

FST Meeting

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Valuing Biodiversity

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Humanity's Impacts

Over the past century and a half:

- the human population has increased x 7
- the global average energy use per person has increased x 7
- That is, overall energy use has **increased roughly fifty-fold**

GLOBAL SCALE OF IMPACTS

- Humans use, directly or indirectly, ca. 40% of all terrestrial net primary productivity, NPP (Vitousek et al. 1986).
- Recent analysis of satellite images confirm this, showing 40% of land area modified by humans.
- Humans use 45% of Earth's photosynthetic potential (e.g. Sachs, 2008).

GLOBAL SCALE OF IMPACTS

- Humans currently use 60% of all run-off water (e.g. Sachs, 2008)
- Projecting current trends in demand (70% for agriculture) and sustainable supply of fresh water shows the curves cross around 2040

GLOBAL SCALE OF IMPACTS

- Of all the atmospheric N fixed in 2007, 55% came from the Haber-Bosch chemical process.
- Such fertilizers underpinned production of 80% of all cereal crops in the twentieth century.



SPECIES THREATENED WITH EXTINCTION [IUCN Red Data Books, 2004]

Taxon	All known species in taxon, % threatened	Fraction threatened, for species of evaluated status, %
<u>Vertebrates</u>		
mammals	20	23
birds	12	12
amphibians	31	31
reptiles	4	61
fish	3	26
<u>Plants</u>		
dicots	4	74
monocots	1	68
<u>Invertebrates</u>		
insects	0.06	73

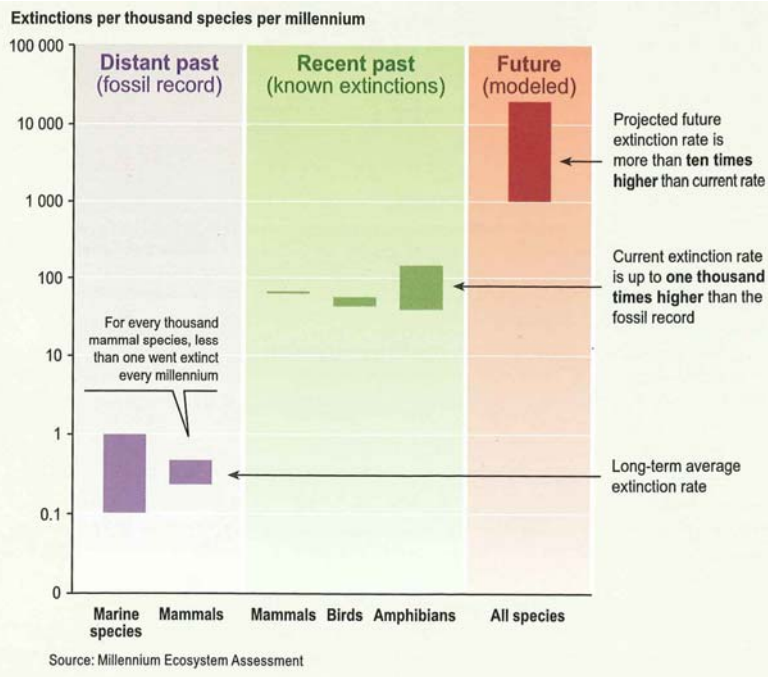


Table 1 : Global Status of Ecosystem Services (Millennium Ecosystem Assessment, 2005)

Service	Status ^a	Notes
Provisioning Services		
Food: crops	+	substantial production increase
: livestock	+	substantial production increase
: capture fisheries	-	declining production due to overharvest
: aquaculture	+	substantial production increase
: wild foods	-	declining production
Fibre: timber	+/-	forest loss in some regions, growth in others
: cotton, hemp, silk	+/-	declining production of some fibres, growth in others
: wood fuel	-	declining production
Genetic resources	-	lost through extinction and crop genetic resource loss
Biochemicals, natural medicines, pharmaceuticals	-	lost through extinction, overharvest
Fresh water	-	unsustainable use for drinking, industry, and irrigation; amount of hydro energy unchanged, but dams increase ability to use that energy
Regulating Services		
Air quality regulation	-	decline in ability of atmosphere to cleanse itself
Climate regulation: global	+	net source of carbon sequestration since mid-century
: regional and local	-	preponderance of negative impacts
Water regulation	+/-	varies depending on ecosystem change and location
Erosion regulation	-	increased soil degradation
Water purification and waste treatment	-	declining water quality
Disease regulation	+/-	varies depending on ecosystem change
Pest regulation	-	natural control degraded through pesticide use
Pollination	- ^b	apparent global decline in abundance of pollinators
Natural hazard regulation	-	loss of natural buffers (wetlands, mangroves)
Cultural Services		
Spiritual and religious values	-	rapid decline in sacred groves and species
Aesthetic values	-	decline in quantity and quality of natural lands
Recreation and ecotourism	+/-	more areas accessible but many degraded

Footnote:

a: + means enhanced, - means degraded, in the senses defined in the main text.
 b: the evaluation here is of "low to medium certainty"; all other trends are "medium to high certainty"

ECOSYSTEM SERVICES

- Rough estimate of their value puts it comparable with, or greater than, the global GDP of conventional economics.
- The MEA classifies such services under 24 headings: 15 are degrading; 4 improving; 5 not able to evaluate.

The COSTS OF PRESERVATION

- (1) Nature reserves and other protected areas: 6% of land area; \$6 billion/yr
- (2) Costs of increase to 10%, properly protected, and with sustainable compensation for local people: \$30 billion/yr
- (3) Environmentally friendly and sustainable agriculture: \$300 billion/yr (less than 1% of global GDP)

Balmford *et al*, 2002

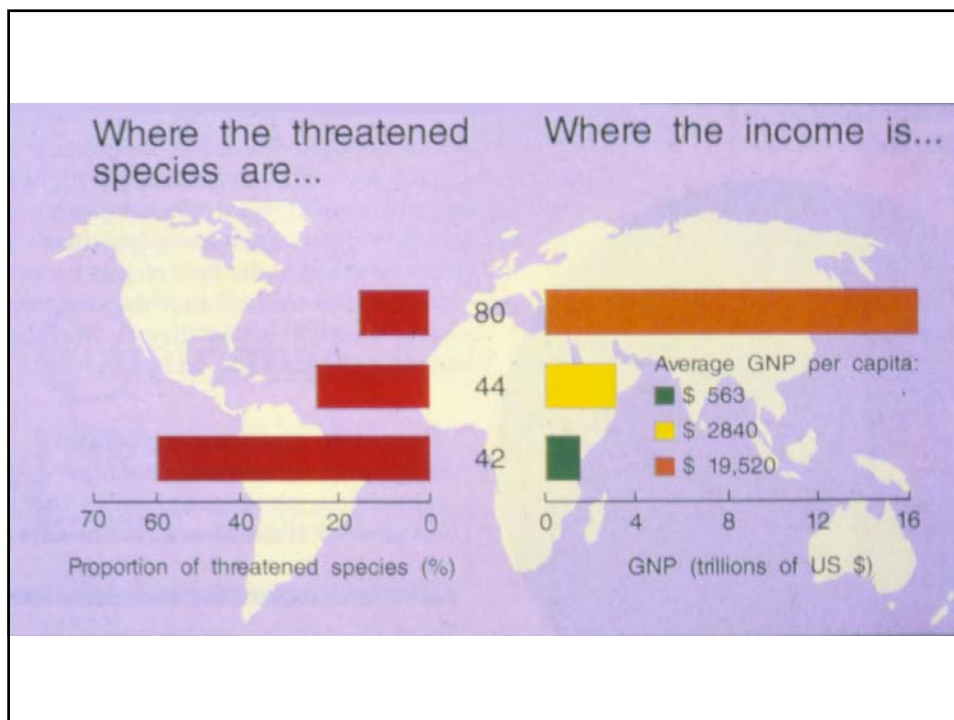


Fig. 20: ECOLOGICAL FOOTPRINT AND BIOCAPACITY BY REGION, 2003

