

Aggregating biodiversity indicators for policy purposes: sense or nonsense?



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www.alter-net.info

Klok et al. Aggregating biodiversity indicators for policy purposes-sense or non-sense? EnvironSc&Pol (submitted)

Outline talk

- Biodiversity crisis
- DPSIR approach
- 2010 target
- How to monitor progress to target?
- Indicators: what has been developed
- 5 aggregated indicators selected
- Scientific quality (pros and cons)
- Policy relevance
- Added value of LT(S)ER sites

Biodiversity is disappearing at high speed

The current rate of species extinction by far exceeds historical ones (Pimm *et al.*, 1995), and suggests that we are at the brink of a major biodiversity crisis (Thomas *et al.*, 2005).



BBC NEWS
Tuesday, 21 May, 2002, 13:48 GMT 14:48 UK

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Quarter of mammals 'face extinction'



WORLD CUP Siberian tigers may vanish within three decades

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By Corinne Podger
BBC science correspondent

Almost a quarter of the world's mammals face extinction within 30 years, according to a United Nations report on the state of the global environment.



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Study: Only 10 percent of big ocean fish remain

By Marsha Walton
CNN
Wednesday, May 14, 2003 Posted: 10:29 PM EDT (0229 GMT)

(CNN) – A new global study concludes that 90 percent of all large fishes have disappeared from the world's oceans in the past half century, the



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Fifth of bird species 'threatened'

- -- **More than a fifth of the world's bird species are threatened with extinction, according to an annual survey published**

BirdLife, a global alliance of conservation groups, said that 1,212 of the planet's 9,775 species were in imminent danger of disappearing, while a further 788 were considered "near threatened."



Fewer than 300 Azores bullfinches survive.

Climate change threatens tropical frog species

•Source(<http://www.nsf.gov/news/>)

Press release 2006



- The Panamanian golden frog is one of more than 100 species of disappearing harlequin frogs.
- Scientists estimate that about 67 percent of harlequin frogs have disappeared due to fungus outbreaks driven by global warming.
- Recent studies show the Earth's warming climate is contributing to the increase of chytrid disease, a fungus infection that is responsible for the extinction of many tropical frog species. The fungus, *Batrachochytrium dendrobatidis*, infects tadpoles and eventually attacks the skin of adults and kills them. Scientists know the spore stage can swim through water to infect other frogs, but there is still much to know about how the disease spreads, and if it can survive in other animals.

Credit: *Nicolle Rager Fuller, National Science Foundation Photo: NatureServe*

Humans spur worst extinctions since dinosaurs



- Last Update: Tuesday, March 21, 2006. based on Global Biodiversity Outlook 2 report
- Humans are responsible for the worst spate of extinctions since the dinosaurs and must make unprecedented extra efforts to reach a goal of slowing losses by 2010, a UN report has said.
- "In effect, we are currently responsible for the sixth major extinction event in the history of earth, and the greatest since the dinosaurs disappeared, 65 million years ago," said the 92-page Global Biodiversity Outlook 2 report.
- Habitats ranging from coral reefs to tropical rainforests face mounting threats, the Secretariat of the UN Convention on Biological Diversity said in the report, issued at the start of a March 20-31 UN meeting in Curitiba, Brazil.
- It estimated the current pace of extinctions was 1,000 times faster than historical rates, jeopardizing a global goal set at a 2002 UN summit in Johannesburg "to achieve, by 2010, a significant reduction in the current rate of biodiversity loss".
- A rising human population of 6.5 billion was undermining the environment for animals and plants via pollution, expanding cities, deforestation, introduction of "alien species" and global warming, it said.
- "Unprecedented additional efforts' will be needed to achieve the 2010 biodiversity target at national, regional and global levels," it said. The report was bleaker than a first UN review of the diversity of life issued in 2001.

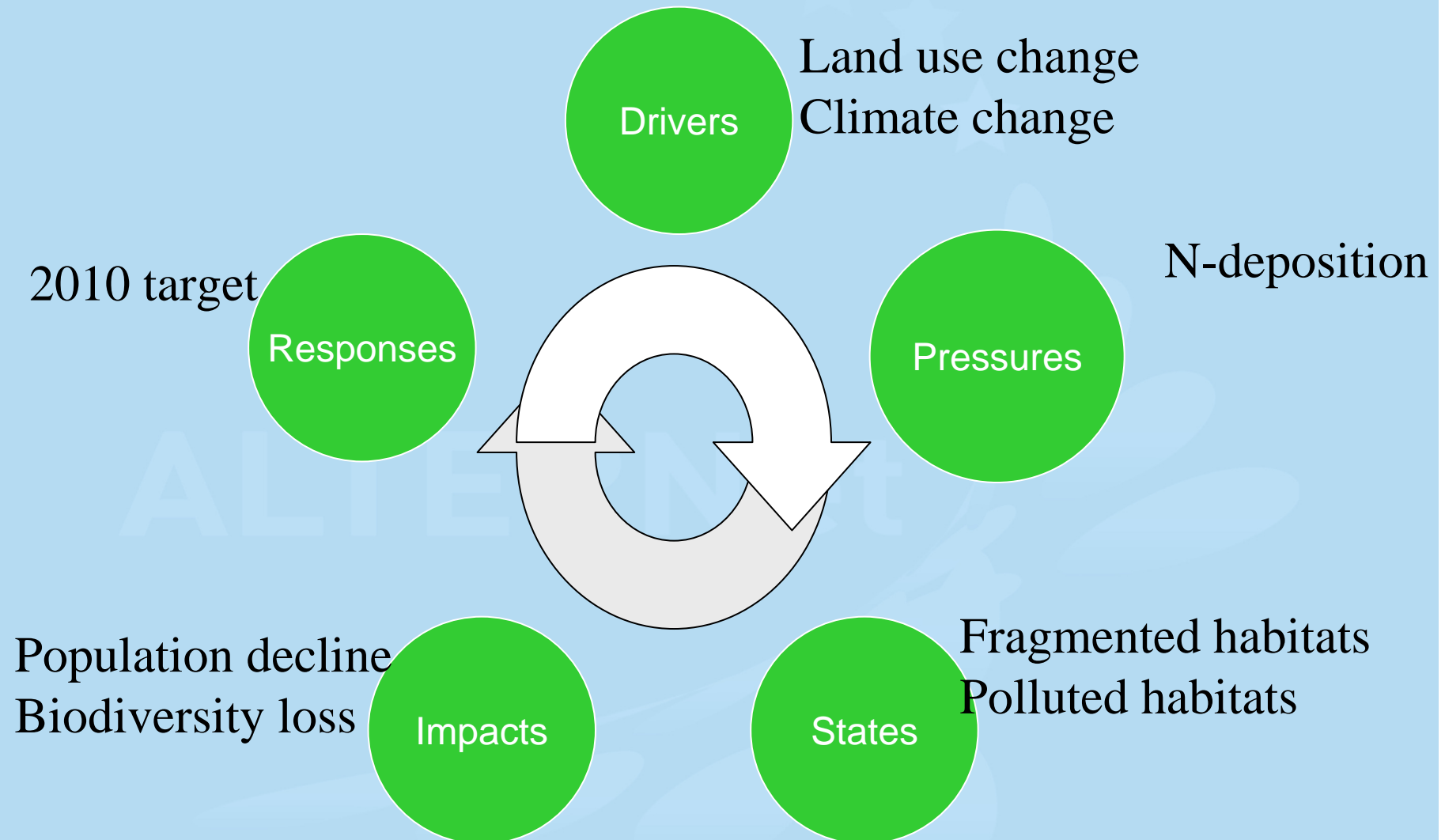
Biodiversity loss a concern for all?

Healthy, biodiverse ecosystems provide the goods and services that humans need for their well-being.

- Many of these goods and services are in decline, such as the provision of fresh water, marine fisheries, the cleansing of atmospheric pollutants, protection from natural hazards, pollination of our crops and pest control.
- The loss of biological diversity destabilizes ecosystems and makes them more vulnerable to shocks and disturbances such as hurricanes and floods, which may further reduce the ability of environments to provide for human well-being.
- These negative consequences are felt most harshly by the rural poor, who rely most directly on the services provided by local ecosystems for their well-being. For this reason, biodiversity loss poses a significant barrier to meeting the Millennium Development Goals.
- Biodiversity underpins many of our cultural and spiritual values.

Source: <http://www.cbd.int/gbo2/main-messages.shtml>

DPSIR- approach



Most important drivers

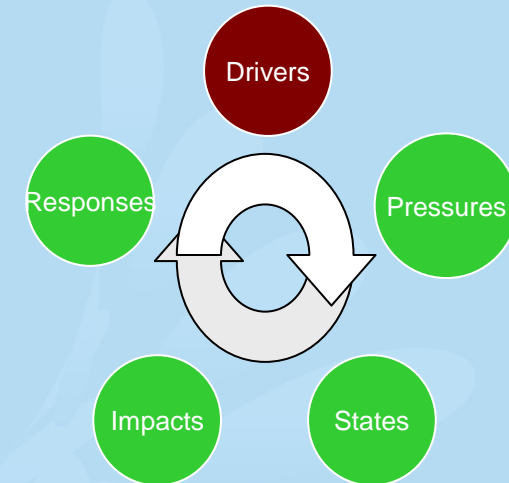
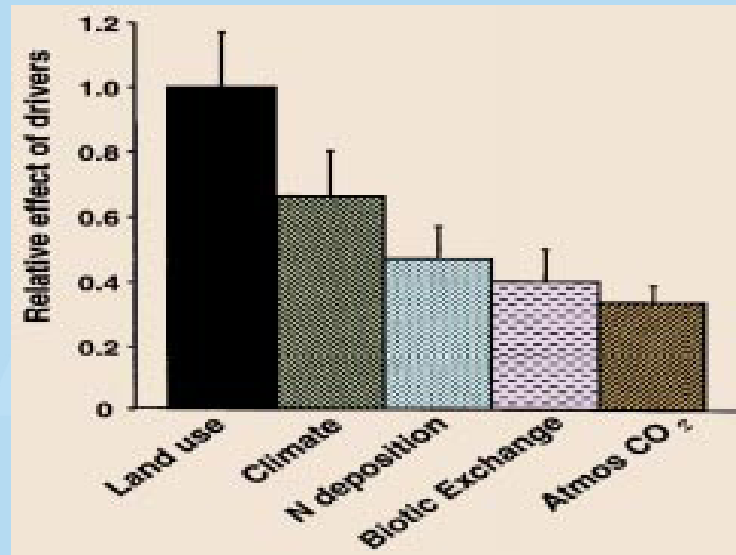
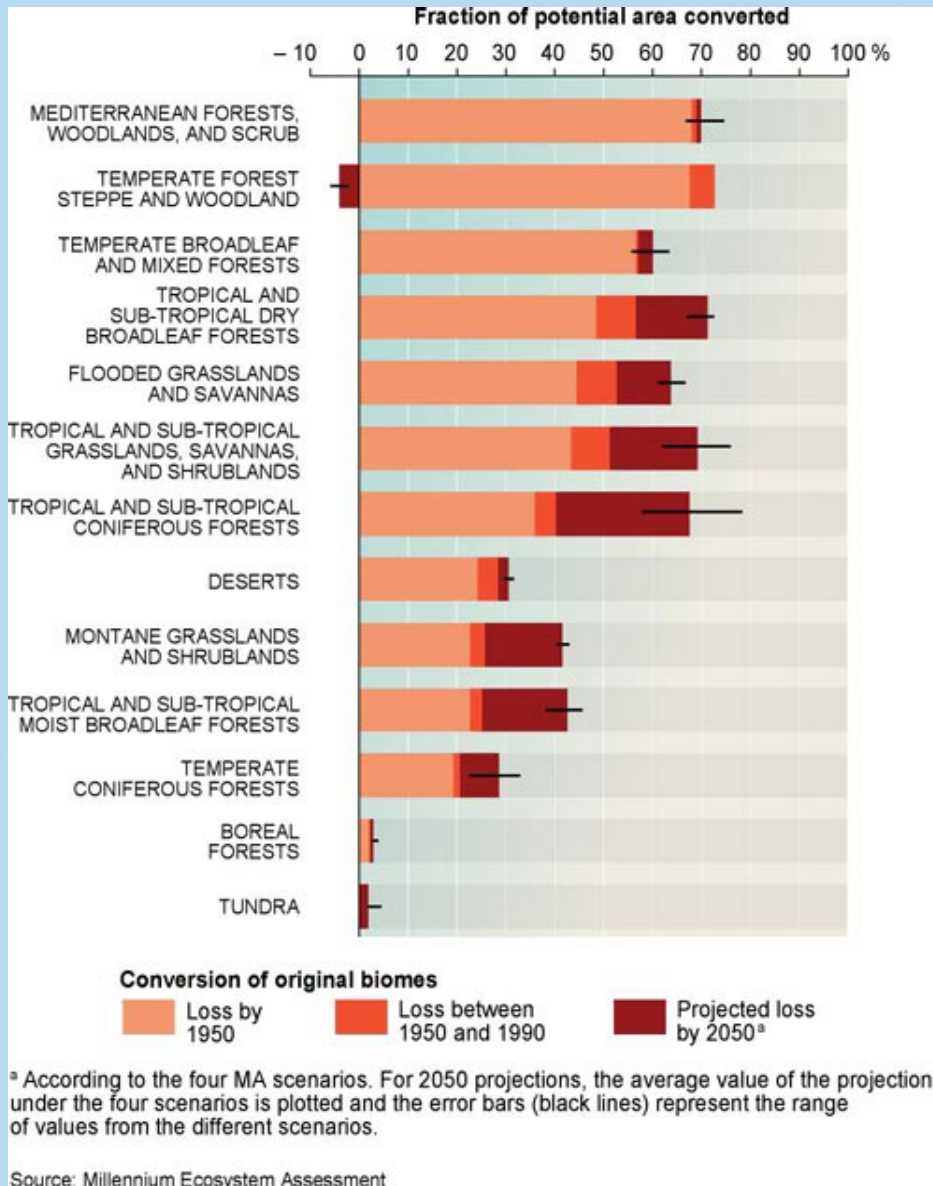
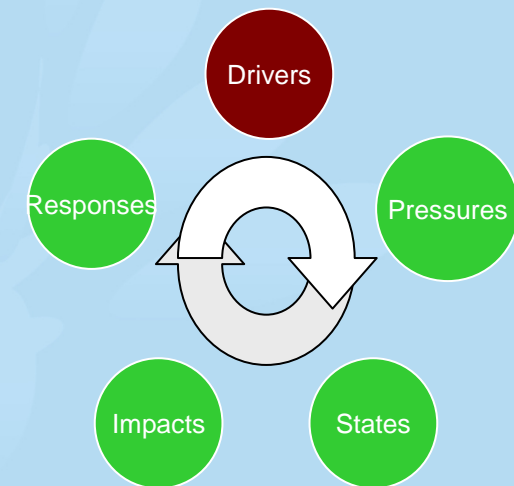


Figure 1. Relative effects of the five most important drivers of biodiversity change for the year 2100 as resulting from the biodiversity scenarios (2) [© Science 2000, Sala et al. 2000].

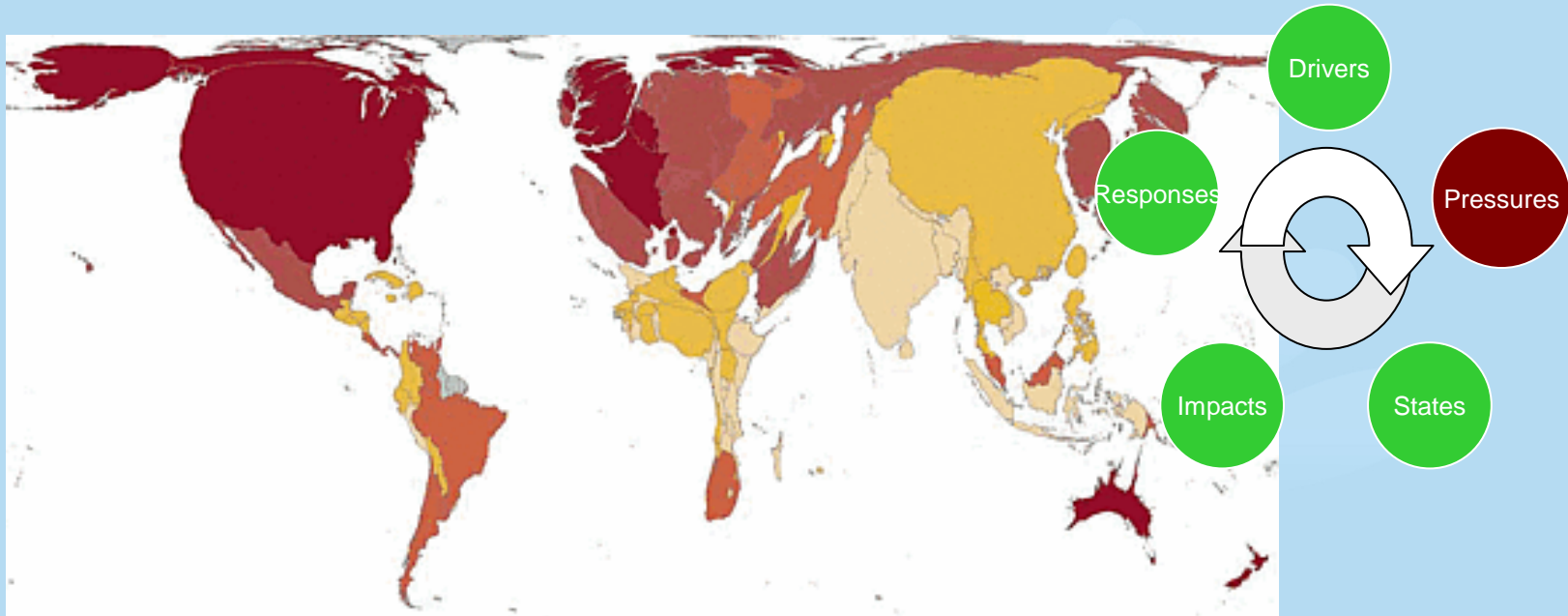


Land use change



The Living Planet Report 2006

confirms that we are using the planet's resources faster than they can be renewed – the latest data available (for 2003) indicate that humanity's Ecological Footprint, our impact upon the planet, has more than tripled since 1961. Our footprint now exceeds the world's ability to regenerate by about 25 per cent.



the Living Planet Index, shows a rapid and continuing loss of biodiversity – populations of vertebrate species have declined by about one third since 1970. This confirms previous trends.

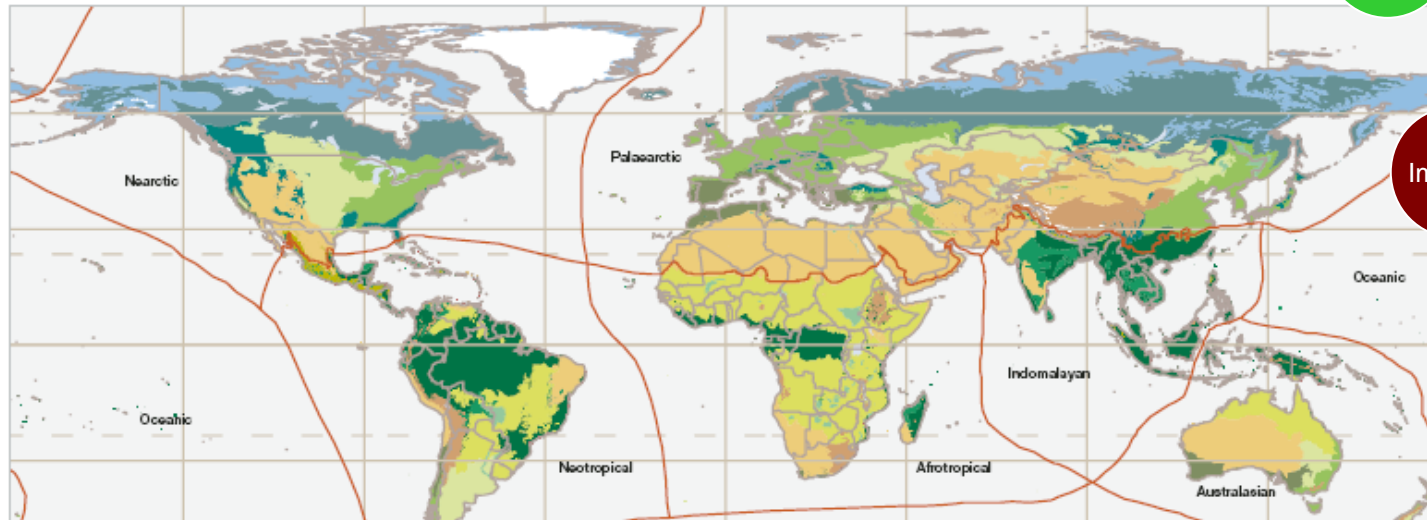
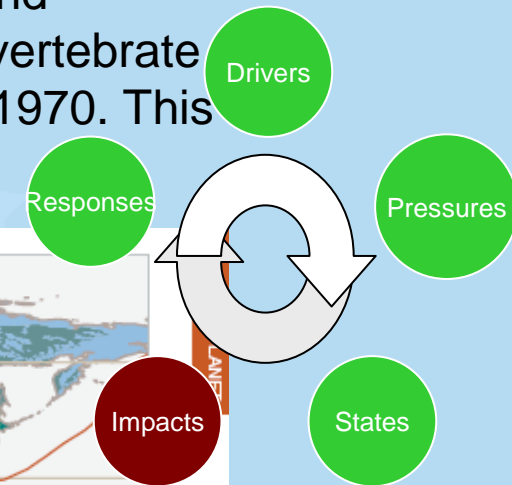


Fig. 7: TEMPERATE AND TROPICAL TERRESTRIAL LIVING PLANET INDICES, 1970–2003

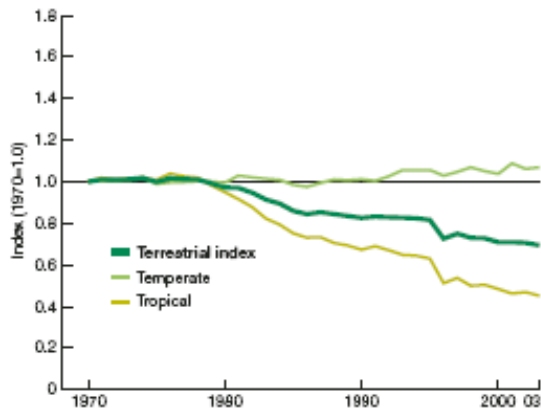


Fig. 8: LOSS OF NATURAL HABITAT, BY BIOME, to 1990 (as % of estimated original area)

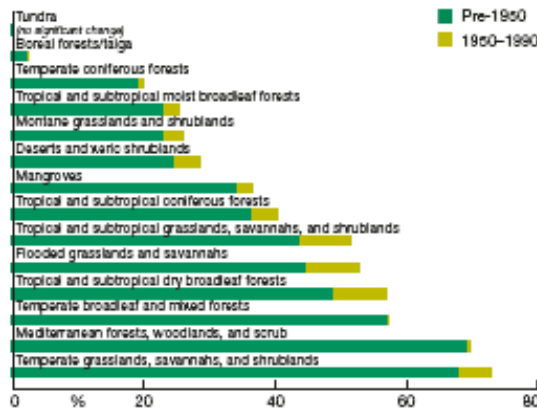
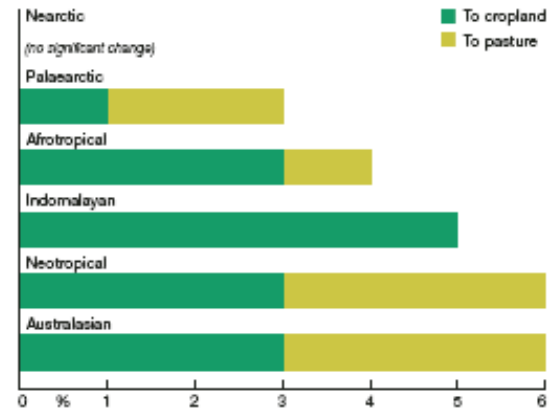
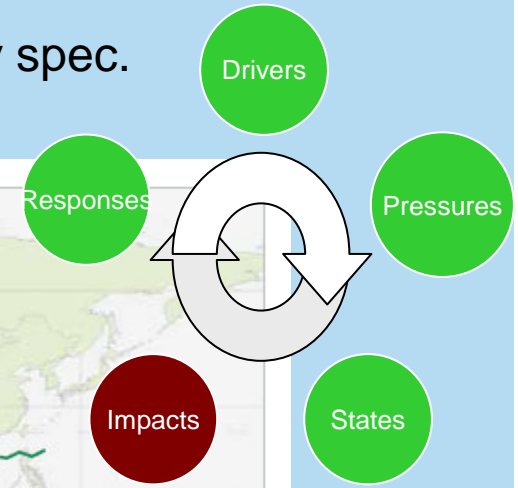
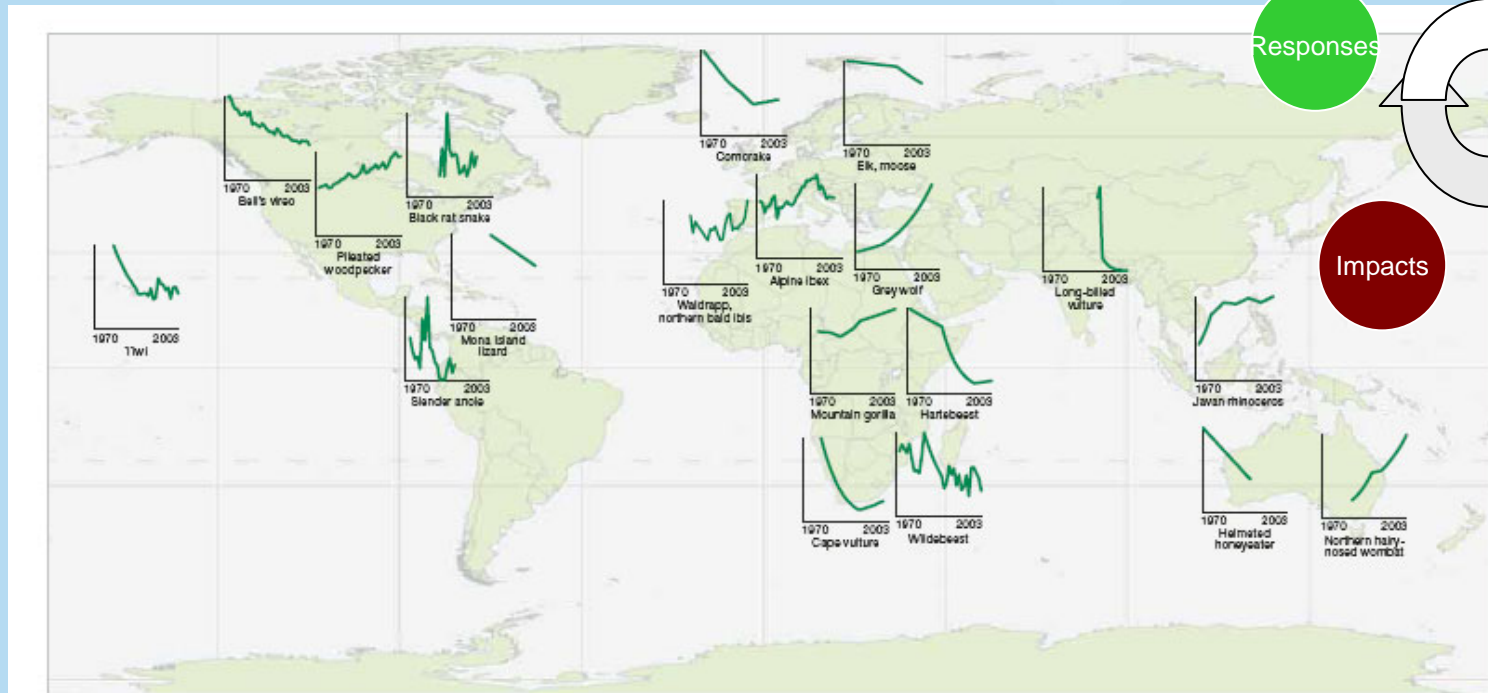


Fig. 9: LOSS OF NATURAL HABITAT TO AGRICULTURE, BY REALM, 1950–1990 (as % of 1950 area)



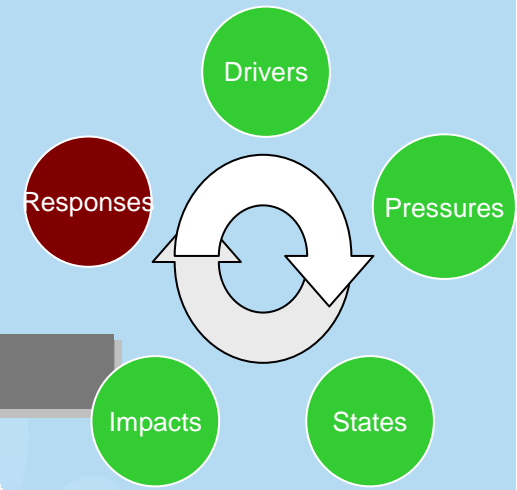
Also at the species level we see decline in many spec.



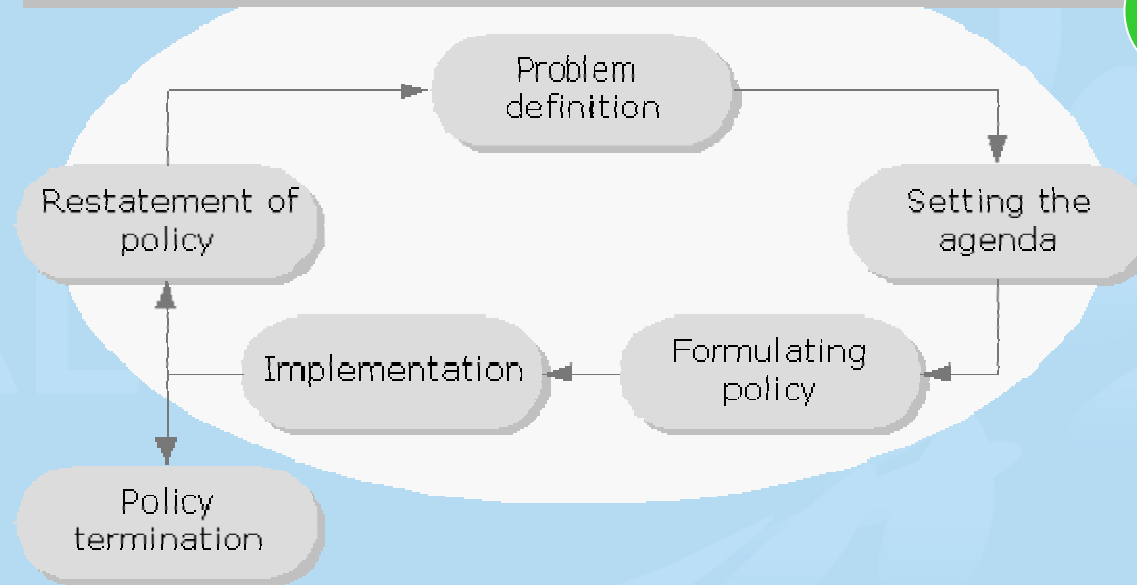
Map 2: TRENDS IN SELECTED TERRESTRIAL SPECIES POPULATIONS, 1970–2003

Common name	Species	Location of population surveyed	Common name	Species	Location of population surveyed
Tiwi	<i>Vestiaria coccinea</i>	Hawaii, United States	Grey wolf	<i>Canis lupus</i>	Greece
Bell's vireo	<i>Vireo bellii</i>	United States and Canada	Mountain gorilla	<i>Gorilla beringei</i>	Virunga range: Democratic Republic of the Congo, Rwanda, and Uganda
Black rat snake	<i>Elaphe obsoleta</i>	Hill Island, Ontario, Canada	Hartebeest	<i>Alcelaphus buselaphus</i>	Uganda
Pileated woodpecker	<i>Dryocopus pileatus</i>	United States and Canada	Cape vulture	<i>Gyps coprotheres</i>	South Africa
Mona Island lizard	<i>Cyclura cornuta</i>	Mona Island, Puerto Rico	Wildebeest	<i>Connochaetes taurinus</i>	Ngorongoro Crater, Tanzania
Slender anole	<i>Anolis limifrons</i>	Barro Colorado Island, Panama	Long-billed vulture	<i>Gyps indicus</i>	Northern India
Comorake	<i>Crex crex</i>	United Kingdom	Helmeted honeyeater	<i>Rhinoceros sondaicus</i>	Java, Indonesia
Elk, moose	<i>Alces alces</i>	Lithuania	Northern hairy-nosed wombat	<i>Lasiornis krefftii</i>	Australia
Waldrapp, northern bald ibis	<i>Geronticus eremita</i>	Morocco			
Alpine ibex	<i>Capra ibex</i>	Gran Paradiso National Park, Italy			

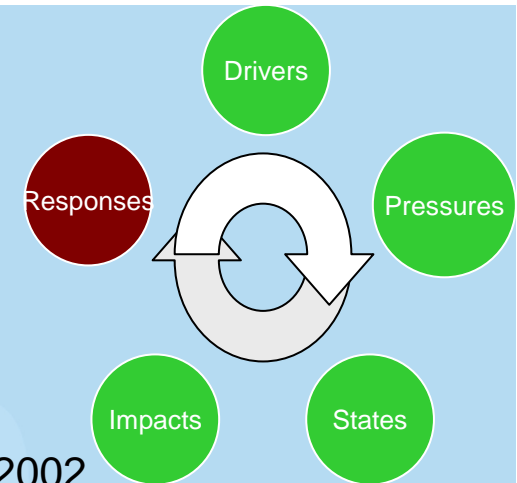
How to mitigate biodiversity loss: policy



Teaching politics: policy cycle



2010 Target



- *What is the 2010 Biodiversity Target?*

It is a target agreed by all Parties to the Convention in the Hague in 2002

“to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on earth.”

- *How is the Convention addressing biodiversity loss and how can its work be enhanced?*

The 188 Parties to the Convention have created a comprehensive body of policies, tools and guidelines that address the threats to biodiversity at all levels. The policies provide a sufficient framework to deal with the biodiversity crisis, but more work needs to be done:

The Convention is working with other international agreements and actors, but coordination can be improved, particularly with the international trade agenda.

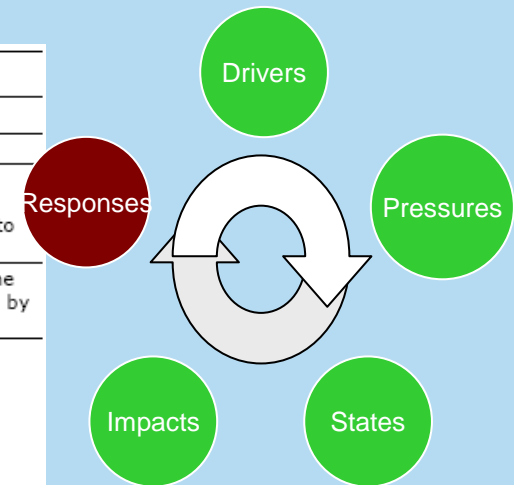
More effort needs to be made to improve the capacity of all countries to implement the policies of the Convention.

More people and more groups need to understand the importance of biodiversity and the work of the Convention.

More effort needs to be made to engage key stakeholders to integrate biodiversity considerations into their work.

Table 1.1 Important recent political commitments related to the loss of biodiversity

At the global level	
6th conference of the parties to the Convention on Biological Diversity in the Hague 7–19 April 2002	Adoption of a Strategic Plan for the Convention on Biological Diversity (Decision VI/26) including the 2010 target 'to achieve a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on earth'.
World Summit on Sustainable Development in Johannesburg, 26 August–4 September 2002	Endorsement of the target for 'achievement by 2010 of a significant reduction in the current rate of loss of biological diversity' and recognition of the critical role played by biodiversity in sustainable development and poverty eradication.
7th conference of the parties to the Convention on Biological Diversity in Kuala-Lumpur, 9–27 February 2004	Adoption of a framework (Decision VII/30): <ul style="list-style-type: none"> – to facilitate the assessment of progress towards the 2010 target and communication of this assessment, – to promote coherence among the programmes of work of the Convention, – to provide a flexible framework within which national and regional targets may be set, and indicators identified.
At the pan-European level	
5th 'Environment for Europe' Ministerial Conference in Kiev, 21–23 May 2003	Endorsement of a resolution to 'halt the loss of biological diversity at all levels by the year 2010', according to seven key targets in the areas of: forests and biodiversity; agriculture and biodiversity; a pan-European ecological network; invasive alien species; financing biodiversity; biodiversity monitoring and indicators; public participation and awareness.
Third Intergovernmental Conference 'Biodiversity in Europe' in Madrid, 19–21 January 2004	European Union — pan-European partnership to implement actions towards halting biodiversity loss, in line with global concerns.
In the European Union	
6th environmental action programme (2001)	'Nature and Biodiversity' addressed as a priority area with the overall aim of 'protecting, conserving, restoring and developing the functioning of natural systems, natural habitats, wild flora and fauna with the aim of halting desertification and the loss of biodiversity (by 2010), including diversity of genetic resources, both in the European Union and on a global scale'.
European Council in Gothenburg, 15–16 June 2001	Adoption of the EU Strategy for Sustainable Development, which has as a headline objective 'managing natural resources more responsibly: to protect and restore habitats and natural systems and halt the loss of biodiversity by 2010'.
Conference 'Sustaining Livelihoods and Biodiversity: Attaining the 2010 Target in the European Biodiversity Strategy' in Malahide, 25–27 May 2004	A large consultation with various stakeholders was organised within the process for review of the EC Biodiversity Strategy and Biodiversity Action Plans which resulted in the 'Message from Malahide' identifying the need for further action under cross-cutting themes and major sectors influencing European biodiversity to halt its loss by 2010. The Malahide Conference also endorsed a first set of EU headline biodiversity indicators to assess progress towards the 2010 target.
European Council in Brussels 28 June 2004	Conclusions on 'Halting the loss of biodiversity by 2010'.
European Commission 2006	Preparation for the adoption of a communication on biodiversity.
At the national level	
Several countries have included the '2010 target' as part of their national biodiversity strategies.	



EEA report N0 5/2006

GUIDELINES FOR INCORPORATING BIODIVERSITY-RELATED ISSUES INTO ENVIRONMENTAL IMPACT ASSESSMENT LEGISLATION AND/OR PROCESS AND IN STRATEGIC ENVIRONMENTAL ASSESSMENT

1. For the purpose of these guidelines, the following definitions are used for environmental impact assessment and strategic environmental assessment:

Environmental impact assessment is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse. Although legislation and practice vary around the world, the fundamental components of an environmental impact assessment would necessarily involve the following stages:

- (i) Screening to determine which projects or developments require a full or partial impact assessment study;
- (ii) Scoping to identify which potential impacts are relevant to assess, and to derive terms of reference for the impact assessment;
- (iii) Impact assessment to predict and identify the likely environmental impacts of a proposed project or development taking into account inter-related consequences of the project proposal, and the socio-economic impacts; Identifying mitigation measures (including not proceeding with the development, finding alternative designs or sites which avoid the impacts, incorporating safeguards in the design of the project, or providing compensation for adverse impacts);
- (iv) Deciding whether to approve the project or not;
- (v) Monitoring and evaluating the development activities, predicted impacts and proposed mitigation measures to ensure that unpredicted impacts or failed mitigation measures are identified and addressed in a timely fashion; Source: CBD 2002. Decision VII/26 of the Conference of the Parties (COP 6) Strategic Plan for the Convention on Biological Diversity UNEP/CBD/COP/6/26, 278pp. Available at <<http://www.biodiv.org/doc/decisions/COP-06-dec-en.pdf>>.

2010 Target

- In order to meet the 2010 target, the Parties to the Convention should develop and ensure the implementation of comprehensive national [biodiversity](#) strategies and action plans; promote greater awareness of the importance of biodiversity; and integrate biodiversity concerns into national policies, programmes and strategies on trade, agriculture, forestry and [fisheries](#), and development planning.



It is important to include biodiversity in sectors such as agriculture and energy.

Source: Paul Springett / Alpha Presse

Aggregating biodiversity indicators for policy purposes-sense or non-sense? 9 September Peresq, Chris Klok

Are we going to meet the targets?

Unprecedented efforts will be needed to achieve the 2010 target.

However, with appropriate responses it is possible to achieve the 2010 target at national, regional and global levels.

The policies of the Convention are sufficient to meet the 2010 biodiversity target if widely applied and in all relevant sectors.

Changes in the agricultural and trade sector to reduce pressure through land-use change, nutrient loading and over-exploitation of wild resources and negative effects of invasive species

- Improved agricultural efficiency
- More effectively plan for the expansion of agriculture
- Moderate the demand for meat
- Halt over-fishing
- Accompany trade liberalization with proactive measures to mitigate invasions
- Integrate Biodiversity consideration with poverty reduction to ensure sustainability
- Develop tools to value biodiversity economically

Source: <http://www.cbd.int/gbo2/main-messages.shtml>

- Reduction in drivers do not directly result in improvement of biodiversity

Fig. 26: SLOW-SHIFT SCENARIO AND ECOLOGICAL DEBT

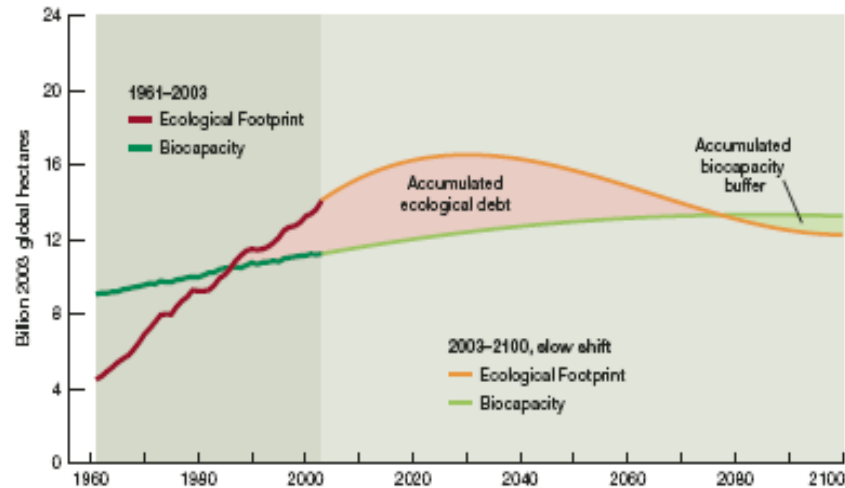
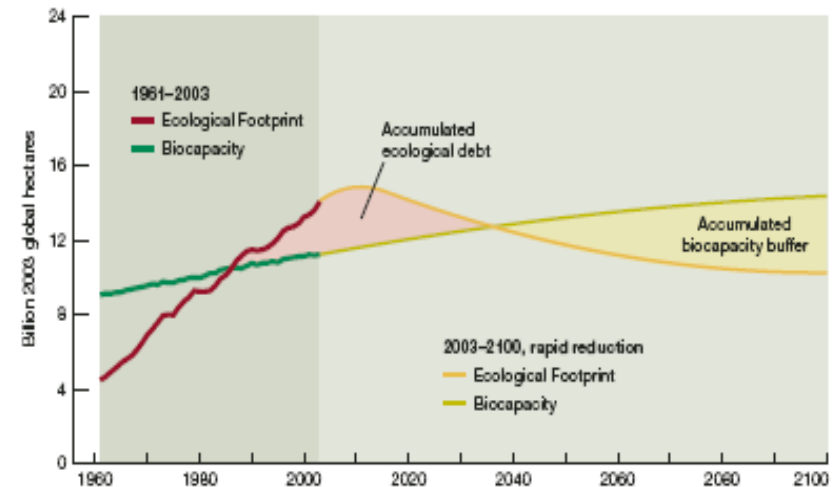


Fig. 27: RAPID-REDUCTION SCENARIO AND ECOLOGICAL DEBT



How to monitor progress towards 2010?

- Indicators were established to monitor the status and trends of [biological diversity](#), and to provide information on ways to improve the effectiveness of [biodiversity](#) policies and management programmes. These indicators cover seven focal areas which include reducing the rate of biodiversity loss, addressing its major threats, promoting its [sustainable use](#), and maintaining [ecosystem](#) health

1. Status and trends of the components of biological diversity
2. Sustainable use
3. Threats to biodiversity
4. Ecosystem integrity and ecosystem goods and services
5. Status of traditional knowledge, innovations and practices
6. Status of access and benefit-sharing
7. Status of resource transfers

Indicators: what has been developed

1-CBD indicators

CONVENTION ON BIOLOGICAL DIVERSITY'S FRAMEWORK FOR ASSESSMENT BY 2010

Identified indicators

Proposed indicators

Components of biological diversity

- | | |
|---|--|
| <ul style="list-style-type: none"> • Forest area • Trends in abundance and distribution of selected species • Coverage of protected areas • Change in status of threatened species • Trends in genetic diversity of domesticated plants and animals • Extent and location of mangroves and seagrass and macroalgal beds • Management effectiveness of protected areas • Investment in protected areas | <ul style="list-style-type: none"> • Condition of forests • Extent and condition of shrublands, grasslands, and deserts • Extent of wetlands and large water bodies • Catchment condition—extent of riparian vegetation • Percent live coral cover • Extent and condition of estuaries |
|---|--|

Sustainable use

- Area of forest, agriculture, and aquaculture under sustainable management
- Proportion of products derived from sustainable sources

Threats to biodiversity

- | | |
|---|--|
| <ul style="list-style-type: none"> • Nitrogen deposition • Number and cost of alien invasions | <ul style="list-style-type: none"> • Marine fishing effort • Road-free area • Epidemic outbreaks among wild species |
|---|--|

Ecosystem integrity, goods, and services

- | | |
|---|--|
| <ul style="list-style-type: none"> • Marine trophic index • Water quality in inland waters • Freshwater trophic index • Connectivity and fragmentation of ecosystems • Incidence of human-induced ecosystem failure • Health and well-being of people in biodiversity-dependent communities • Biodiversity use in food and medicine • Fish harvest per unit effort • Timber and fuelwood harvest per unit effort | <ul style="list-style-type: none"> • Number of dams • Sediment load in rivers • Percent population without potable water • Carbon storage in ecosystems • Market share of nature-based tourism • Hit rates for biodiversity-related website • Pesticide use per unit agricultural harvest • Agricultural harvest per unit effort |
|---|--|

Traditional knowledge, innovations, and practices

- Status and trends of linguistic diversity and numbers of speakers of indigenous languages

Resource transfers

- Official development assistance in support of CBD

2- EU headline indicators

Table 1.2 A first set of EU headline biodiversity indicators to assess progress towards the 2010 target of halting biodiversity loss

Focal area	Indicators
Status and trends of the components of biological diversity	<ul style="list-style-type: none"> • Trends in extent of selected biomes (*), ecosystems and habitats • Trends in abundance and distribution of selected species • Change in status of threatened and/or protected species • Trends in genetic diversity of domesticated animals, cultivated plants, and fish species of major socio-economic importance • Coverage of protected areas
Sustainable use	<ul style="list-style-type: none"> • Area of forest, agricultural, fishery and aquaculture ecosystems under sustainable management
Threats to biodiversity	<ul style="list-style-type: none"> • Nitrogen deposition • Numbers and costs of invasive alien species • Impact of climate change on biodiversity
Ecosystem integrity and ecosystem goods and services	<ul style="list-style-type: none"> • Marine trophic index • Connectivity/fragmentation of ecosystems • Water quality in aquatic ecosystems
Status of access and benefit sharing	<ul style="list-style-type: none"> • Patents
Status of resource transfers and use	<ul style="list-style-type: none"> • Funding of biodiversity
Public opinion	<ul style="list-style-type: none"> • Public awareness and participation

(*) Biomes are defined as 'the world's major communities, classified according to the predominant vegetation and characterized by adaptations of organisms to that particular environment' (Campbell).

Indicators relevant to the 2010 target should match the following requirements (see also UNEP/CBD/SBSTTA/9/10).

They should:

- (a) Address the key properties of the process of biodiversity loss;
- (b) Be meaningful for the target-audience;
- (c) Be measurable in an accurate and affordable way making maximum use of existing data, indicators and assessments;
- (d) Be sensitive to measure a reduction in the loss of biodiversity;
- (e) Be scientifically sound;
- (f) Have broad acceptance;
- (g) Be representative for the various biodiversity levels;
- (h) Be flexible for use in a limited number of composite indicators.

Why aggregate indicators?

- To assess the status of biodiversity
- To monitor change
- To get the message across



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Selection of Five?

Index		Indicates	Type of data	Peer refereed	Source
STI ¹	Species Trend Index	Trends in abundance of species	Abundance data over time	+	http://biodiversity-chm.eea.europa.eu/information/indicator/F1090245995/ www.ebcc.info/pecbms www.bce.org www.panda.org
NCI ²	Natural Capital Index	Species abundance (quality) Amount of habitat (quantity)	Abundance data GIS data on habitat coverage	-	www.mnp.nl/mnc/i-en-1119.html
RLI	Red List Index	Changes in the overall threat status (or extinction risk) of sets of species over time	Abundance and distribution data over time	+	www.iucn.redlist.org
CLE ³	Critical Load Exceedance	Modelled pressure based on pollutant deposition	Model results Critical load data	+	www.umweltdaten.de/ui/manual/mapping_brochure.pdf
CI	Connectivity Index	Measure of species movement, dispersal potential	Size of patches distance between patches	-	http://sof.eomf.on.ca/Biological_Diversity/Ecosystem/Fragmentation/Indicators/Shape/Documents/Landscape_fragmentation_20process.pdf

Klok et al. EnvironSc&Pol (submitted)

Scientific appraisal (pros and cons)

Literature search

- Critical appraisal
- Structure of the index (scope and goal, mode of computation, distinctiveness of application)
- Record of applications (frequency and scale)
- Potential and limitation at the European scale (focus of ALTER-Net)



More info on literature search see ALTER-Net home page

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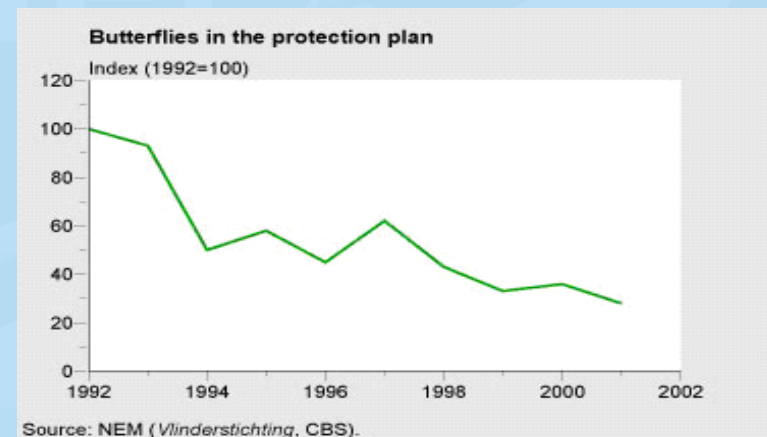
Scientific appraisal (pros and cons)

	Advantages	Disadvantages	Data availability
STI	<ul style="list-style-type: none"> Applicable at different scales Statistical rigor Sensitive to changes Easy to update 	<ul style="list-style-type: none"> Lack of taxonomic evenness Lack of spatial coverage Unclear baseline interpretation 	<ul style="list-style-type: none"> Good in developed countries In other and specifically tropics low

Species Trend Index (e.g. Living Planet Index, Common Bird Index)

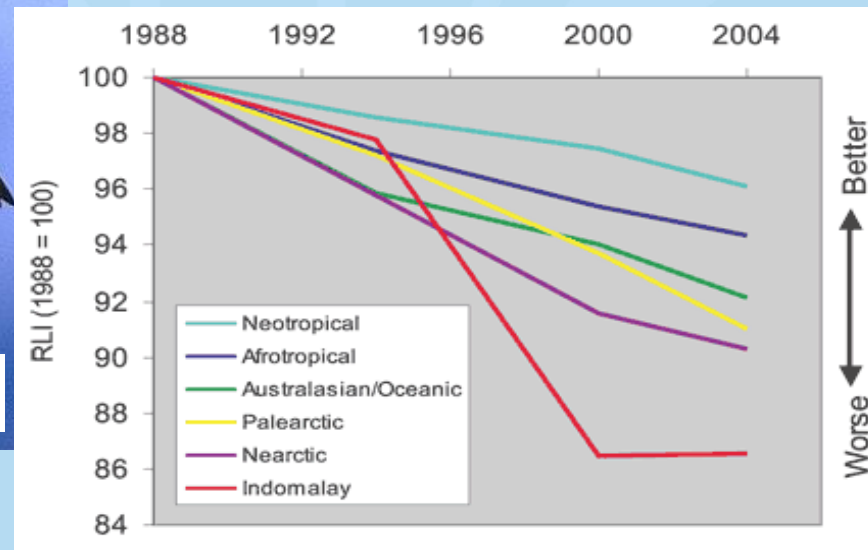


Papilio machaon



Scientific appraisal (pros and cons)

	Advantages	Disadvantages	Data availability
RLI	<p>Scientifically robust</p> <p>Broad taxonomic scope</p> <p>Can be disaggregated such that changes in the index can be traced back to change in specific species</p>	<p>Small changes in viability not represented in index</p> <p>Low temporal resolution</p>	<p>Good globally</p>

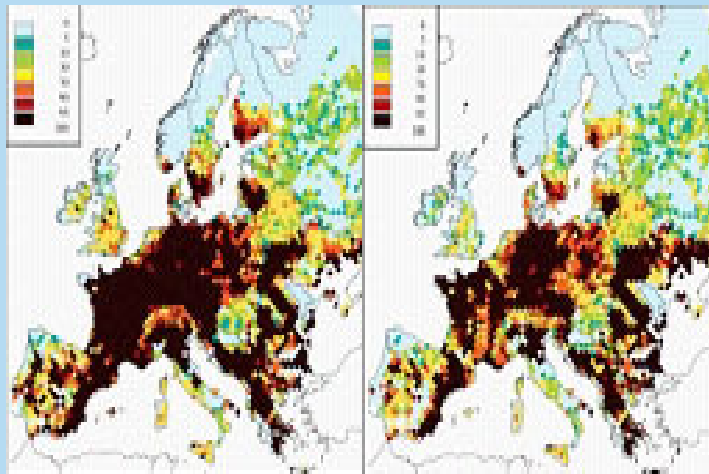


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Scientific appraisal (pros and cons)

Critical Load Index

	Pros	Cons	Data available
CLE	Low data acquisition Scientifically accepted	Index difficult to communicate More indicator than index Down scaling Difficult to validate	Yes model output

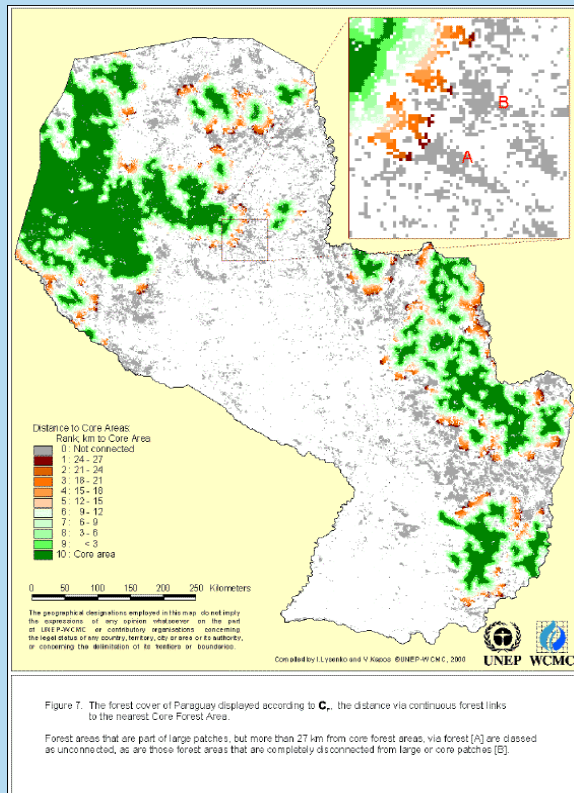


Map of CLE for Nitrogen in 2000 and 2020 (Bareham et al 2005)

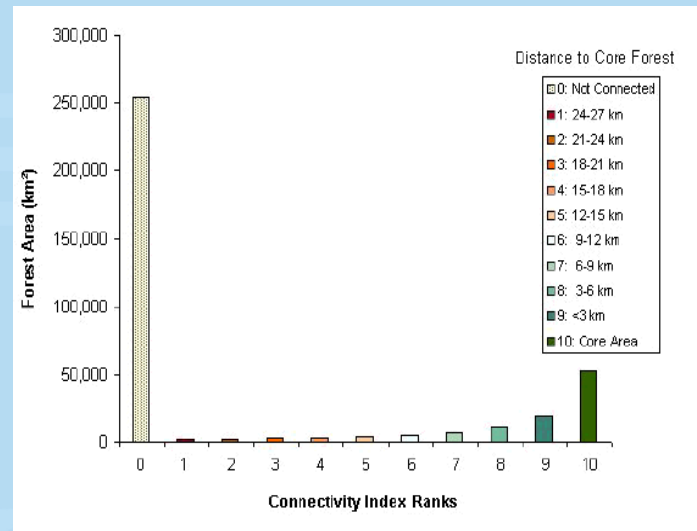
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Scientific appraisal (pros and cons)

Connectivity Index



	Pros	Cons	Data available
CI	Scientifically robust	Much debate on connectivity measures	Low can be very site and species specific



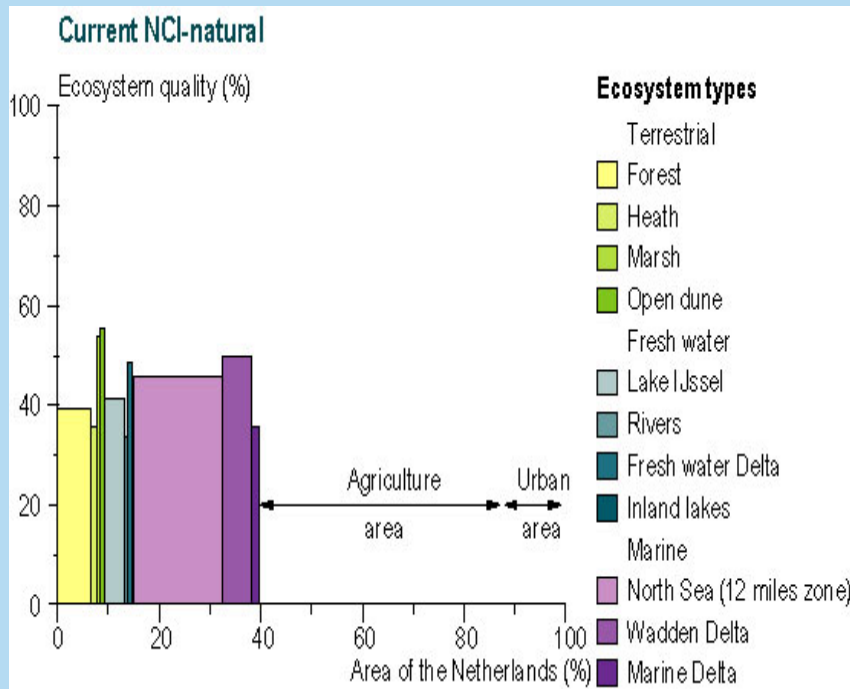
<http://www.fao.org/docrep/006/ad654e/ad654e04.htm>

Klok et al. EnvironSc&Pol (submitted)

Scientific appraisal (pros and cons)

National Capital Index

	Pros	Cons	Data available
NCI	Integrates ecosystem quality with quantity	Taxonomic evenness spatial coverage baseline interpretation	Developed countries yes Tropics scarce



Quality based on diversity in flora and fauna

Klok et al. EnvironSc&Pol (submitted)

Policy relevance (interviews)

	Usage	Usefulness	Scientific quality	Acceptance
STI	67% (18)	8.1 (8)	7.6 (7)	7.7 (8)
NCI	0% (18)	3.0 (1)	6.0 (1)	- (0)
RLI	39% (18)	8.2 (5)	7.1 (5)	8.3 (5)
CLE	22% (18)	7.8 (3)	6.8 (3)	6.0 (3)
CI	17% (18)	8.2 (3)	7.8 (3)	6.0 (2)
Average	29% (90)	7.8 (20)	7.3 (19)	7.4 (18)

Table 3. Usage (in percentage) and ranking of five biodiversity indices on a scale from 1 to 10 (best) based on interviews with 16 national biodiversity experts in 10 European countries and two biodiversity experts in EU (DG Environment). Number of respondents in brackets.

Klok et al. EnvironSc&Pol (submitted)

Policy relevance (interviews)

Index	Advantages	Disadvantages
STI	<p>Sends a clear message</p> <p>Easy to understand</p> <p>Scientifically the most well founded and evaluated index</p> <p>Applicable at any scale: global, national, habitat</p> <p>High policy relevance and acceptance</p> <p>Lots of data exists</p> <p>Species are popular with the public</p> <p>Can be disaggregated into policy relevant and biologically interesting cuts</p> <p>High temporal resolution</p>	<p>Selected trends/species may not be representative</p> <p>Uncertain how different species should be weighed</p> <p>Uncertain if it will change the policy making</p> <p>Data hungry</p> <p>Lack of data for some regions and taxonomic groups</p> <p>May be biased towards well studied species or towards strongly positive or negative trends</p> <p>Invasive species may confuse the message</p>

Table 4. Comments of interviewed experts on biodiversity indices.

Policy relevance (interviews)

Index	Advantages	Disadvantages
RLI	<ul style="list-style-type: none"> Sends a clear message Easy to understand Scientifically sound Broadly used Threatened species clear in people's mind Measures the rate of biodiversity loss Geographically comprehensive 	<ul style="list-style-type: none"> Lack of data Low temporal resolution Not describing what is happening (e.g. landscape changes) Difficult for a politician to respond to Reliability depends on how comparable data are between countries

Table 4. Continued.

LT(S)ER sites

What is LT(S)ER and why do we need it? An ecological perspective

By Bill Heal

Scandinavian-North European Network of Terrestrial Field Bases (SCANNET)

In the USA, where an LTER network has been running for 20 years, the benefits of this approach to ecological research and monitoring are clear. The US LTER network has played a major role in **understanding complex ecological processes**, and the impacts of different environmental pressures on systems. For example, LTER data have been used to show the relative impacts of a range of environmental drivers on biodiversity occurring in different regions and habitats. It is clear from this study that the different drivers impact biodiversity in varying degrees depending on the nature of the ecosystems. Such a conclusion could only have been reached by **integrating long-term data from a range of sources**.

- The existence of an LTER network in the US has enabled long-term monitoring and experiments to be undertaken, which might otherwise have not been possible. The network has evolved to form a strong research base that is flexible and responsive enough to address a changing agenda. For instance, the US LTER network has evolved to embrace a holistic approach to environmental science, in which the **human social dimension is a part**. Expansion of the LTER approach to a larger scale, through international cooperation is being addressed through the International Long-Term Ecological Research Network.

Source: Sier and Parr. 2003. Workshop on European Networking of Long-Term Ecosystem Research (LTER) and Monitoring for Environment and Health, EAA report, Copenhagen.

LT(S)ER-Like sites

What is LTER and why do we need it? A socio-economic perspective

By Sander van der Leeuw

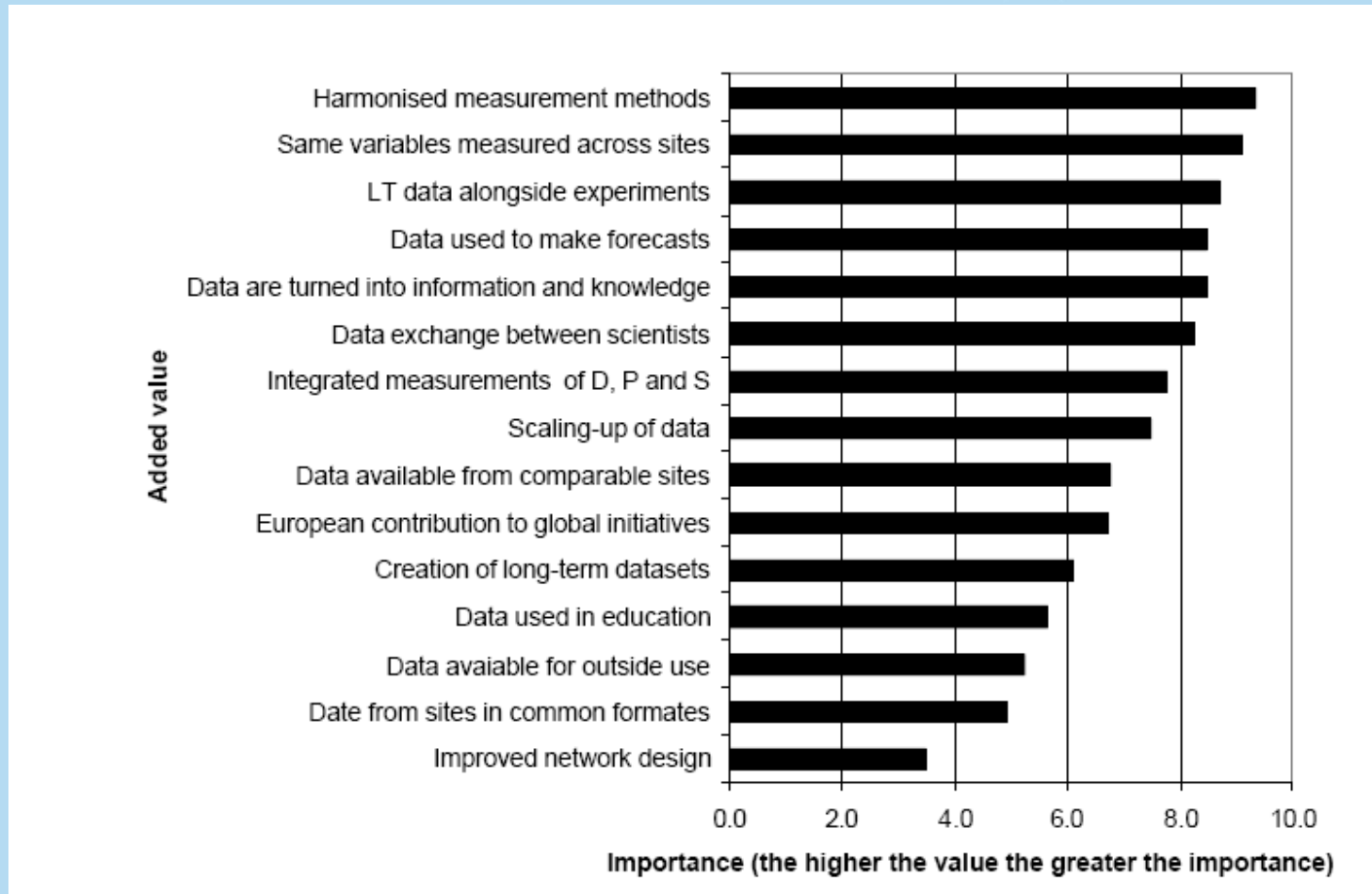
Humans are intimately bound up in environmental issues. We define what the environment is, what problems it faces and the solutions in response to these. Therefore, a **socio-economic approach** to understanding environmental issues and developing solutions is necessary.

It is often appropriate for such an approach to **utilize long-term datasets**. This can mean using historic data, such as archaeological data and archival resources, and carrying out long-term interdisciplinary research and monitoring. Such activities can enable us, for instance, to look at the co-adaptation and co-evolution of human and natural systems, as well as address contemporary issues such as rural-urban dynamics and urban ecology (which are presently poorly studied).

Source: Sier and Parr. 2003. Workshop on European Networking of Long-Term Ecosystem Research (LTER) and Monitoring for Environment and Health, EAA report, Copenhagen.

Aggregating biodiversity indicators for policy purposes-sense or non-sense? 9 September Peresq, Chris Klok

LT(S)ER-Like sites

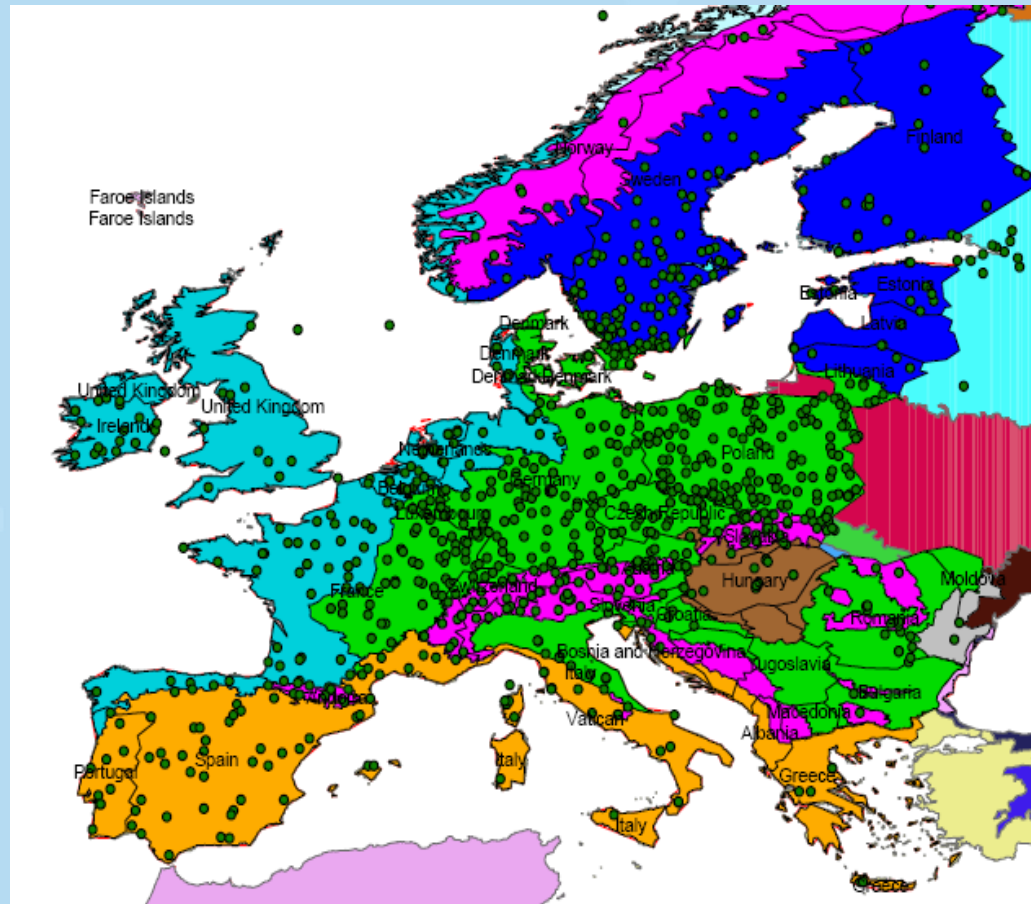


Source: Sier and Parr. 2003. Workshop on European Networking of Long-Term Ecosystem Research (LTER) and Monitoring for Environment and Health, EAA report, Copenhagen.

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LT(S)ER Sites. Do they have added value?



Distribution of LT(S)ER sites over Europe

Based on monitoring programs: BRIM, ENFORs, ICP-Forest, ICP-IM, ILTER Network and TEMS

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LT(S)ER sites. Spatial and temporal scales

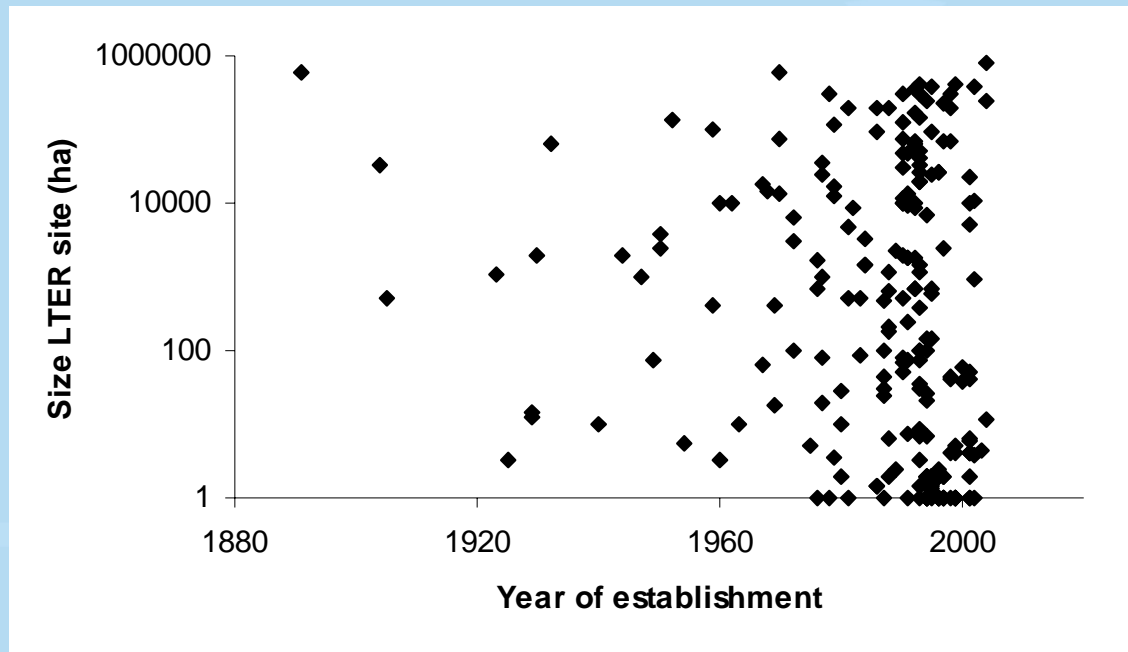
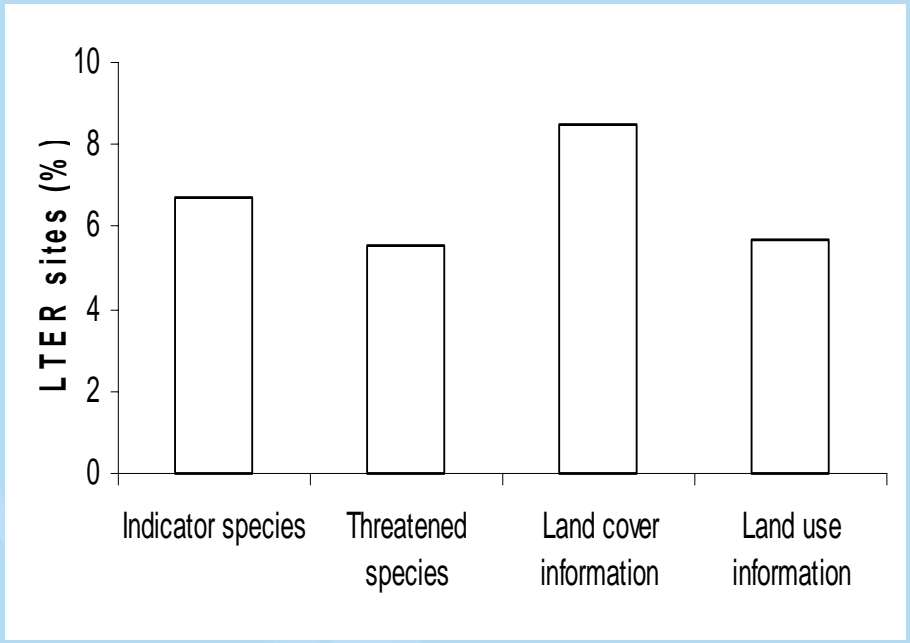
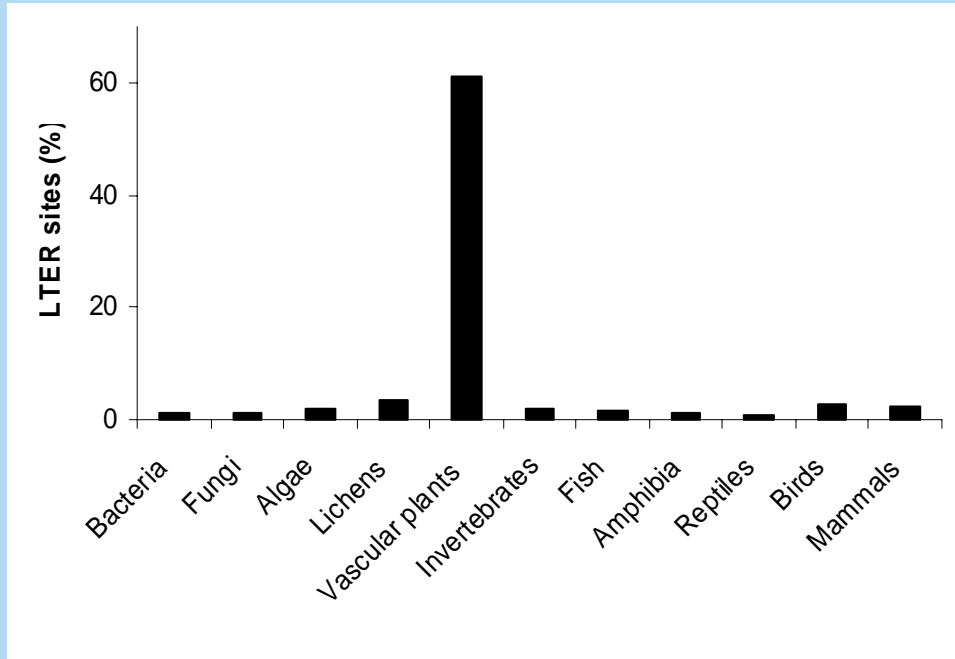


Figure 5. Temporal and spatial scales of LT(S)ER sites (n=1003).

LT(S)ER sites. What is monitored?



Added value:

- cover relatively long data series
- Include various aspects of biodiversity and environmental information
- Include socio-economic information

Questions?

Presentation partly based on:

Chris Klok, Michael Bredemeier, Bo Normander, Elena Preda, René Smulders Ana Nieto, Lubos Halada, Cristiana Cociuffa. Aggregating biodiversity indicators for policy purposes: sense or nonsense? Environmental Science & Policy (submitted)

