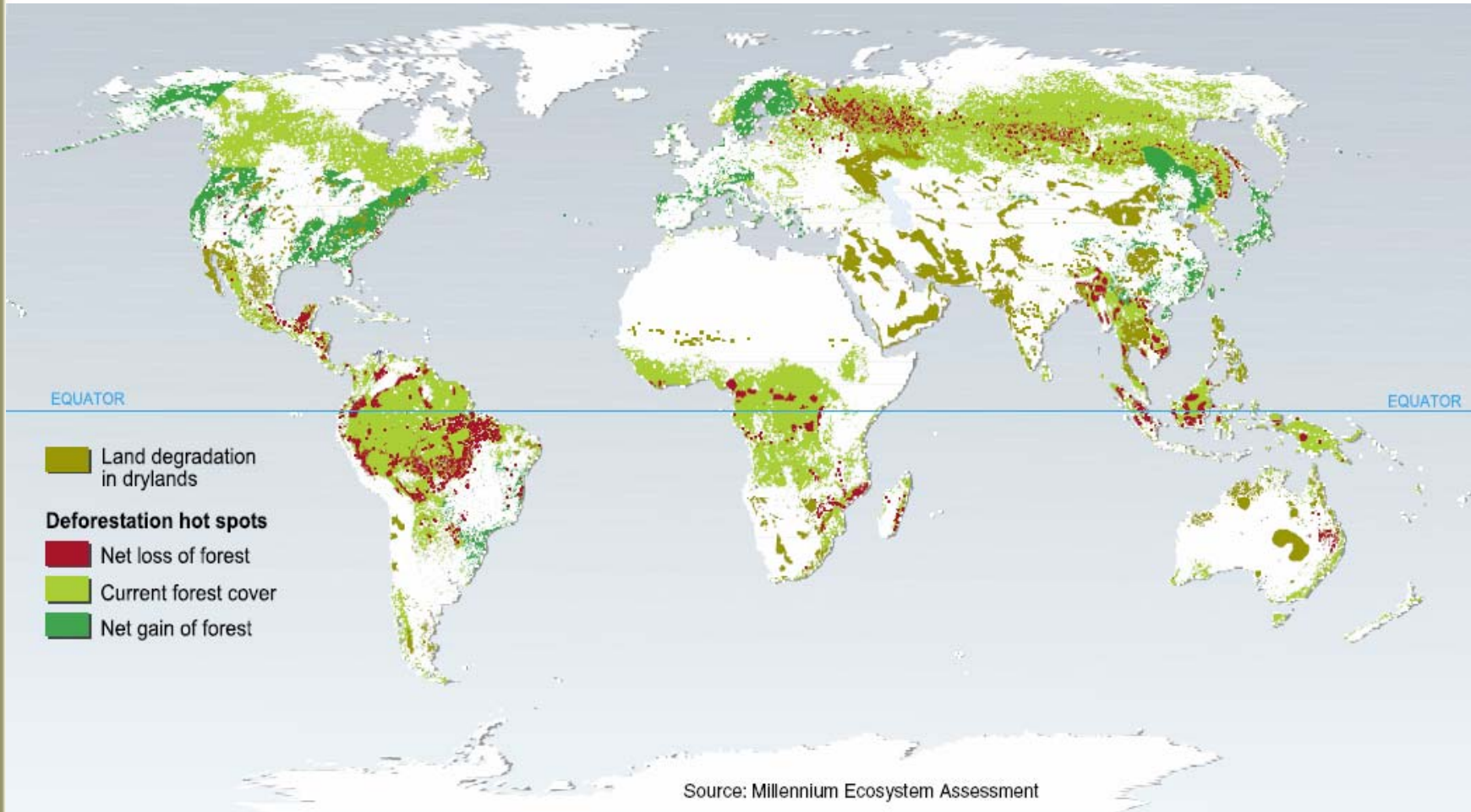


# Cultivated systems



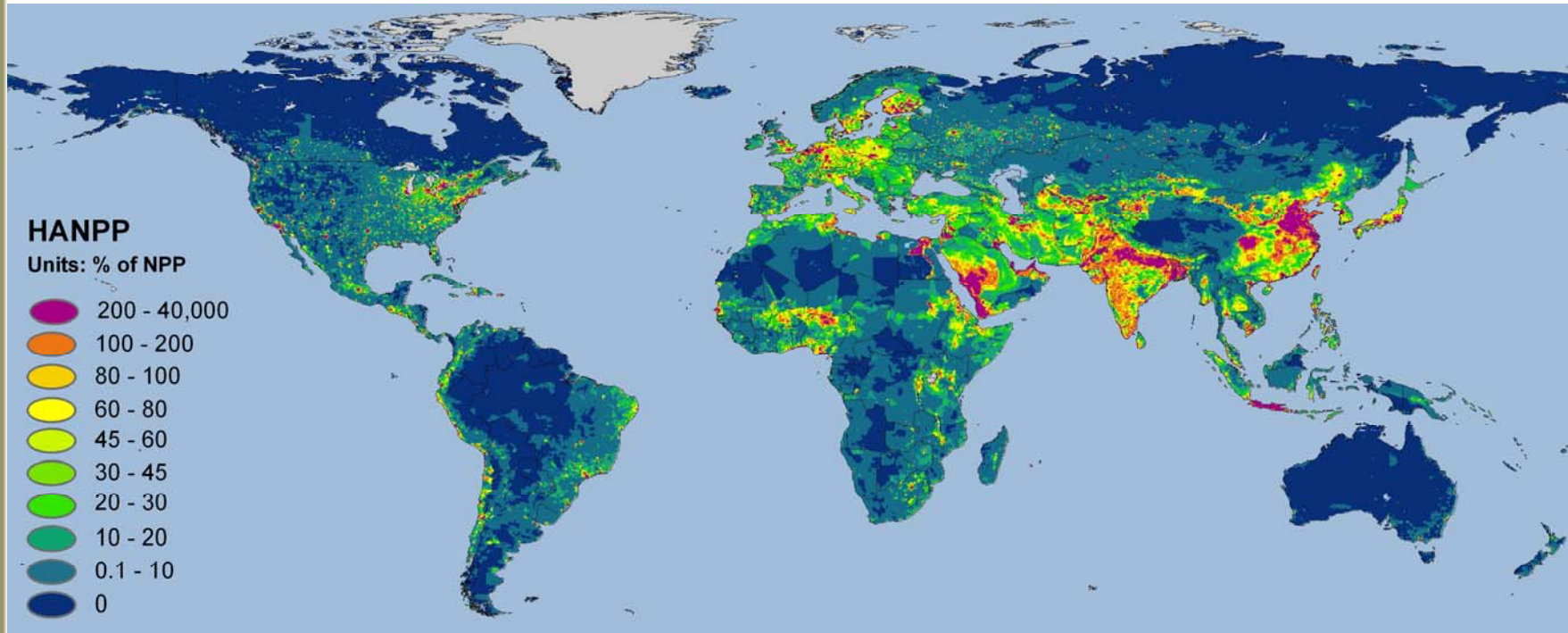


# Areas of deforestation





# Percent of Net Primary Productivity used





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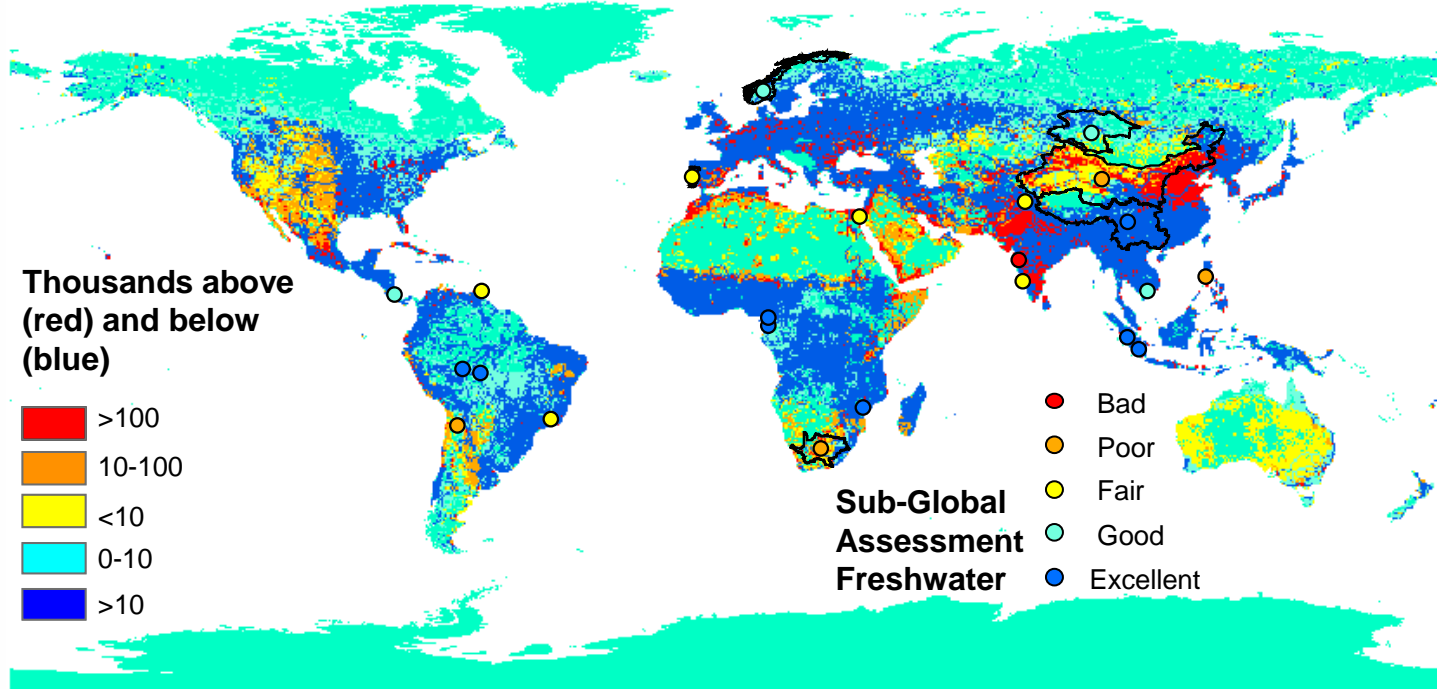


# Why deal with scale?

- Ecological and social processes have a characteristic scale,
- Progressively greater spatial, temporal or causal detail considered as the scale becomes finer.
- Validation of larger-scale conclusions by smaller-scale studies
- Contextualization at larger scales of findings at smaller scales.
- Reporting and response options to matched to the scales at which social decision-making occurs,



1. Ecosystem services are important for many dimensions of human well-being, some of which are best observed at local scales



2. The condition and trends of ecosystem may depend on the scale of analysis



	Global	Regional	Local
Over-exploitation	Orange	Light Red	Red
Habitat change	Orange	Light Red	Red
Invasive species	Orange	Red	Red
Pollution	Light Red	Red	Red
Climate change	Red	Red	Red

3. Drivers of ecosystem change and response options depend on scale



4. Using different knowledge systems provides useful insights that might otherwise be missed



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Global

Regional

Local

Human Wellbeing & Poverty Reduction

- Health and disease
- Environmental security
- Cultural security
- Economic security
- Equity

Primary Drivers

- Demographic change
- Economic change (incl globalization, trade, market, & policy framework)
- Social and political change (incl governance, institutional, & legal framework)
- Technological change
- Lifestyle and behavioral change

Ecosystems & Their Services

- Supporting (biodiversity and ecosystem processes)
- Provisioning (food, water, fiber, fuel, other biological products)
- Cultural (social, aesthetic)

Life on Earth

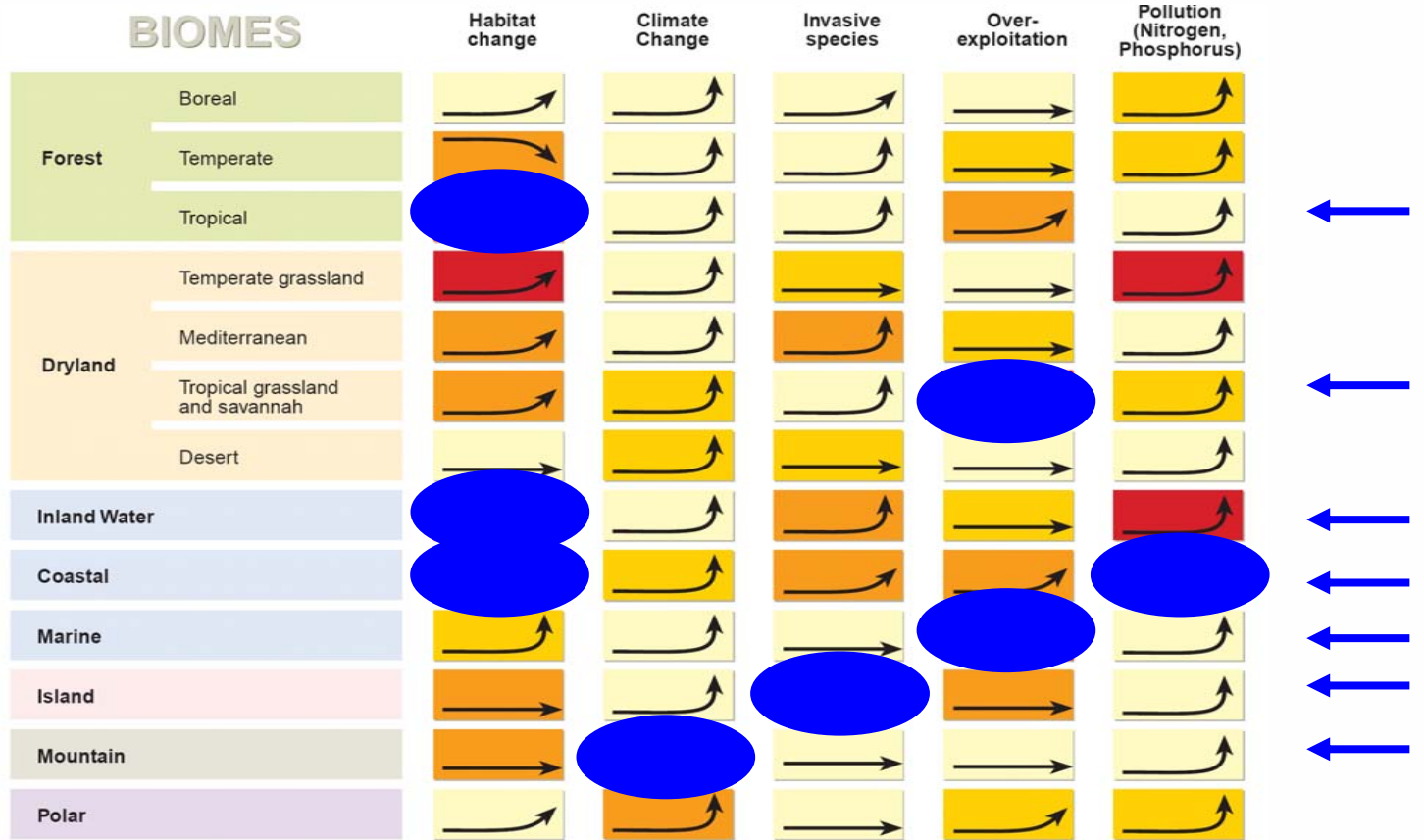
Proximate Drivers

- Climate change
- Land and water use & cover change
- Factor inputs (e.g. irrigation, fertilizers)
- Pollution
- Harvest
- Nutrient release
- Species introductions

 = Strategies and Interventions

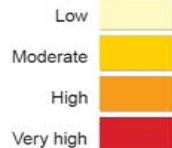


# Direct drivers by biomes



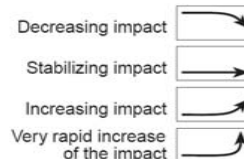
RESULT OF PAST EVOLUTION

Driver's impact on biodiversity over the last century



WHAT HAPPENS TODAY

Driver's actual trends





# Response options

- Institutions
  - transparency and accountability
- Economics
  - Eliminate subsidies
  - Markets for ecosystem services
- Technology
- Social and behavioral
- Knowledge



# OAS and the MA

- Use conceptual framework to analyze tradeoffs for ecosystem services
- Response options:
  - Markets for ecosystem services
  - Technology transfer
  - Institutional capacity
  - Information
- Support national and regional assessments

