Scenarios for global biodiversity change: gaps and limitations

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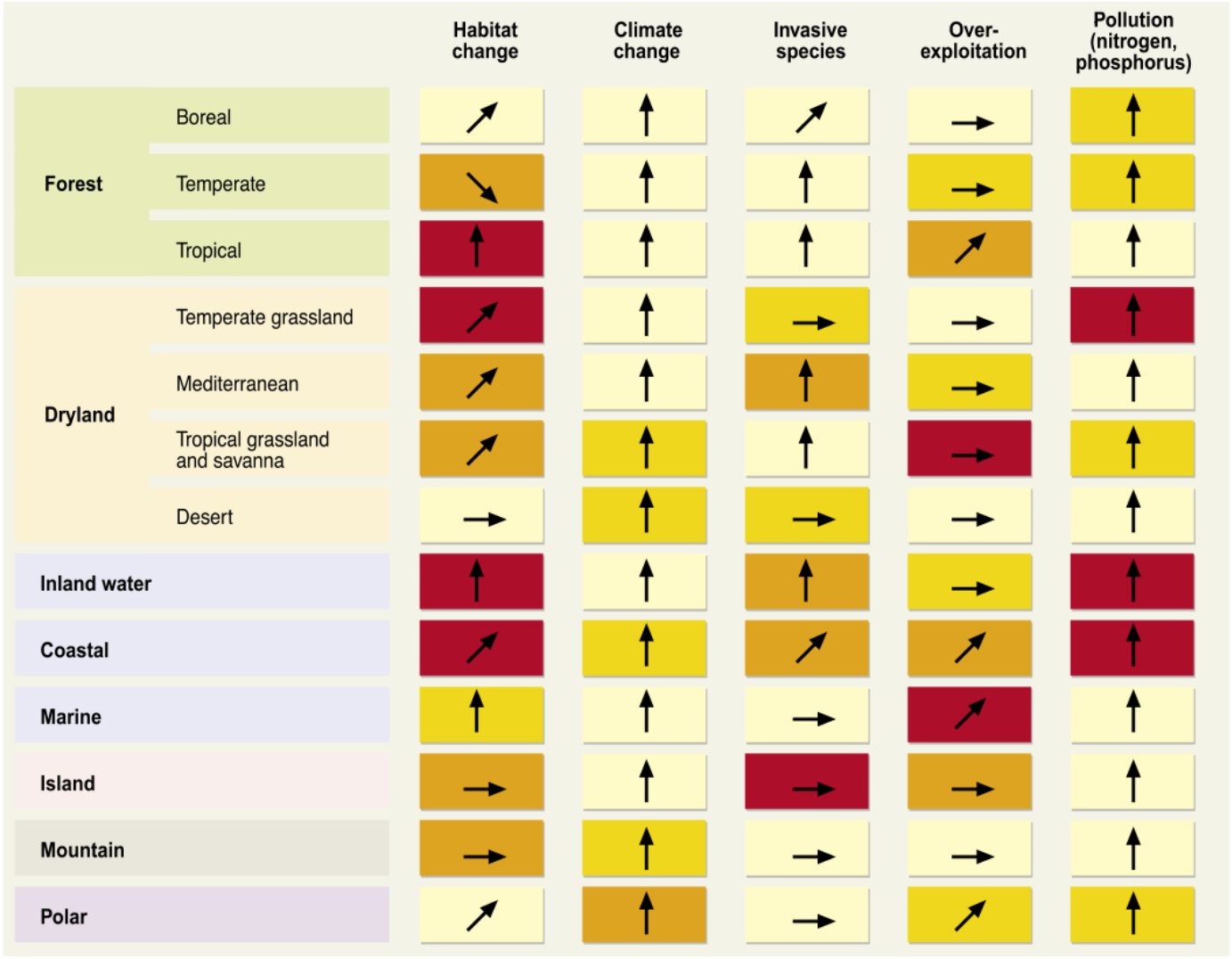
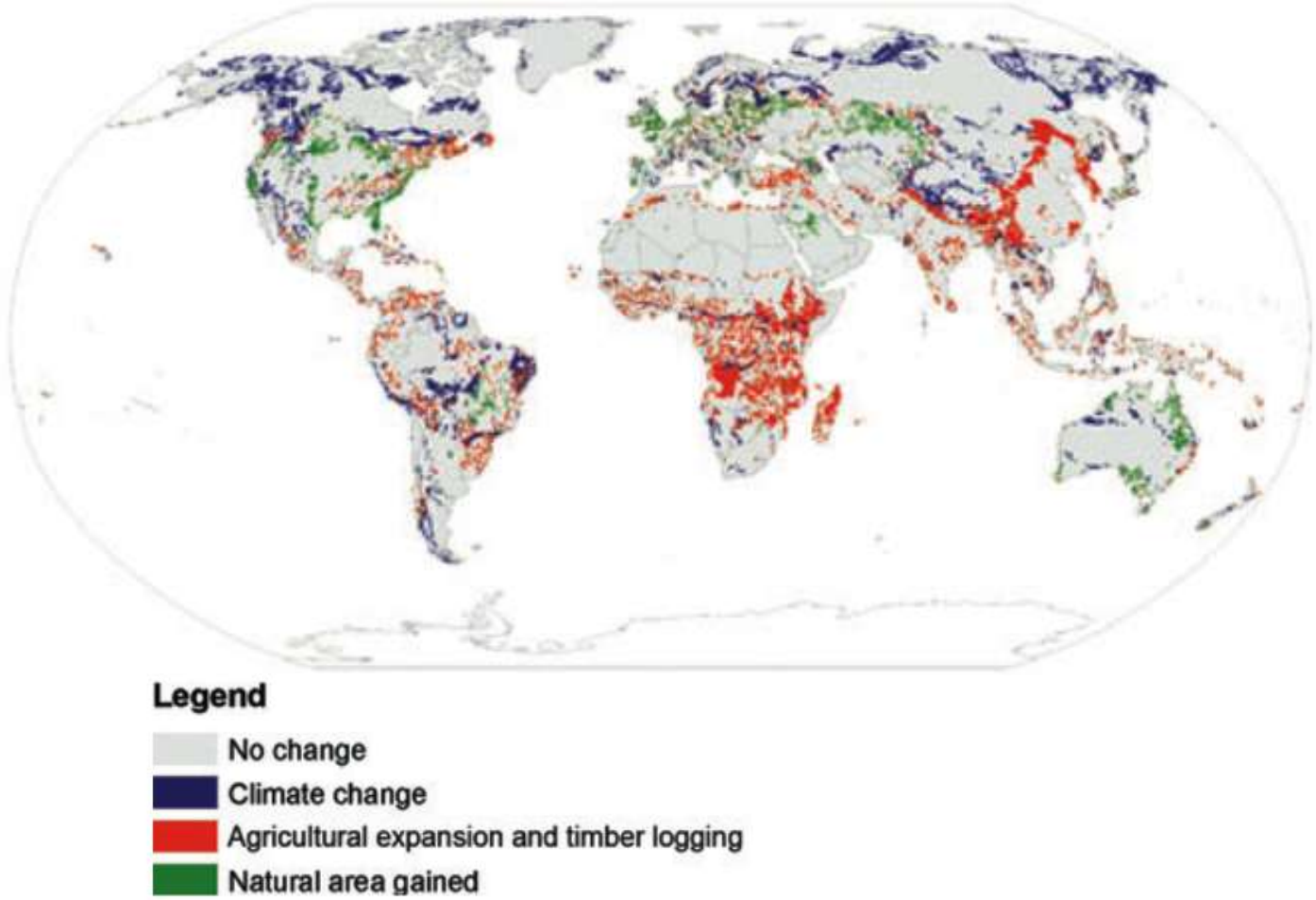
The causes


Habitat change
Climate change
Invasive species
Over-exploitation
Pollution (nitrogen, phosphorus)
Forest
Boreal
Temperate
Tropical
Dryland
Temperate grassland
Mediterranean
Tropical grassland and savanna
Desert
Inland water
Coastal
Marine
Island
Mountain
Polar
Driver's impact on biodiversity over the last century
Low
Moderate
High
Very high
Driver's current trends
Decreasing impact
Continuing impact
Increasing impact
Very rapid increase of the impact

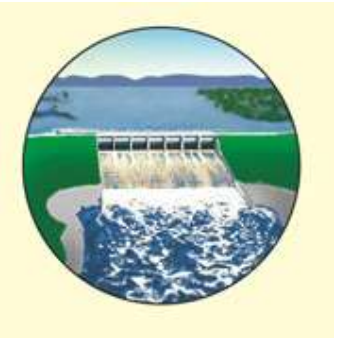
Latitudinal patterns on land-use change

Technogarden 2050



Habitat change and biodiversity

- We lack models projecting biodiversity changes from the expansion of natural vegetation in developing countries
- MSA is a great indicator but GLOBIO methodology to calculate it has not been tested
  - This is a huge problem with many scenarios models
- In freshwater systems dam construction is one of the main drivers of biodiversity loss, but no scenario models account for it
- Some tools are becoming available to predict the impacts of habitat destruction in marine systems
- Trade-offs for provisioning services and biodiversity could be more explored
  - Intensification versus extensification



Climate change

- There are many models available to project the impacts of climate change on biodiversity
  - But not because this is a major threat currently, simply because it is easy to do!
  - Coral reefs (acidification + sea surface temperature) and polar/mountain systems are likely to suffer more but global biodiversity scenarios are lacking for polar/mountain systems
- Empirical tests of these models and their assumptions are still limited
  - Climate envelope limits
  - Adapattion to ocean acidification

Invasive species and biotic exchange

- Invasive species have not been treated in most scenario models
  - Main driver of biodiversity loss in islands
- Biotic exchange poses great threats for the propagation of diseases
- Ballast water impacts could be easy to incorporate in models

Overexploitation

- There are tested models for marine fisheries (Ecosym)
  - Current scenarios with these models do predict tipping points or major collapses (problem with optimization procedure?)
- No models for freshwater and terrestrial biodiversity
  - Priority for savanna

Pollution

- Major driver in inland waters and coastal waters
  - Global models do not deal with impacts on these systems
- Major driver in grasslands
  - Global models forecast impacts on these systems, but with large uncertainties

Ecosystem services

- Provisioning services
  - Well covered
- Regulating services
  - Poorly Covered (exception CO2 sequestration)
- Supporting services
  - Moderately covered
- Cultural services
  - Poorly covered (could be done better)
- Key problems to solve
  - Flows of ecosystem services
    - Where do people benefit form services produced elsewhere
  - Scale of ecosystem services analysis

Lessons from past assessments

- Bringing experts from different fields together improves our understanding of global socio-ecological dynamics
- Pro-active environmental measures can save biodiversity
- People pay attention to scary scenarios!
- Biodiversity and ecosystem services scenarios do not have direct linkages to human-well being that we find in climate scenarios
- Small sidestories with simpler models could be more feasible and still powerful
- We need to test the models and be more transparent about them