Ecological Sustainability: A Policy Oxymoron?

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“ **Oxymoron: a figure of speech in which apparently contradictory terms appear in conjunction** ”

(Oxford English Dictionary)

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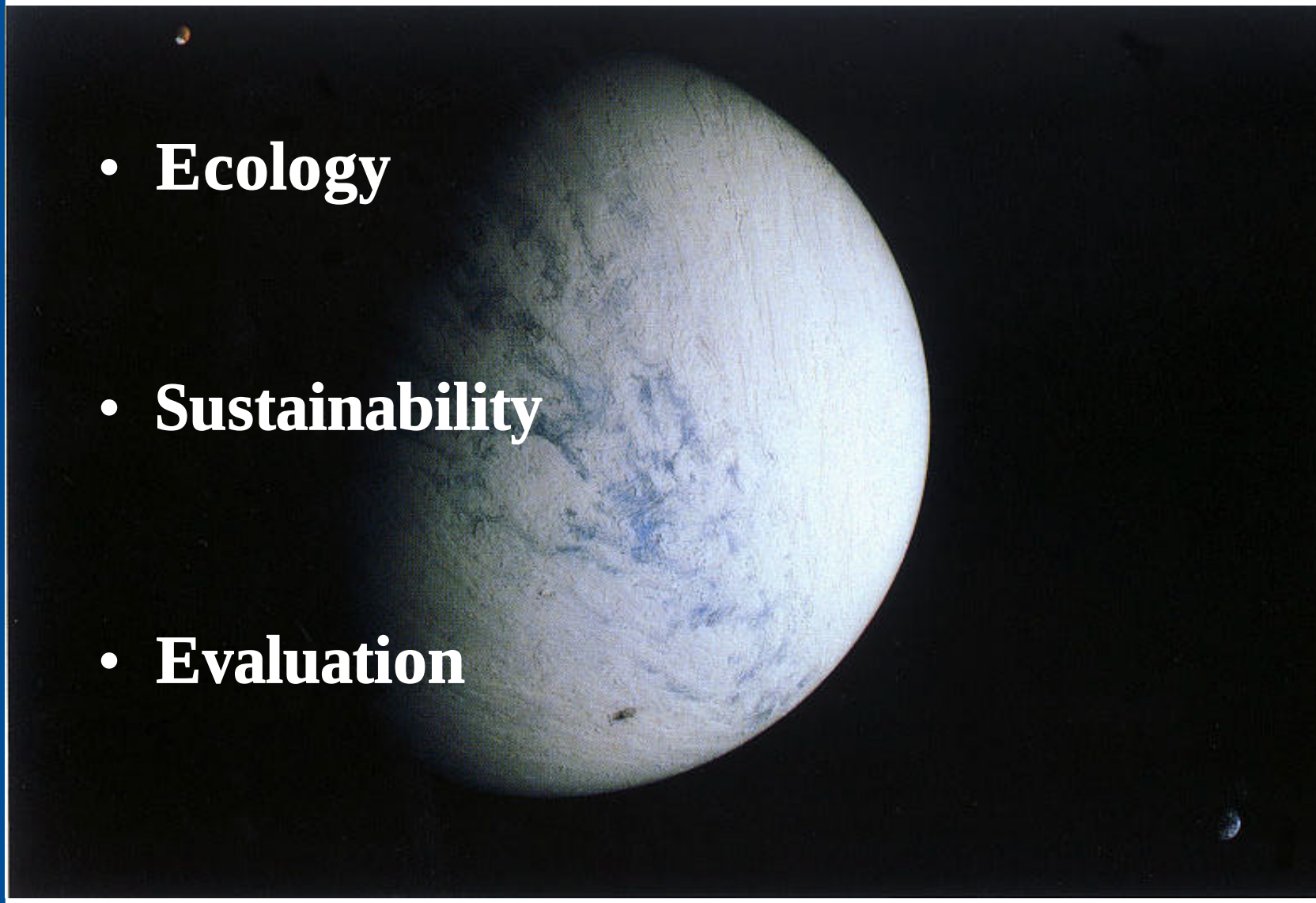

- **Ecology**
- **Sustainability**
- **Evaluation**

1) Does the productivity of ecosystems depend on their Biodiversity?

2) Does ecosystem stability depend on biodiversity?

3) Does the long term sustainability of ecosystem function depend on biodiversity?

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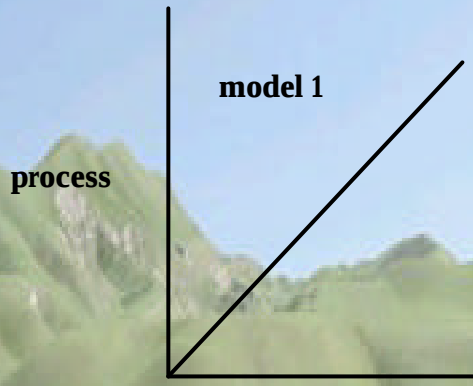

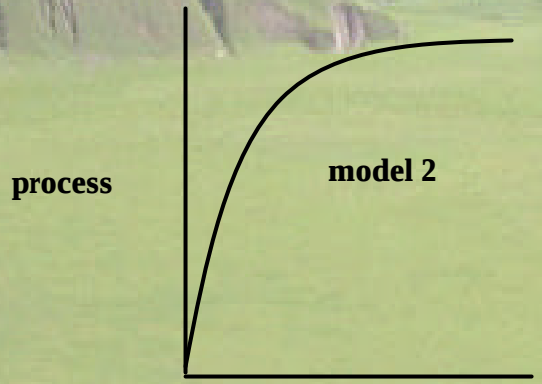

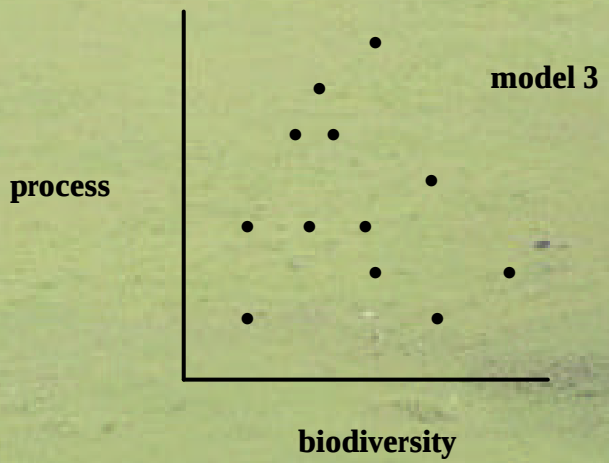

Tilman & Downing. Nature (1994) 367: 363 – 365

Hypotheses:

- More diverse communities are more resistant
- More diverse communities are more resilient

Reasoning:

- Species differ in their traits

Conclusions:

- Species poor plots were more greatly harmed by drought (less resistant)
- Species poor plots took longer to return to pre-drought conditions (less resilient)
- Diversity and ecosystem stability are positively correlated
- Functional diversity should be a saturating function of species richness because, in species rich ecosystems, additional species are more likely to be similar to existing species
- Progressive loss of species should have progressively greater impacts on ecosystem stability

Tilman & Downing. Nature (1996) 379: 718 – 720

Hypotheses:

- More diverse communities are more productive
- Nutrient losses are lower in more diverse communities

Reasoning:

- Interspecific differences allow more diverse communities to more fully utilise limiting resources

Conclusions:

- Productivity increases with diversity
- Soil nitrogen utilisation increases with diversity
- Diversity and sustainability are positively correlated
- Loss of species threatens ecosystem functioning and diversity

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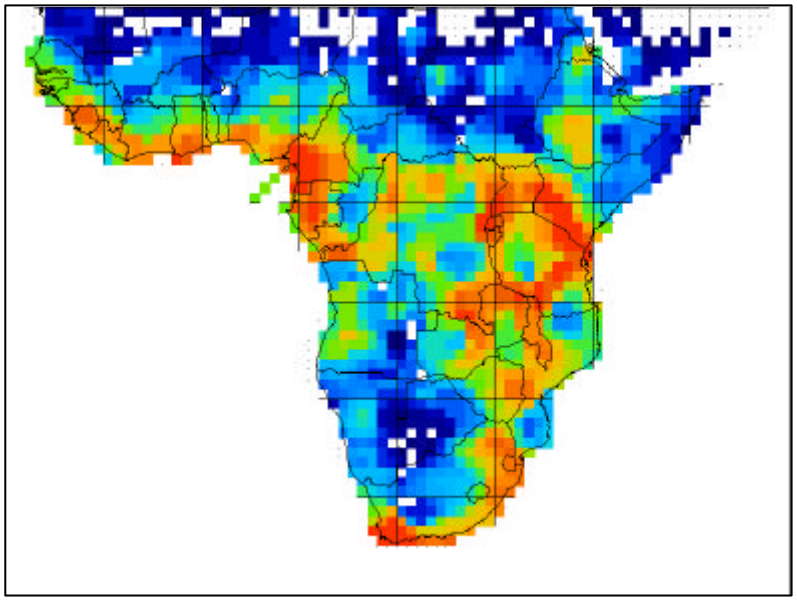
1) Productivity of ecosystems does depend on biodiversity

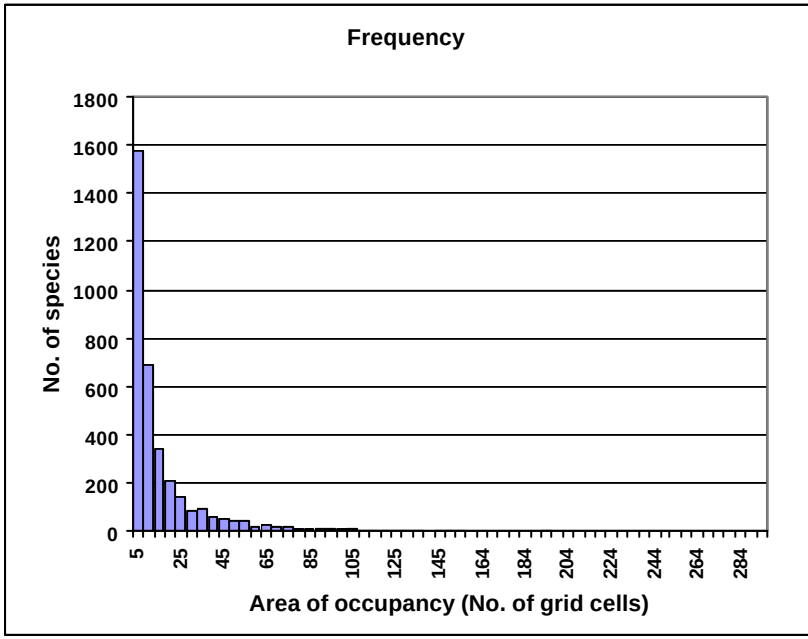
2) Ecosystem diversity does depend on biodiversity

3) Long term sustainability of ecosystem function does depend on biodiversity

Or does it . . . . . ?

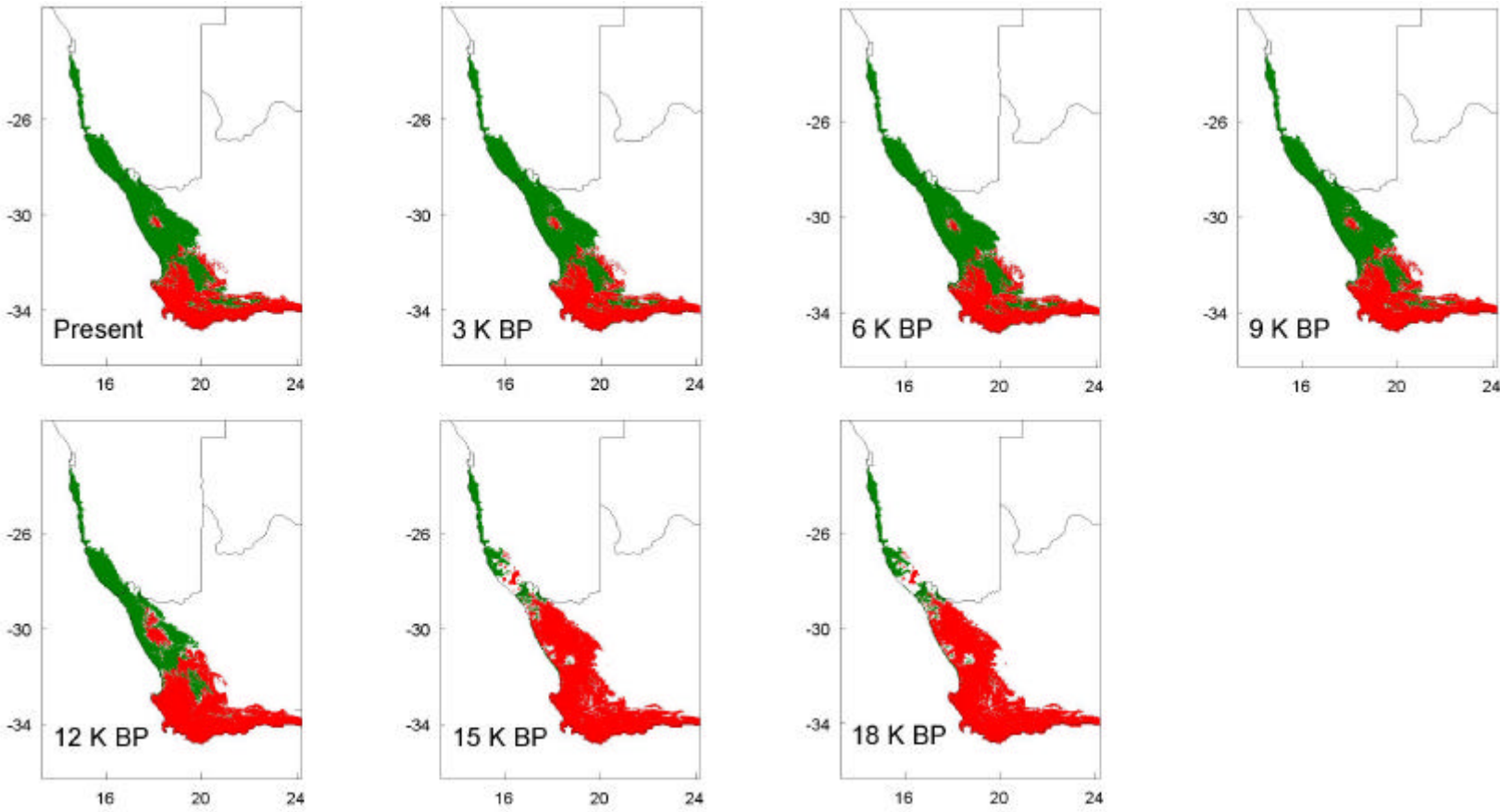
A question of scale





- **25 hotspots occupying 1.44% of the Earth's land surface contain 43.8% of the world's plants**
- **Most plant species are rare**

The problem of dynamics



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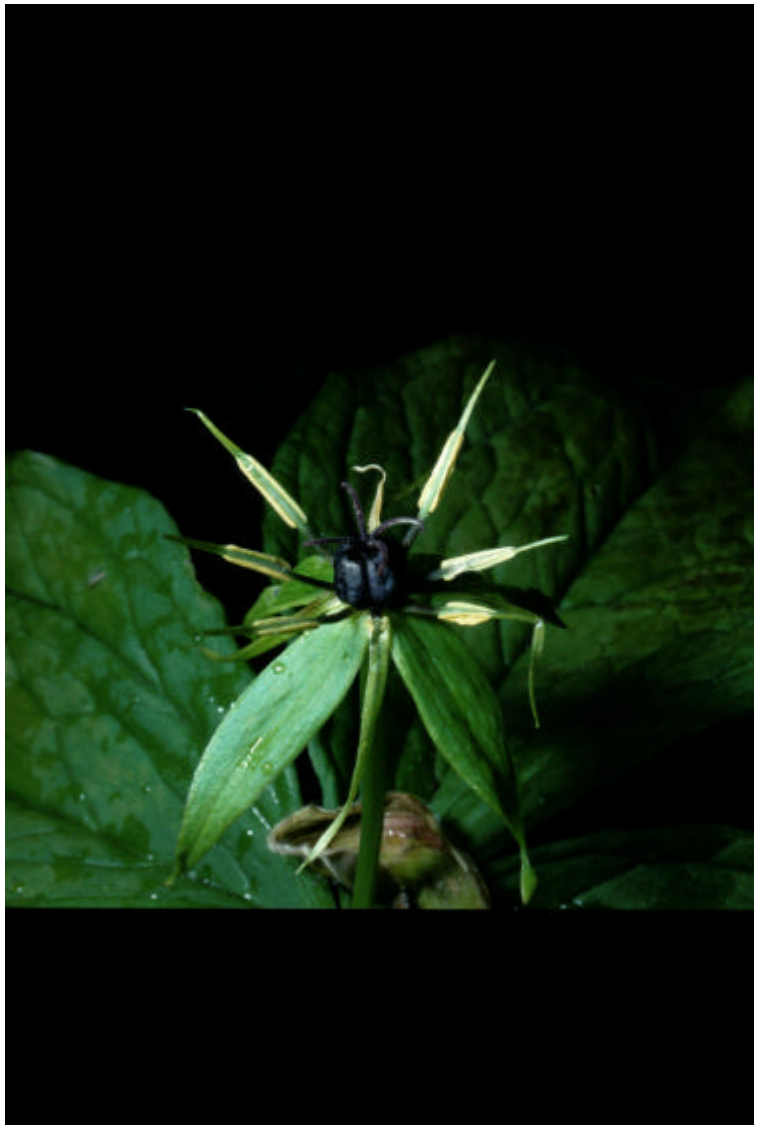
Evaluation

Count species diversity?

What about the microbes!

Measure ecosystem functions?

What about rare species!



Ecology in policy

- **Species specific legislation**
- **Conserve full range of habitats**
- **Shift subsidies to provision of environmental goods**

Conclusion

- **Empirical evidence for positive relationship between diversity, productivity, stability and sustainability**
- **Global diversity concentrated in a few hotspots**
- **Empirical relationship only holds at very local scale with small numbers of species**
- **Ecology is dynamic, responding to climate change**
- **Sustainability: a matter of opinion**
- **Evaluation: ecosystem function or public perception?**