Newest developments in the formation of the global Biodiversity Observation Network (GEO BON)

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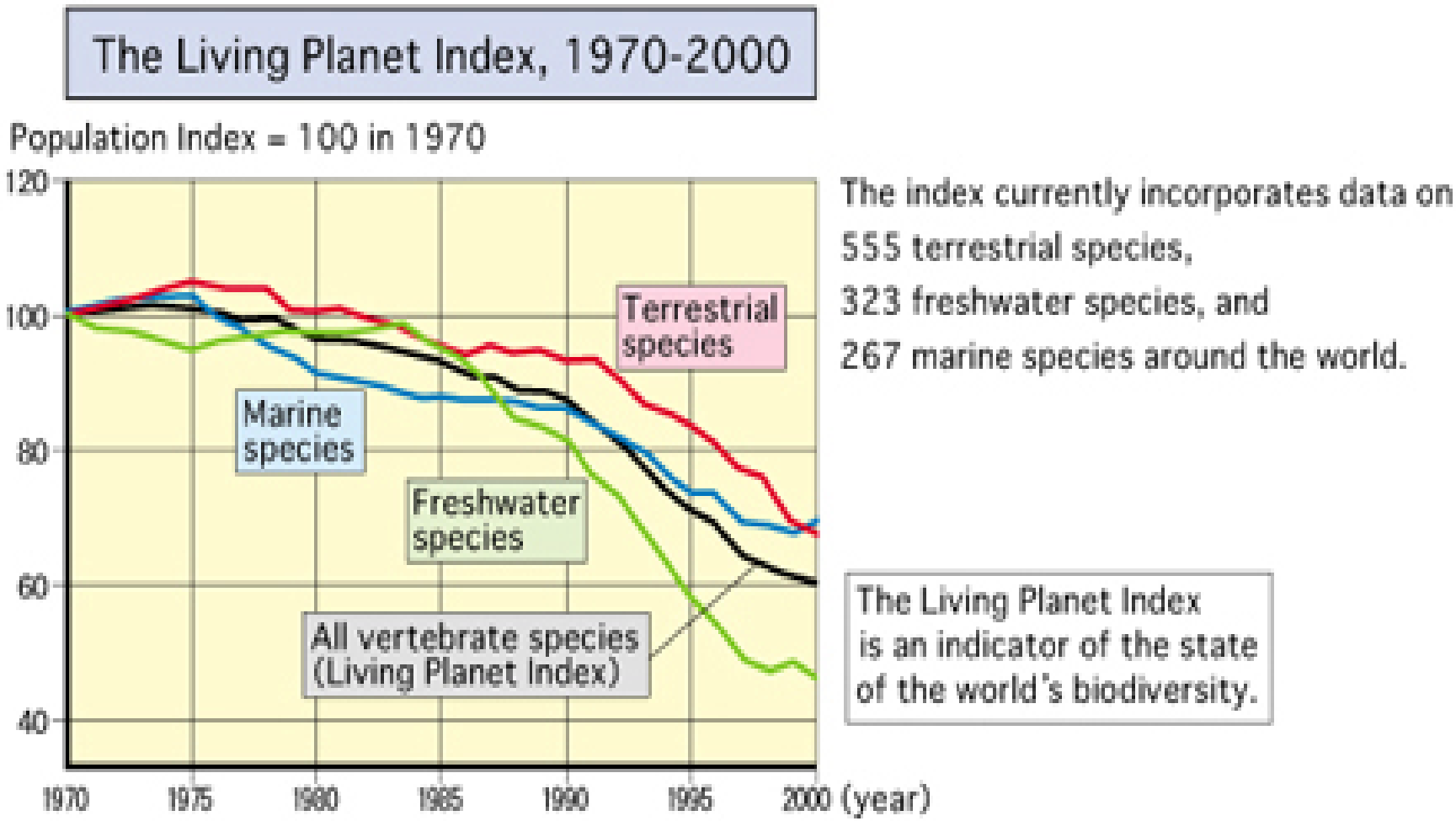
GEO Biodiversity Observation Network

- **The importance of a global Biodiversity Observation Network**
- **The context of GEO BON**
- **The concept of GEO BON**
- **The future of GEO BON**

Why do we need GEO BON?

- **To provide convincing evidence of the magnitude and importance of contemporary biodiversity loss**



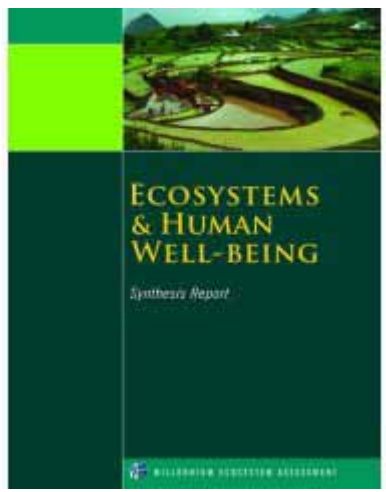
Why do we need GEO BON?

- **To provide relevant and timely biodiversity and ecosystems data to users (e.g. governments, researchers, international conventions and assessments, NGOs, public)**

CBD

CITES

UNCCD



- **To prioritise and target interventions and evaluate success**

Why do we need GEO BON?

- **Biodiversity observation system elements exist, but**
  - **The picture is patchy**
    - **Geographical gaps**
    - **Topical gaps, e.g. mostly vertebrates**
    - **States but not trends reported**
    - **Inconsistency in space, time and observing agency**
  - **The delivery pipeline is blocked**
    - **Many more data are collected than are used**
    - **Key constraint is ‘interoperability’**

The context of GEO BON

GEOSS addresses nine Societal Benefit Areas

Biodiversity values

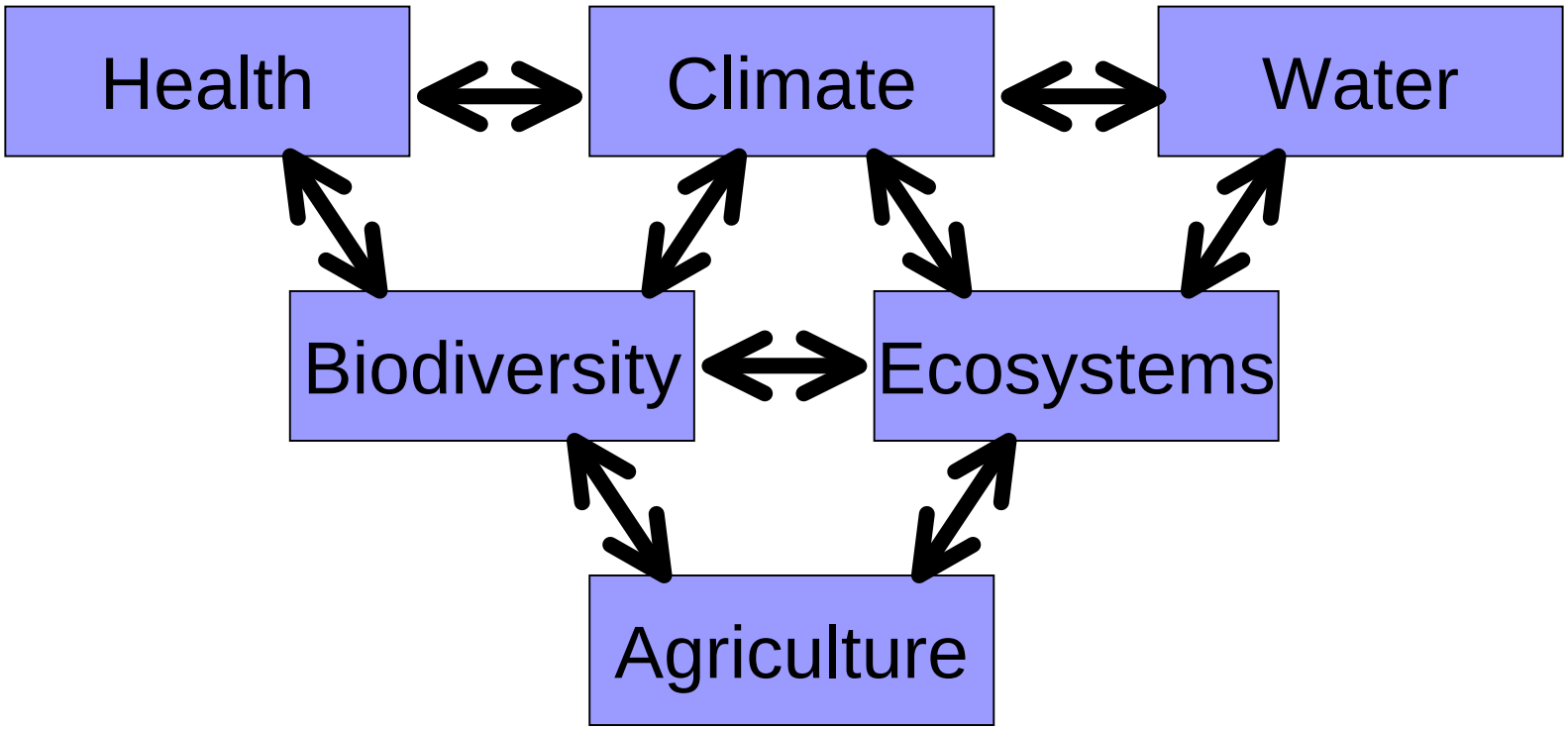
utilitarian values

- ecosystem goods and services

intrinsic values

- aesthetic and recreational enjoyment
- educational enlightenment
- cultural, religious and historical significance

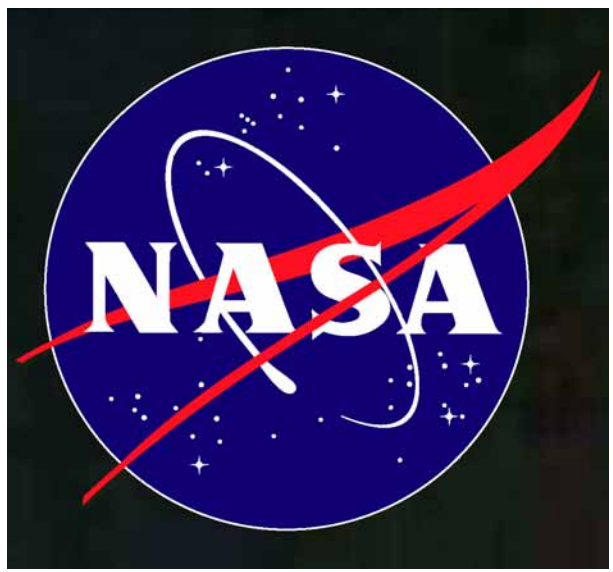
Harnessing the synergies of an integrated system



The context of GEO BON

- **DIVERSITAS and NASA have been appointed to lead task of developing a global Biodiversity Observation Network**

DIVERSITAS
an international programme
of biodiversity science



GEO Biodiversity Task BI-07-01

- Develop and implement a **biodiversity observation network** that is spatially and topically prioritized, based on analysis of existing information and data to be gathered by the network
- Report the **status and trends of global species**, genetic diversity, ecosystem and ecosystem services trends
- Describe **drivers** of biodiversity change, including threats
- Define the impacts of biodiversity change with a focus on vital **ecosystem functions** and resulting **services**
- Support the **2010 CBD target**
- Facilitate the establishment of **monitoring systems** that enable repeated and globally coordinated assessment of trends and distributions of species and ecosystems of importance to biodiversity conservation as well as other societal benefit areas
- Facilitate **consensus** on data collection protocols and the coordination of the development of **interoperability** among monitoring programs

The context of GEO BON

2006: User Needs workshop, Geneva 23-25 October

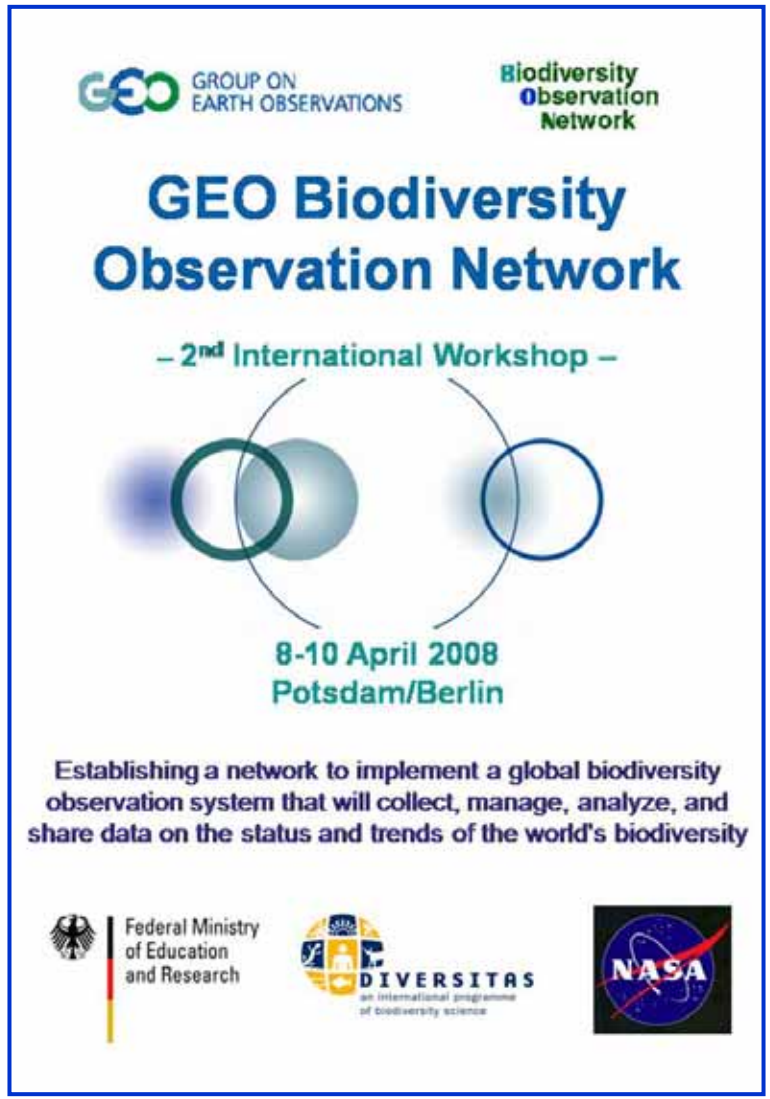
2007: GEO Ministerial in Cape Town

2008: Interim GEO BON Committee formed 14-16 January

- **Draft GEO BON concept document produced**

2008: 2nd International workshop, Berlin/Potsdam 8-10 April

- **Draft GEO BON concept document discussed and amended, first implementation steps planned**



GROUP ON EARTH OBSERVATIONS

Biodiversity

Observation

Network

January 2008, Geneva

The concept of GEO BON

- **As soon as possible:**
  - **The global community of biodiversity data providers and users share an open-access data resource with the best available global biodiversity data, as well as tools and resources for integration and analysis of these data**

- **Within a decade:**
  - **A global biodiversity observation system that provides timely and relevant information on biodiversity status and functions so as to improve environmental management and human wellbeing. The system will be open-resource, user-friendly and responsive to changing requirements, providing authoritative and respected reports, updated at appropriate intervals**

The concept of GEO BON

The unique niche and added values of GEO BON will be to:

- **provide a scientifically robust framework for observations on the detection of biodiversity change with a truly global, taxonomic and functional coverage**
- **coordinate the data gathering and delivery of biodiversity information, especially spatial data, guides, manuals, protocols, tools and models**
- **validate the data (quality control, small versus large scale, remote versus ground-based, etc.)**
- **ensure long-term continuity of operational observations**
- **avoid duplication of work!!!**

The concept of GEO BON

The unique niche and added values of GEO BON will be to:

- **provide a small set of innovative and relevant biodiversity observation products, e.g. regular high-impact, easy-to-use reports of biodiversity status and trends**
- **foster education/training (capacity-building)**
- **strengthen effectiveness and impact of already existing networks by giving them further scope, reach and credibility, leading to better financial and logistical support from decision makers for these networks and GEO BON**
- **increase the awareness of biodiversity change as a global issue**

Biodiversity



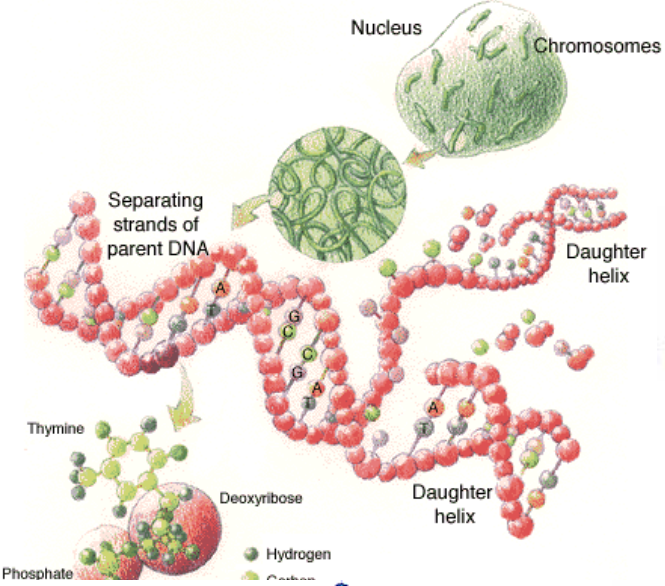


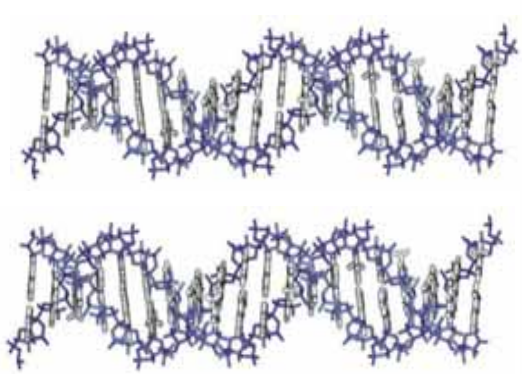




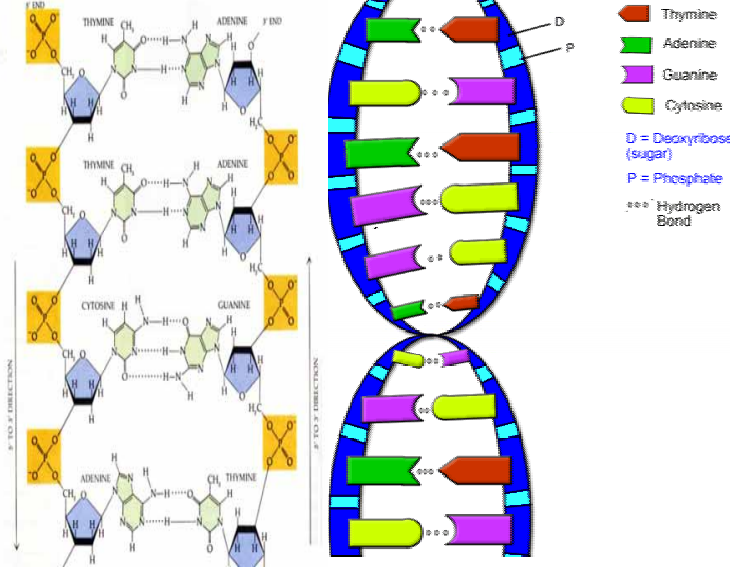


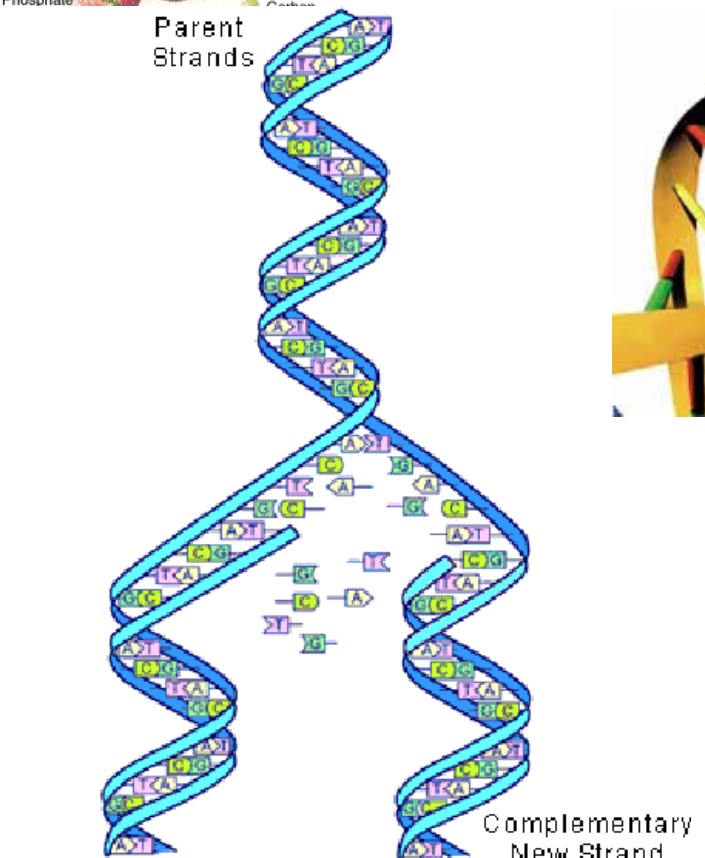


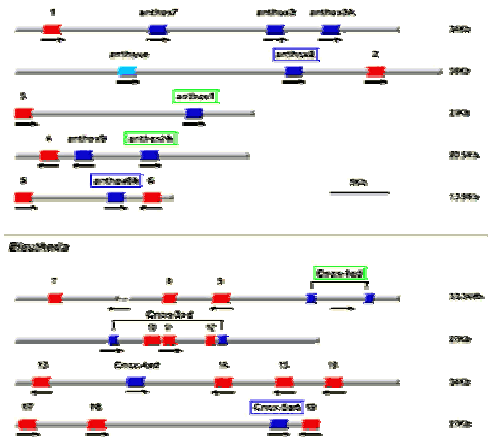

Nucleus
Chromosomes
Separating strands of parent DNA
Daughter helix
Thymine
Deoxyribose
Daughter helix
Phosphate
Hydrogen

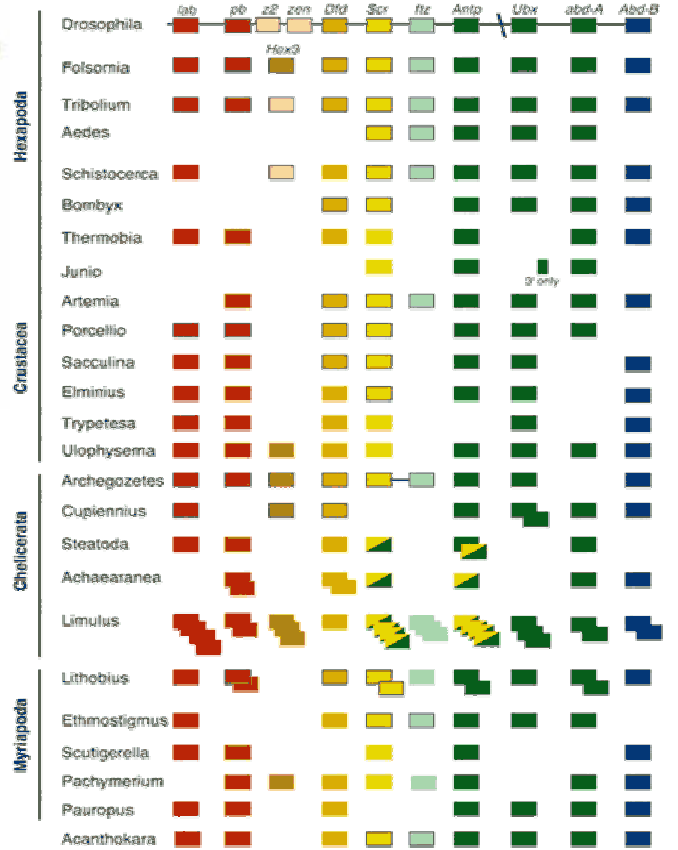


Genes


Thymine
Adenine
Guanine
Cytosine
D = Deoxyribose (sugar)
P = Phosphate
Hydrogen Bond


Parent Strands
Complementary New Strand




lab
pb
zen
Dfd
Scr
Antp
Ubx
abd-A
Abd-B
Hox3
Drosophila
Folsomia
Tribolium
Aedes
Schistocerca
Bombyx
Thermobia
Junio
Artemia
Porcellio
Sacculina
Elminius
Trypetesa
Ulophysema
Archegozetes
Cupiennius
Steatoda
Achaearanea
Limulus
Lithobius
Ethmostigmus
Scutigerella
Pachymerium
Pauropus
Acanthokara
Hexapoda
Crustacea
Chelicerata
Myriapoda

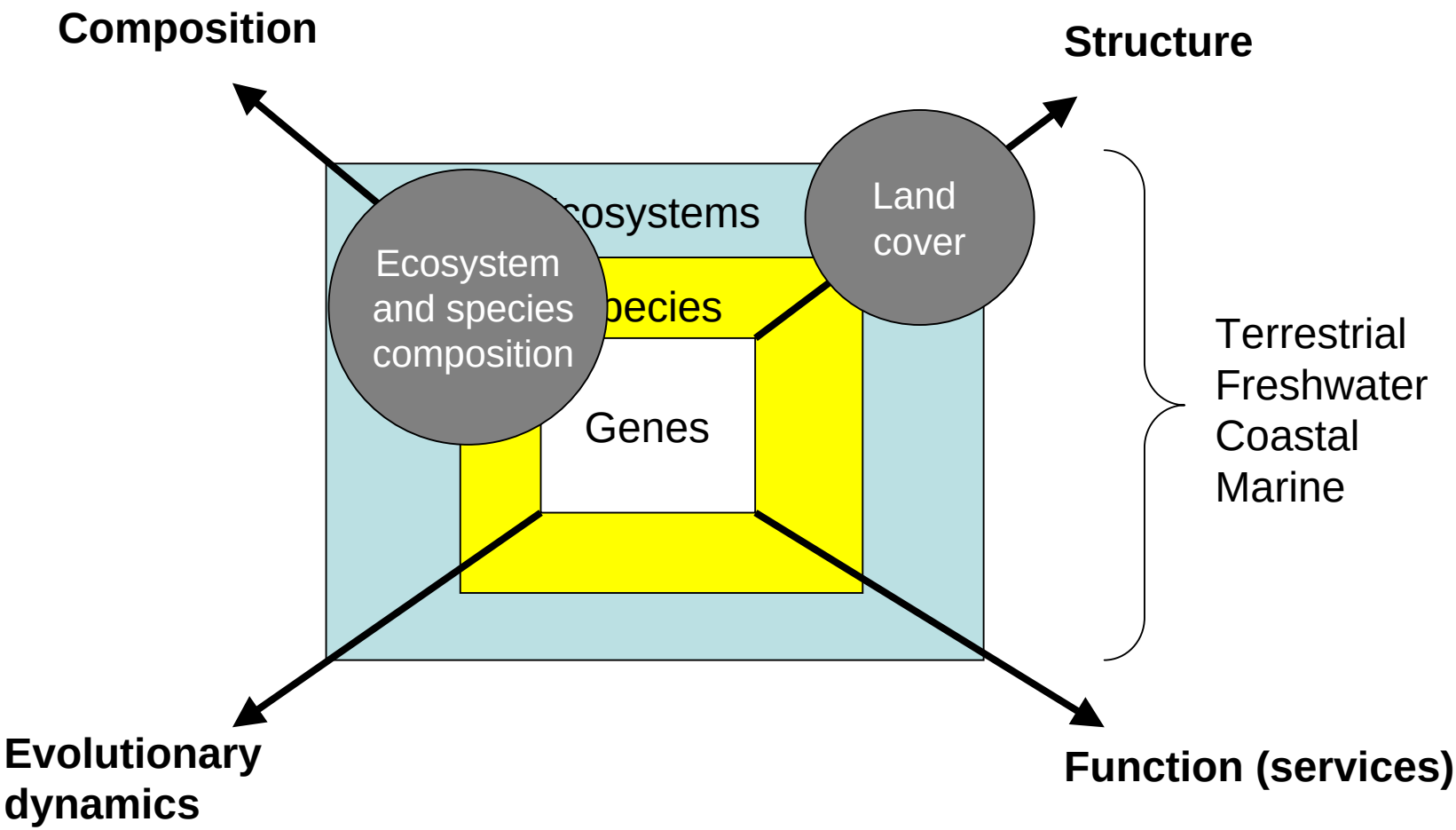

Species



Ecosystems



The concept of GEO BON



The concept of GEO BON

Biodiversity data is complex:

- **Many sampling frames (local to regional to global coverage), periods and frequencies**

- **Many functional units (genes, species, ecosystems)**

- **Many relationships between functional units**

- **Many variables**

- **Many sampling regimes**

- **Many data providers**

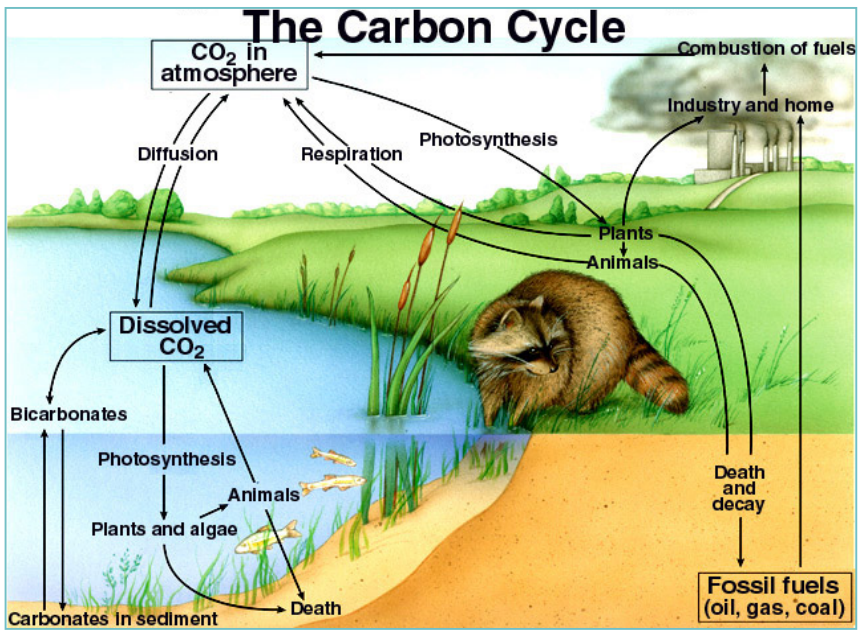
The concept of GEO BON

Local phenomenon:

A new species of bird, the colourful Bugun Liocichla, was found in a remote forest in NE India and only described in 2006.

Global phenomenon:

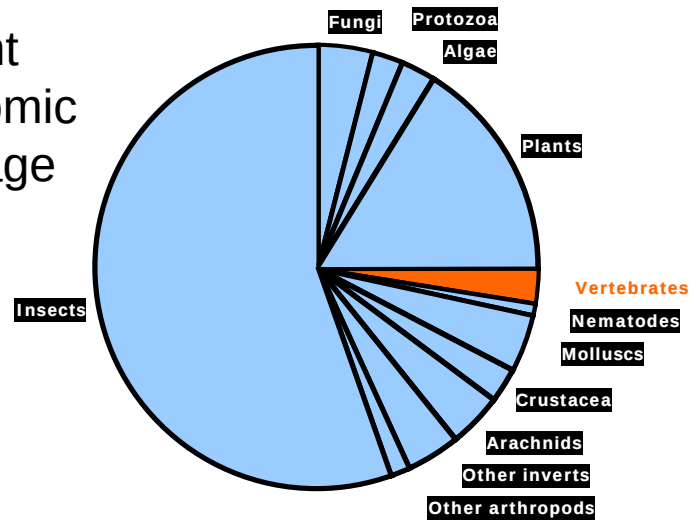
Carbon sequestration via marine plankton affects the entire earth system.



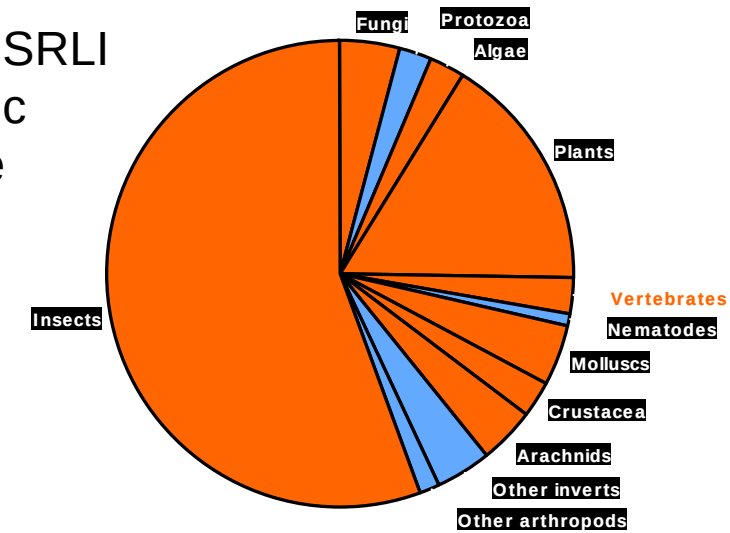
Red List Index

Develop and report on an index of extinction risk for a representative sample of the world's better-known species groups

Current taxonomic coverage



Possible SRLI taxonomic coverage

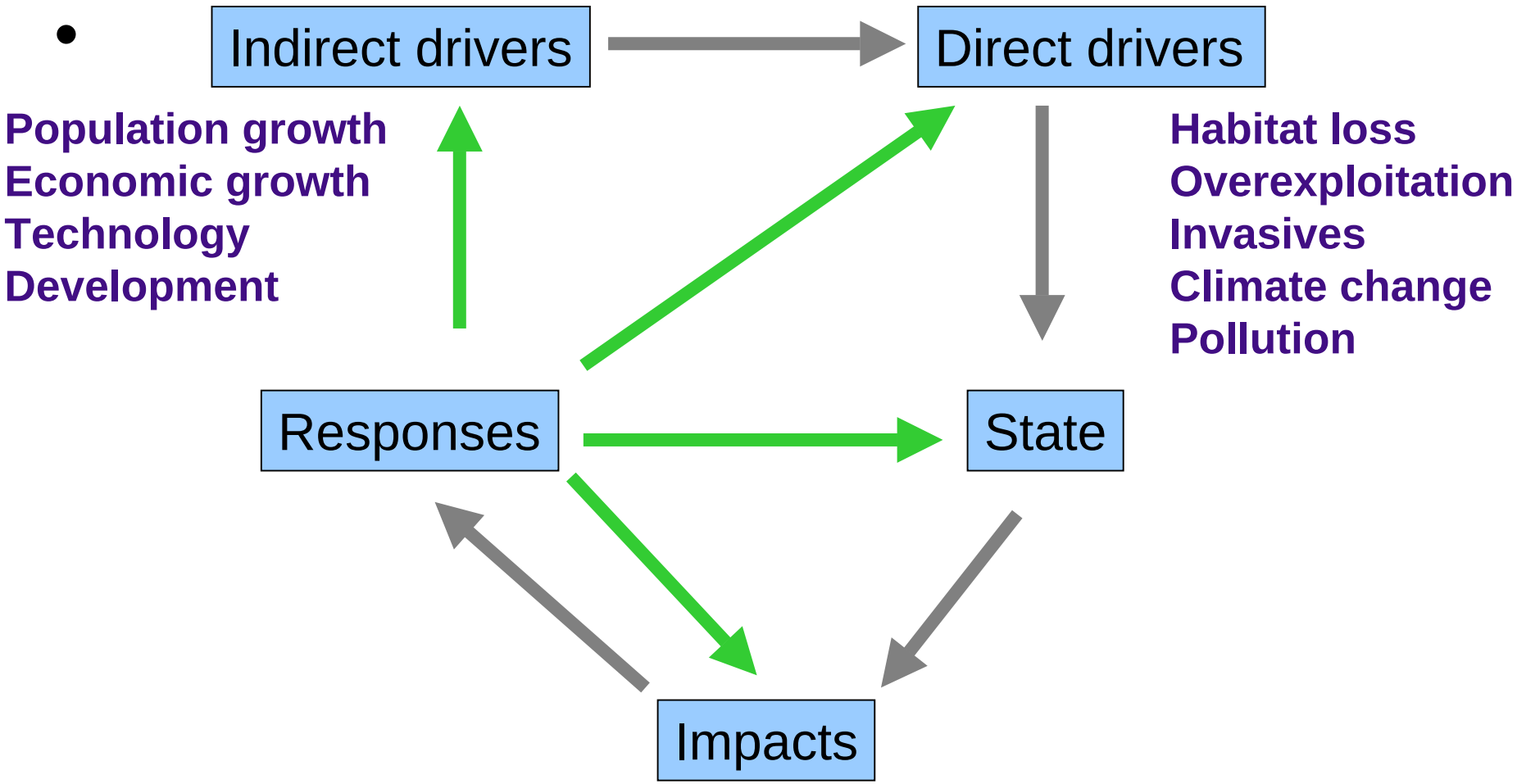


The concept of GEO BON

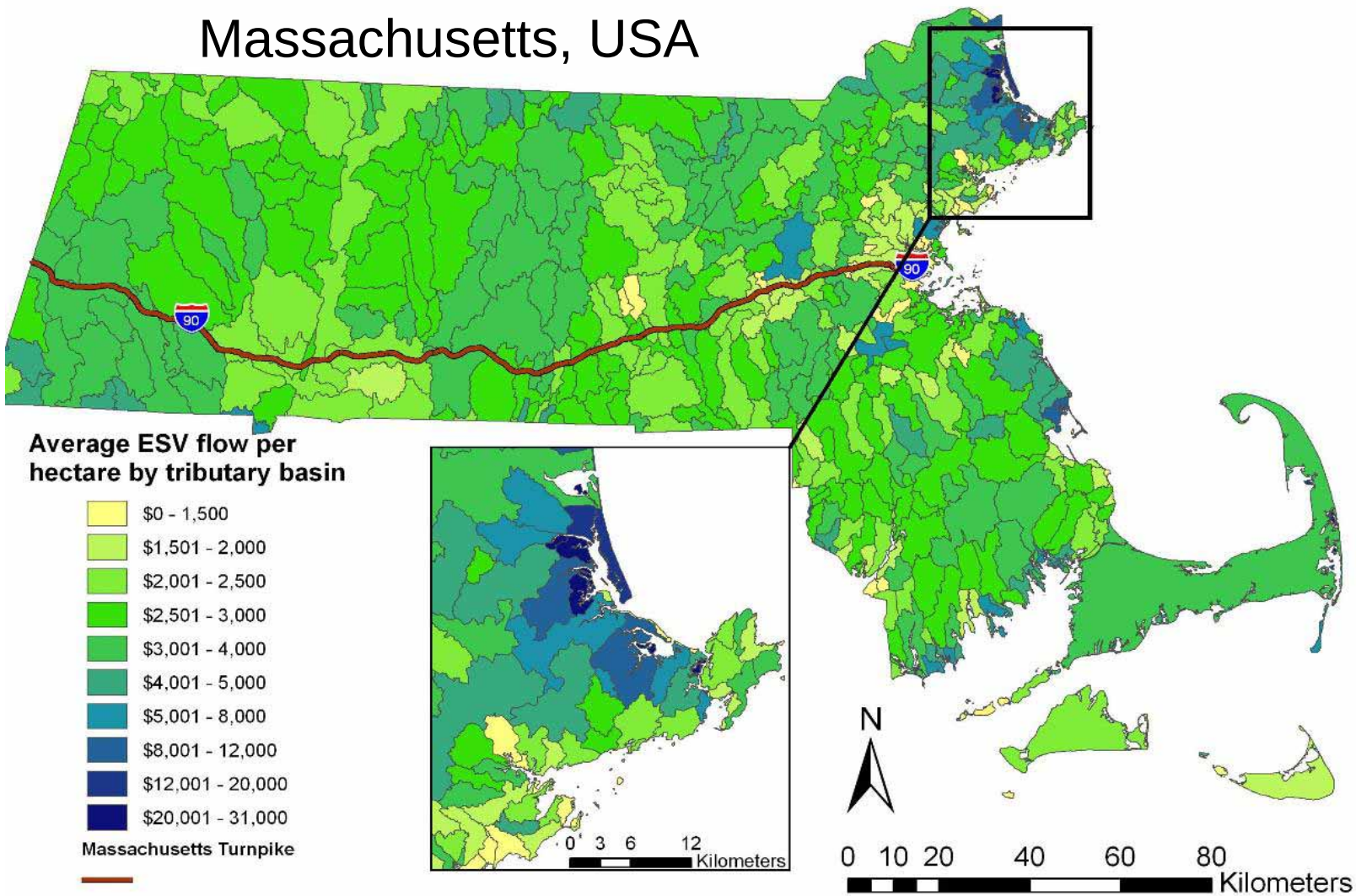
Some scientific principles:

- **Scientifically rigorous and up-to-date**
  - **Earth observation needs (repeatability, continuity, responsivity, representivity, integration)**
- **Monitors genetic, species and ecosystem level**
- **Monitors not just composition and structure, but also drivers of change and ecosystem services**
- **Monitors biodiversity change, not just states**
- **Identifies gaps with expert groups, then fills gaps through capacity-building**

Move back along the chain of cause and effect for biodiversity…



Ecosystem Service Valuation



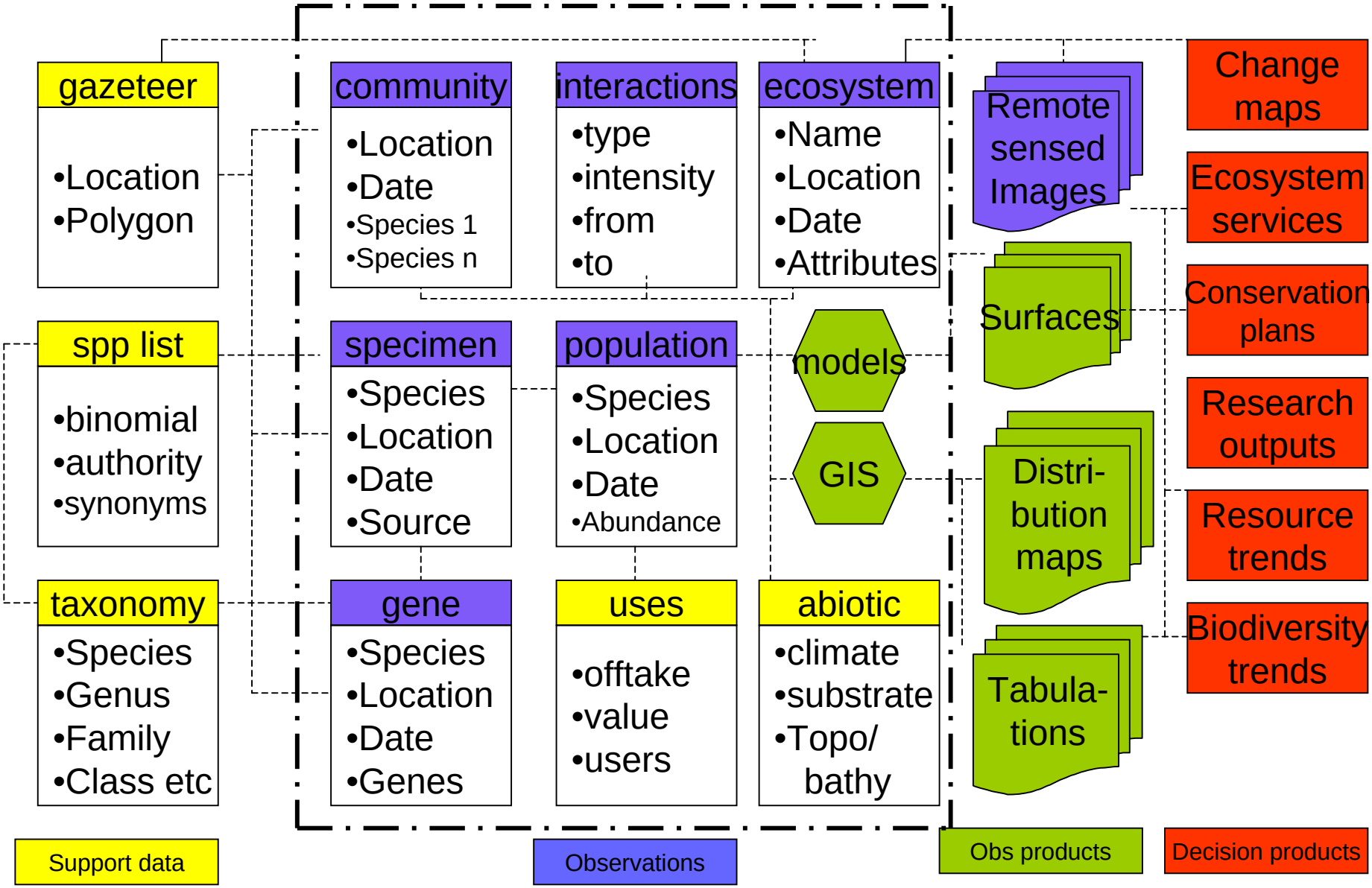
bioDISCOVERY Core Project

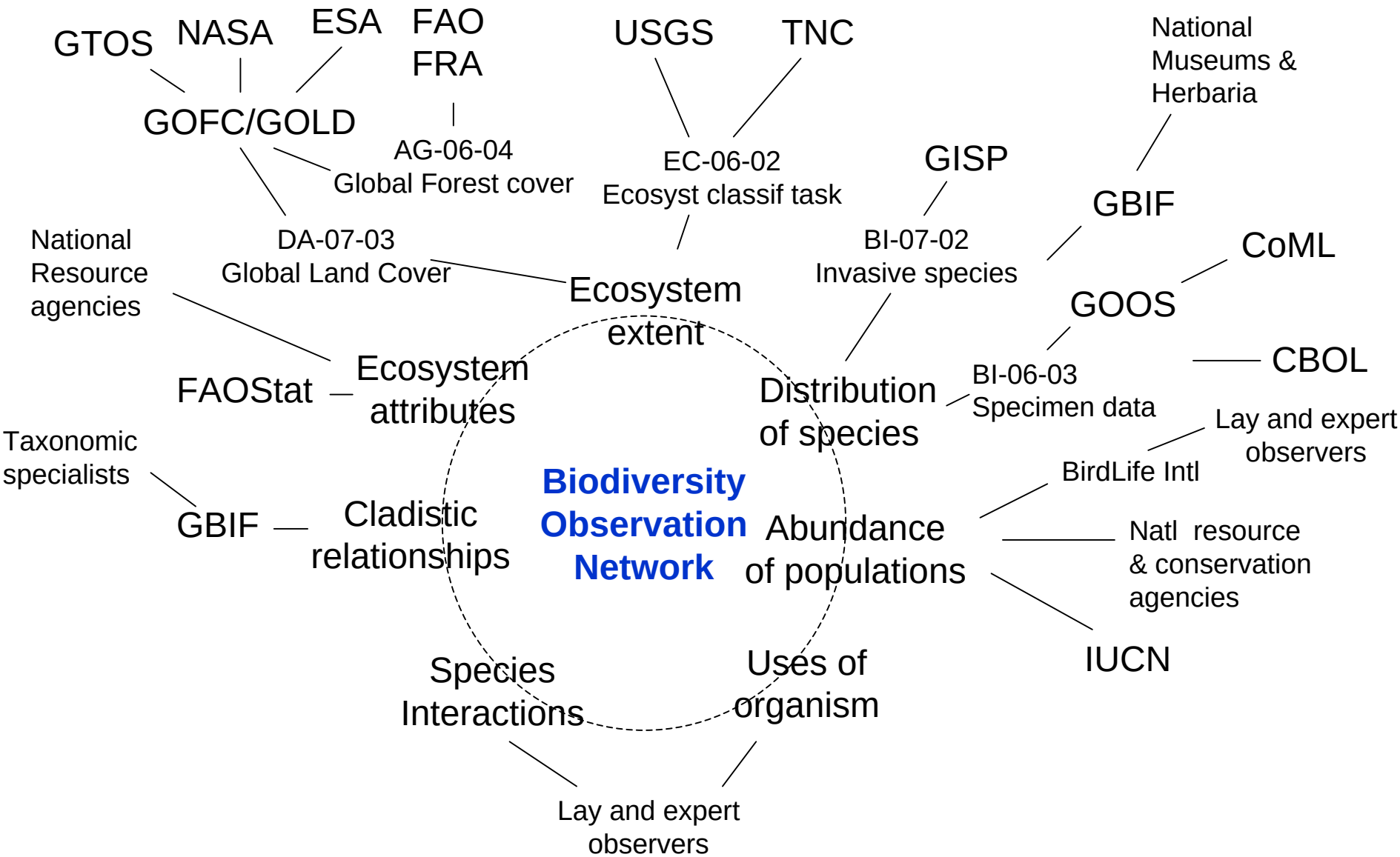
DIVERSITAS
an international programme of biodiversity science

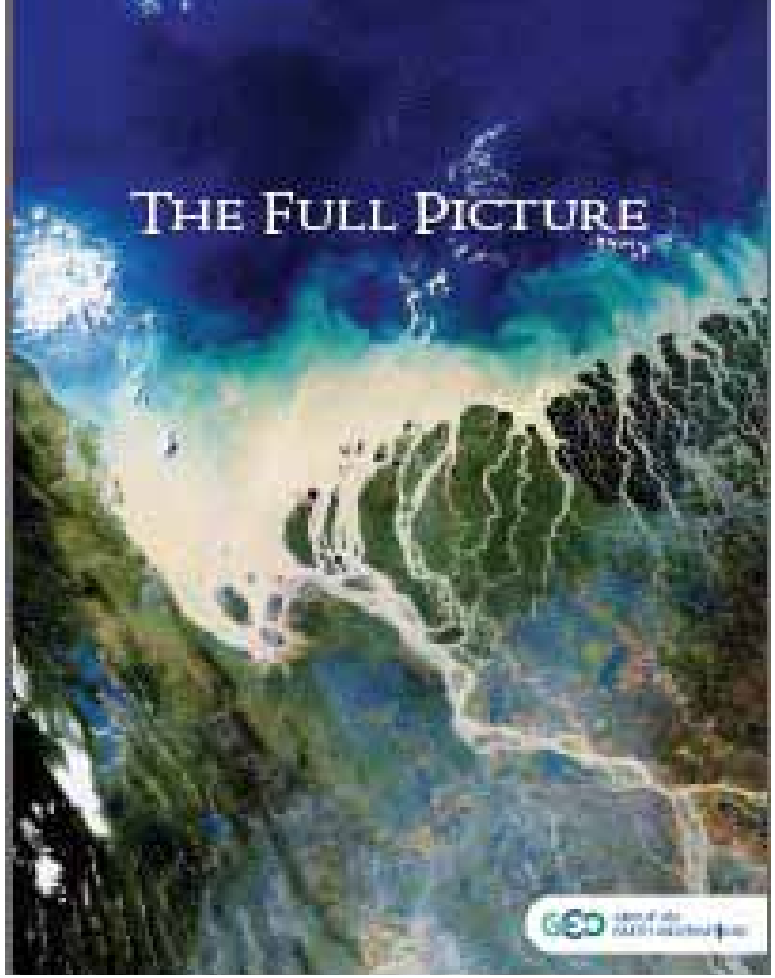
Science Plan "Assessing, monitoring and predicting biodiversity" (2008) will foster research on

- **Mapping species distributions**
- **Developing biodiversity indices**
- **Gap analyses and research prioritization**
- **Development & testing of monitoring methods**
- **Linkage with drivers of change and ecosystem services**
- **Interaction with field experiments and model development**

An integrated biodiversity observation system




GTOS
NASA
ESA
FAO
FRA
USGS
TNC
National
Museums &
Herbaria
GOFC/GOLD
AG-06-04
Global Forest cover
EC-06-02
Ecosyst classif task
GISP
GBIF
National
Resource
agencies
DA-07-03
Global Land Cover
BI-07-02
Invasive species
CoML
Ecosystem
extent
GOOS
CBOL
FAOStat
Ecosystem
attributes
Distribution
of species
BI-06-03
Specimen data
Lay and expert
observers
Taxonomic
specialists
BirdLife Intl
Biodiversity
Observation
Network
GBIF
Cladistic
relationships
Abundance
of populations
Natl resource
& conservation
agencies
IUCN
Species
Interactions
Uses of
organism
Lay and expert
observers



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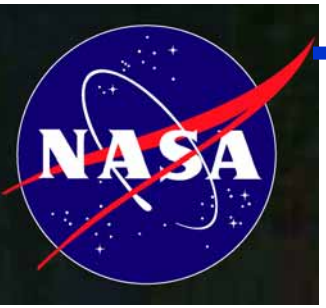
Toward a global biodiversity observation network

Bruno A. Walther and Anne Larigauderie, DIVERSITAS, Museum National d'Histoire Naturelle;
Neville Ash, UNEP-WCMC; Gary N. Geller, NASA Ecological Forecasting Program;
Norbert Jürgens, University of Hamburg;
Meredith A. Lane, Global Biodiversity Information Facility Secretariat

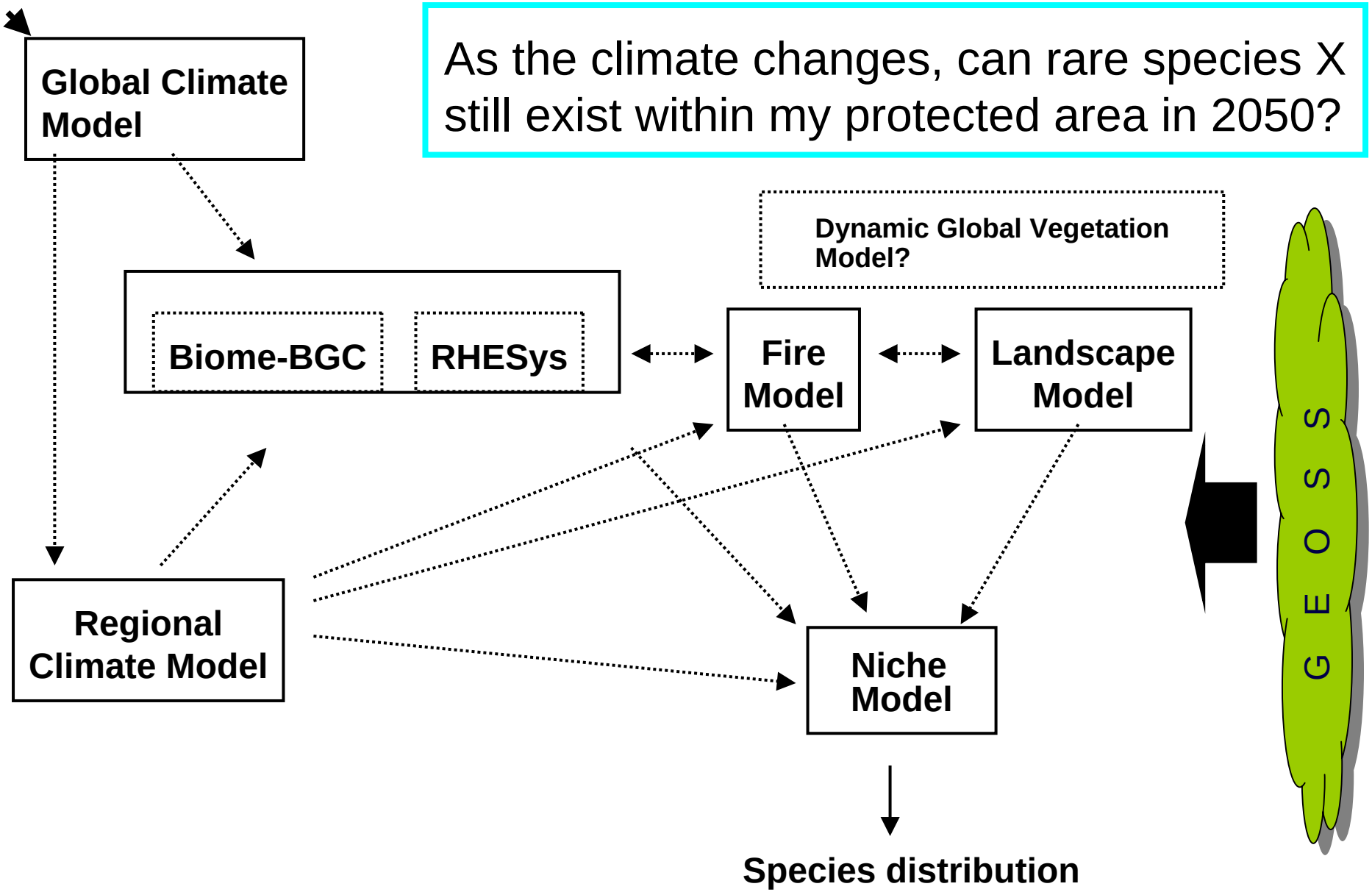


The Model Web: A Concept for Ecological Forecasting

- Distributed network of interoperating models (and datasets and sensors) that behaves as single, large model
- Scope includes physical, biological, and ecological processes
- Grows organically within framework of broad goals and data exchange standards
- Web access provided to researchers, managers, public, etc.

Climate change & species distributions

As the climate changes, can rare species X still exist within my protected area in 2050?



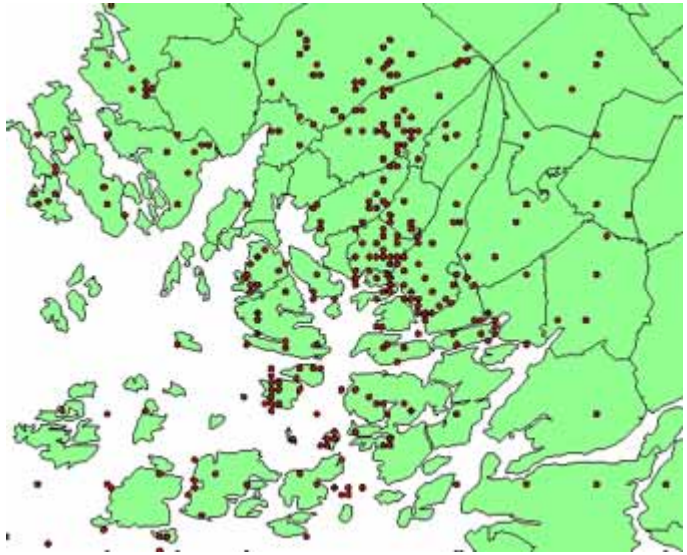
www.gbif.net

Prototype data portal

Global Biodiversity Information Facility

Access to

- Taxonomic names
- Specimens and observations
- Distribution maps



Distribution of a Heteroptera species in SW Finland

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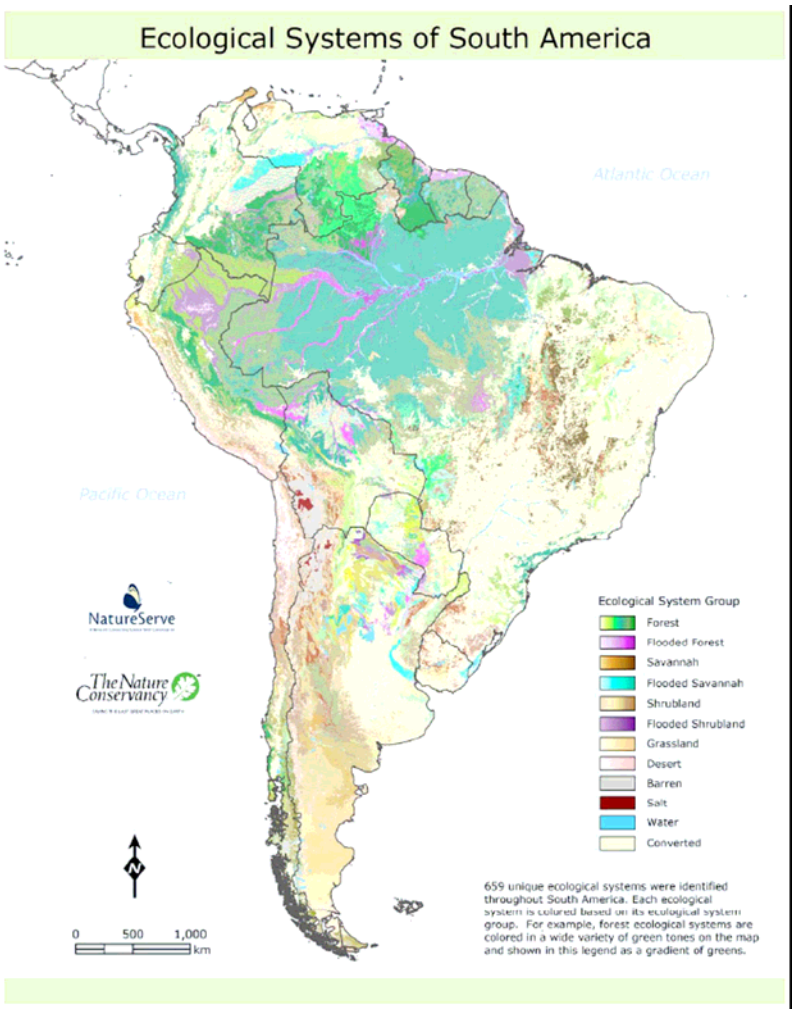
GEO Ecosystems Task
Classification and Mapping EC-07-02



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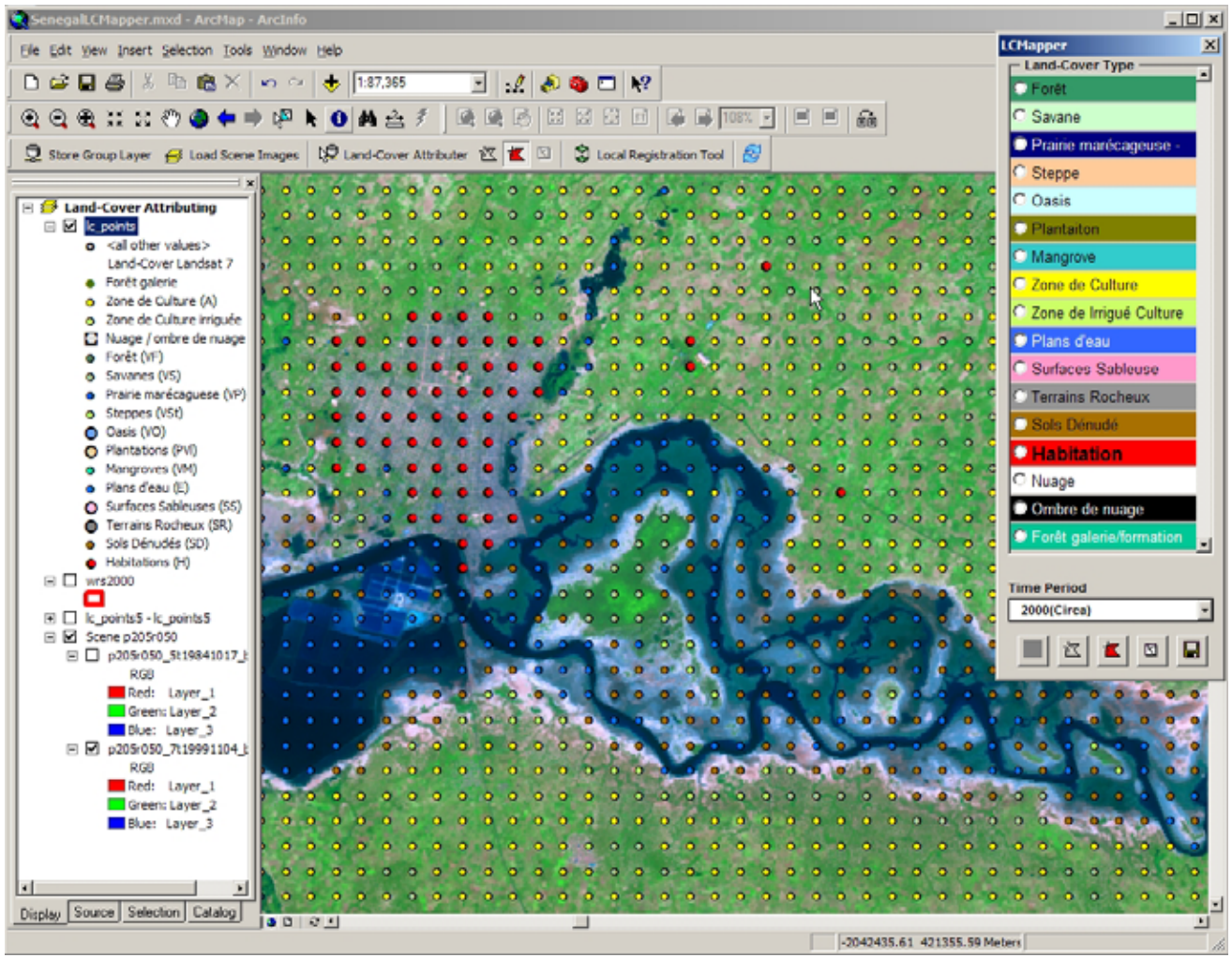
Senegal: Rapid Land Cover Mapping



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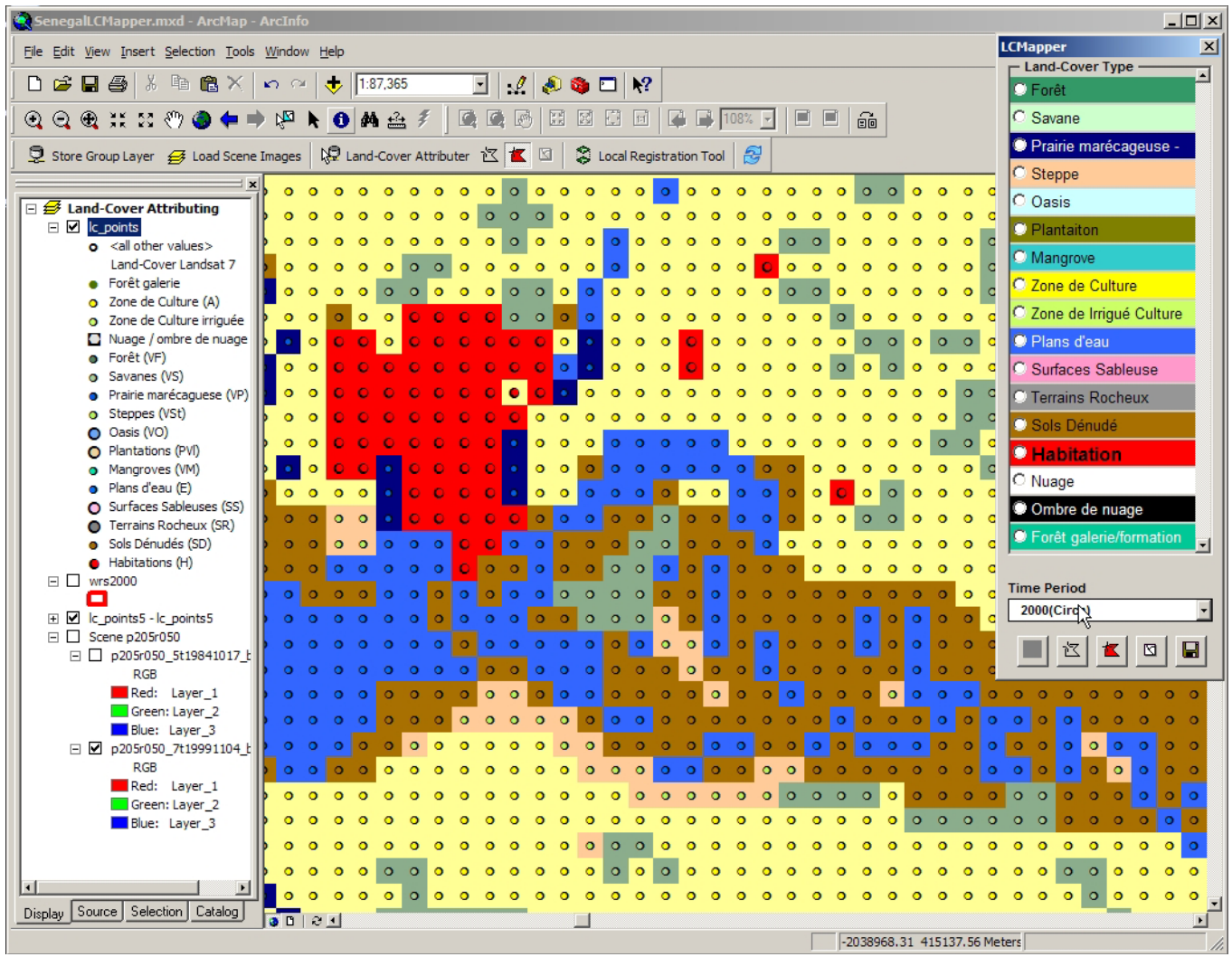
Senegal: Rapid Land Cover Mapping



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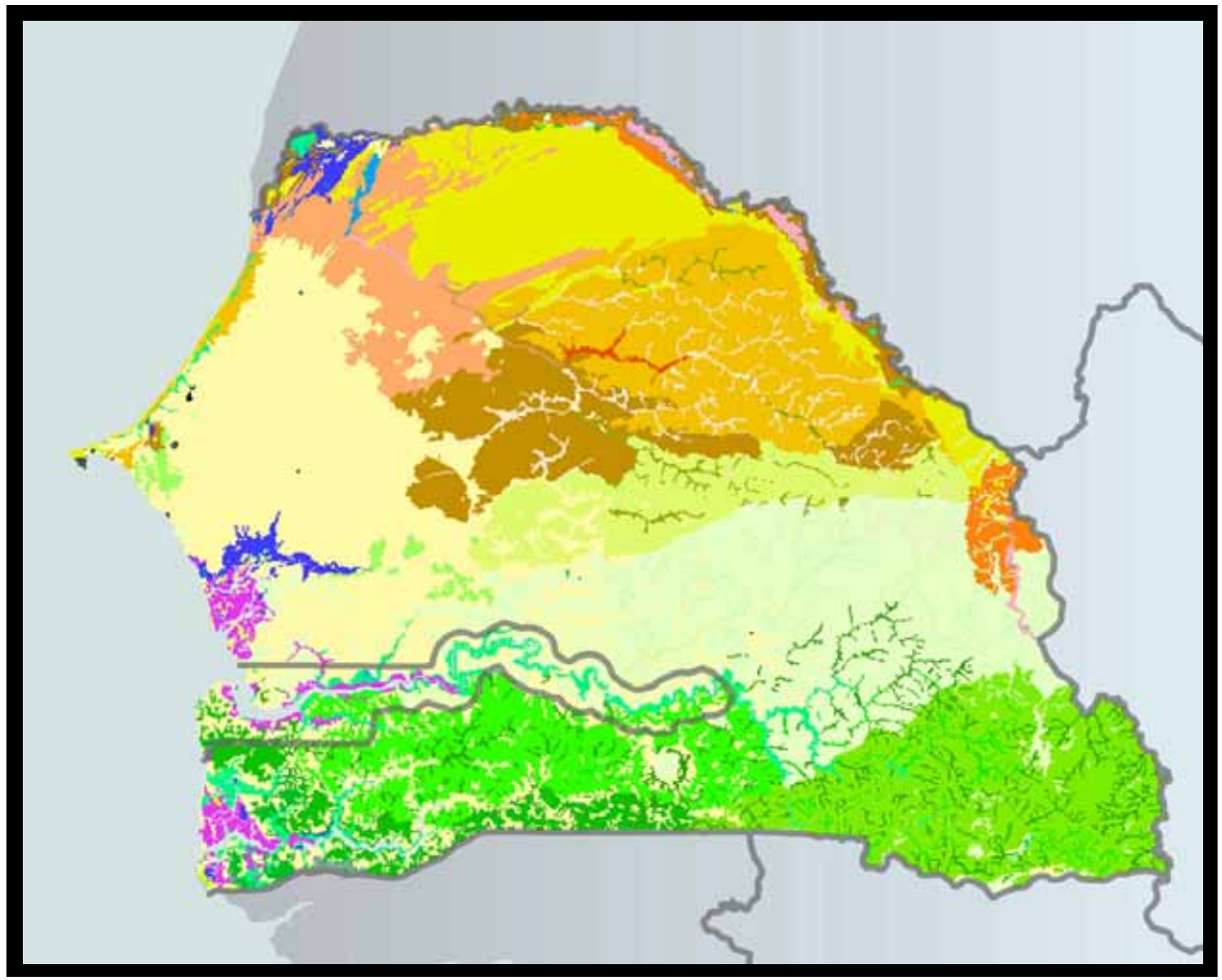


Senegal Land Cover – 0.5 km Resolution Raster

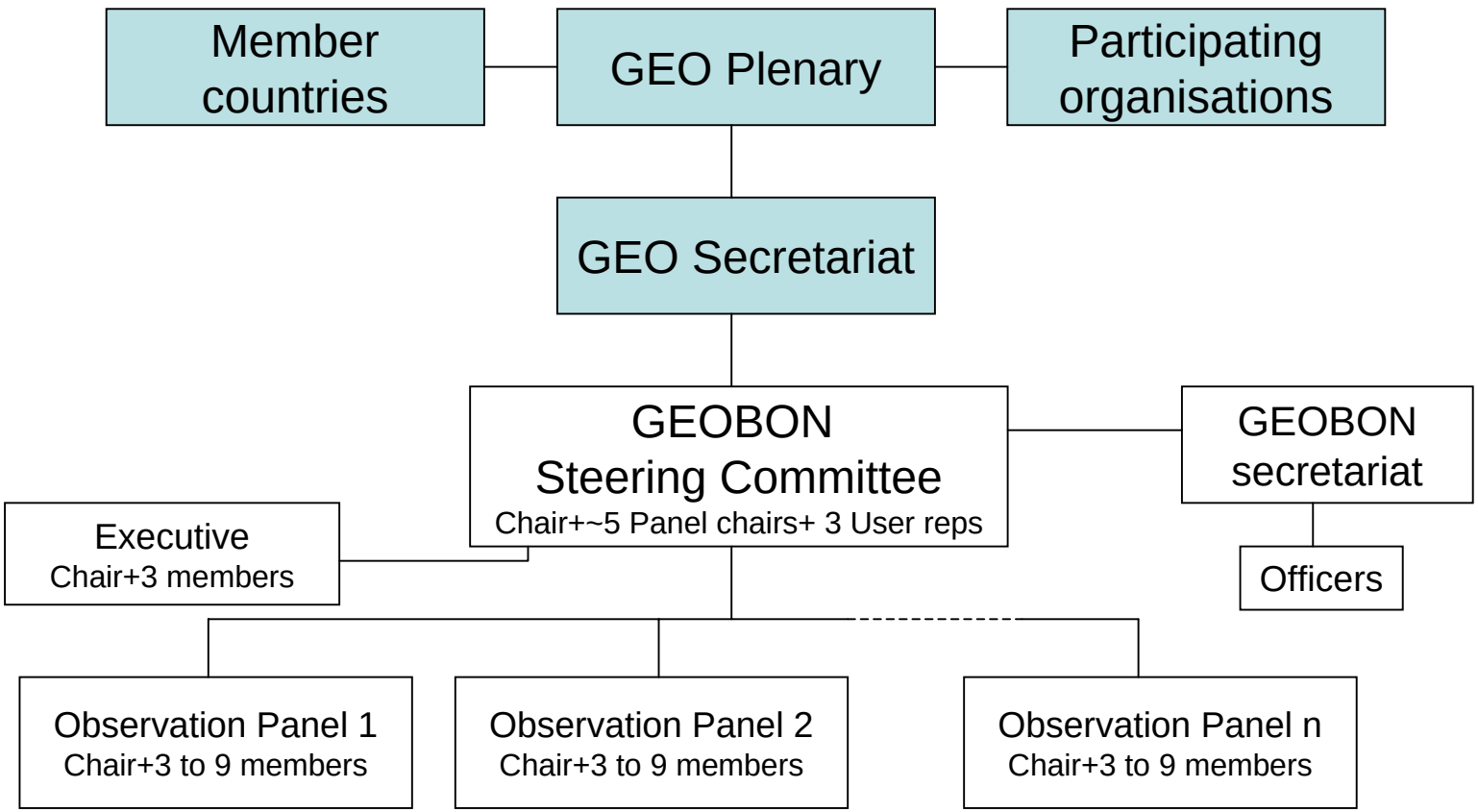
USAID
FROM THE AMERICAN PEOPLE

The future of GEO BON

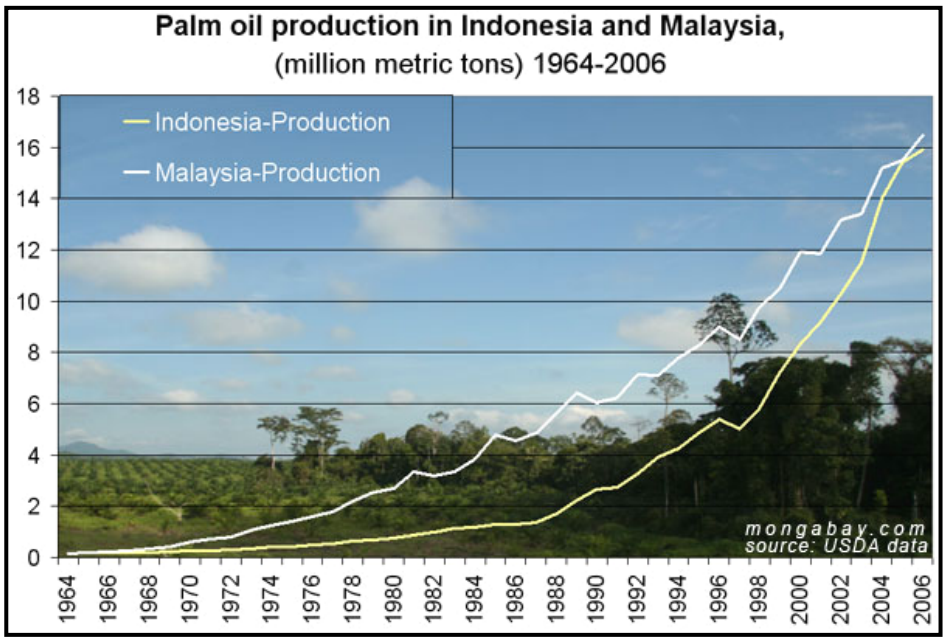
- **8-10 April 2008 2nd Network Meeting**
- **12-14 May 2008 CBD pre-CoP meeting, Bonn**
-
- **October 2008 Implementation plan publication**
- **Mid 2009 Deliver some pilot products**
- **2009 Approval of plan by GEO Plenary**
- **2009 Appointment of GEO BON committee**
- **2010 First operational products**

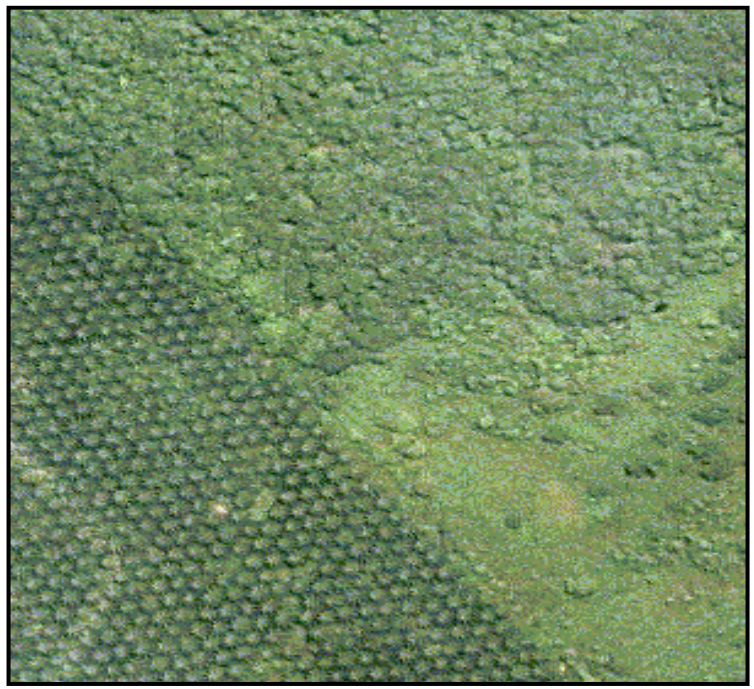
The future of GEO BON

A possible governance structure



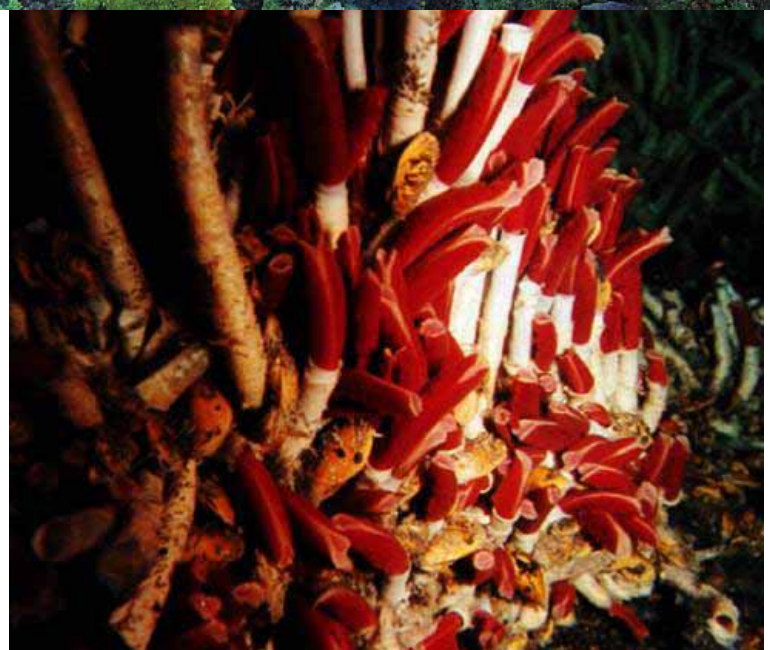
Habitat change >> global warming
Direct exploitation >> global warming





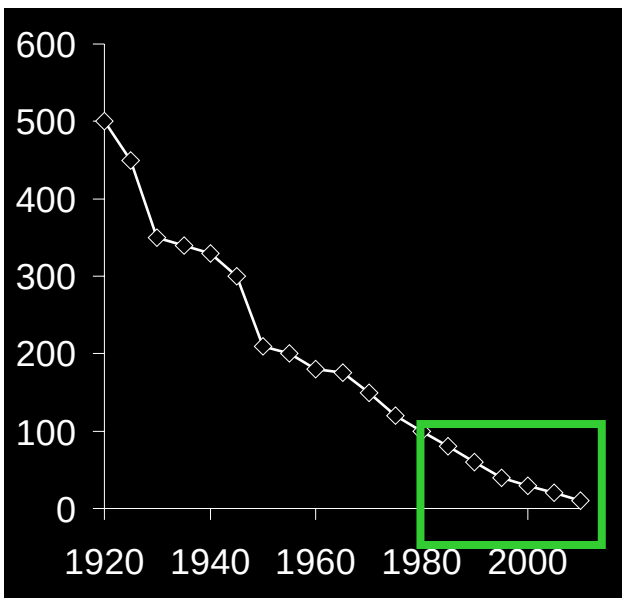
In-situ >> Remote Sensing

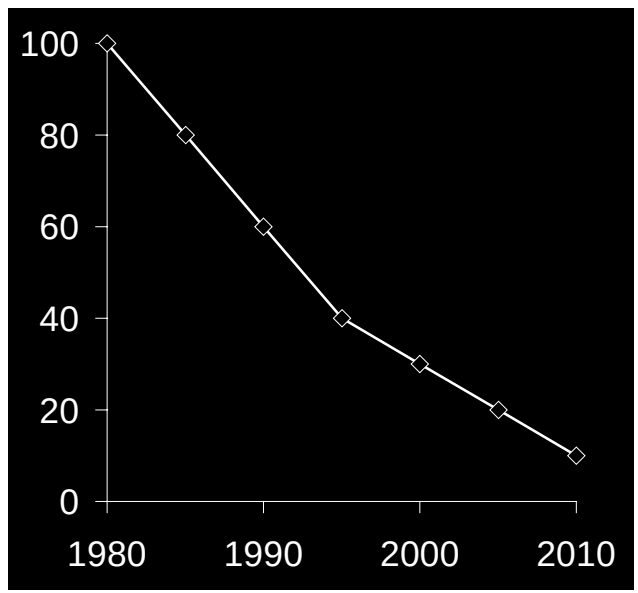
Oceans >> Terrestrial



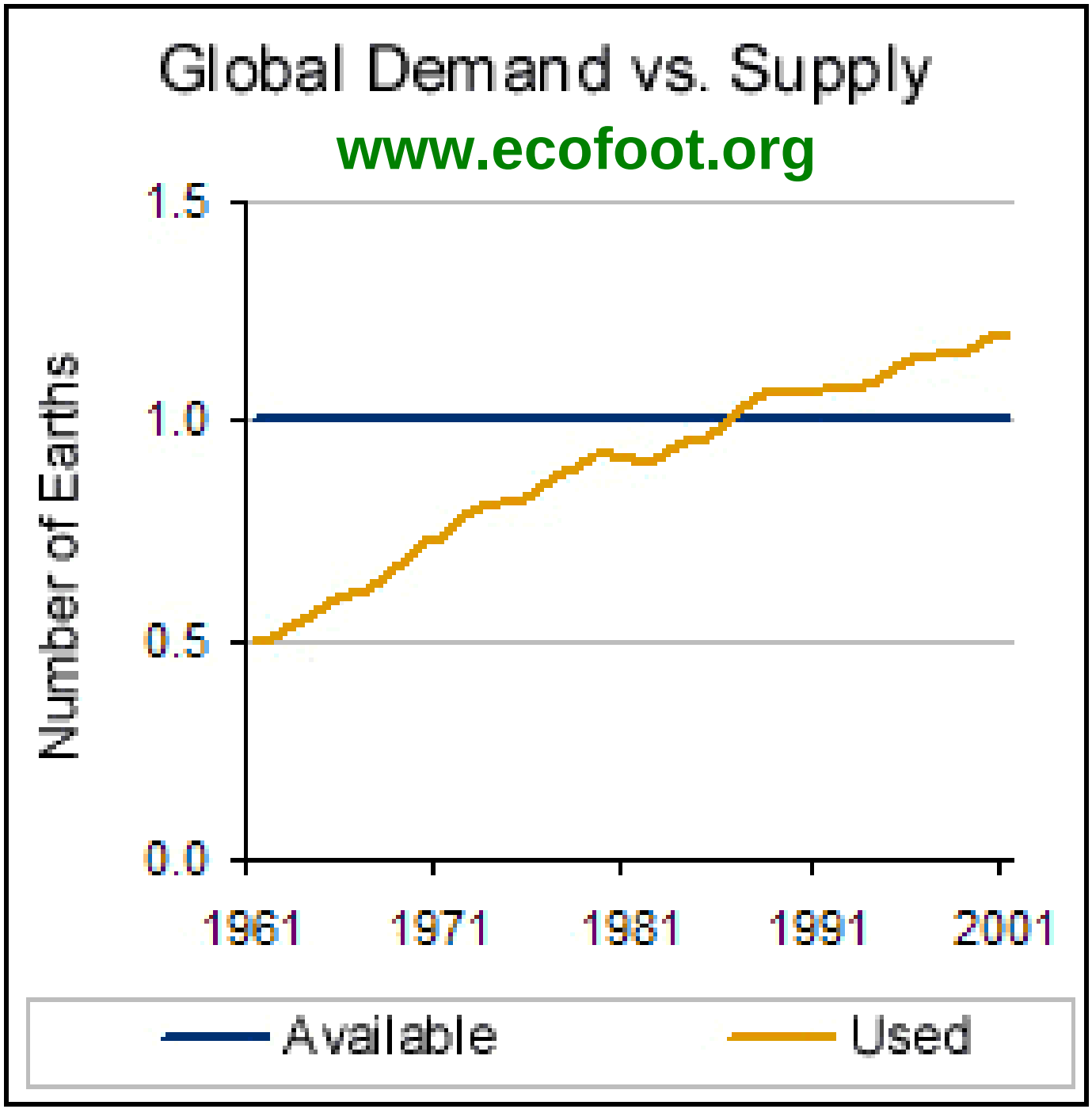
Long-term historical >> Short-term future

Starting points for data series
Back-casting or mining for historical trends

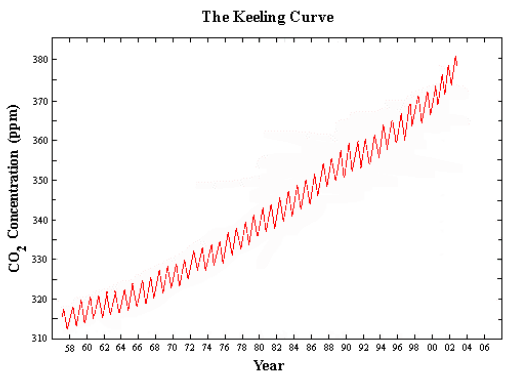




"… achieving by 2010 a significant reduction of the current rate of biodiversity loss …"


Global Demand vs. Supply
www.ecofoot.org
Number of Earths
1.5
1.0
0.5
0.0
1961
1971
1981
1991
2001
Available
Used

"Global warming is not just about science and … is not just a political issue. It is really a moral issue."



In 2007, corn prices went up 70%, wheat prices up 50%, rice up 16% and poultry up 10%


Food riots in Mexico

"Rising food & oil prices: A recipe for riots, says United Nations Food and Agriculture Organization"

"In Italy, shoppers organized a one-day boycott of pasta to protest rising prices"

Bigger runway could be stopped by protected area

NATURE IN WAY OF AIRPORT EXPANSION

FINAL WARNING

According to yesterday's UN report, the world will be a much hotter place by 2100. This will be the impact...

+2.4° +3.4° +4.4° +5.4° +6.4°

THE INDEPENDENT

FREE POSTCARDS BIRDS OF BRITAIN

This is a swede, on sale in a leading supermarket. It is shrink-wrapped in plastic, despite nature providing it with protective wrapping of its own. It is a symbol of the absurd and excessive packaging in our shops – and of the urgent need for...

THE CAMPAIGN AGAINST WASTE

BusinessMirror

IN FREAKISH TURN OF EVENTS, TOXIC SHIPMENT MOVES FROM ILOILO TO MISAMIS OCCIDENTAL

Barge with oil spill debris sink

Africa to Bear the Brunt of Global Warming

THE INDEPENDENT

Today .media

The magic of the FA Cup

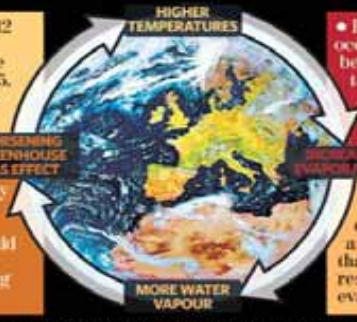
Arsenal cling on – as Chelsea march on 17 PAGES OF SPORT

THE INDEPENDENT

Climate change report finds we each produce 11 tons of carbon a year – and breaks down how we do it

Your carbon footprint revealed

Global Warming The vicious circle



- 11 out of the 12 hottest years since 1850 have been since 1995. Temperatures may rise 6C by 2100
- Evaporation of oceans is rising because of higher temperatures. Arctic sea ice is melting at a faster rate
- Earth's ability to absorb CO2 is reduced. CO2 levels could rise 44% this century, raising temperatures
- Atmospheric concentrations of water vapour are 4% higher than in 1970 as a result of rise in evaporation

EXCLUSIVE: 2,000 CLIMATE CHANGE EXPERTS DELIVER THE MOST TERRIFYING REPORT EVER

FULL REPORTS PAGE 2

Climate Change vs Mother Nature

By Elizabeth Nash

Bears have stopped hibernating in the mountains of northern Spain, scientists revealed yesterday, in what may be one of the strongest signals yet of how much climate change is affecting the natural world.

In a December in which bumblebees, butterflies and even swallows have been on the wing in Britain, European brown bears have been lumbering through the forests of Spain's Cantabrian mountains, when normally they would already be in their long, annual sleep.

Bears are supposed to slumber throughout the winter, slowing their body rhythms to a minimum and drawing on stored resources, because frozen weather makes food too

• REPORTS, PAGE 2

www.earthobservations.org/cop_bi_geobon.shtml

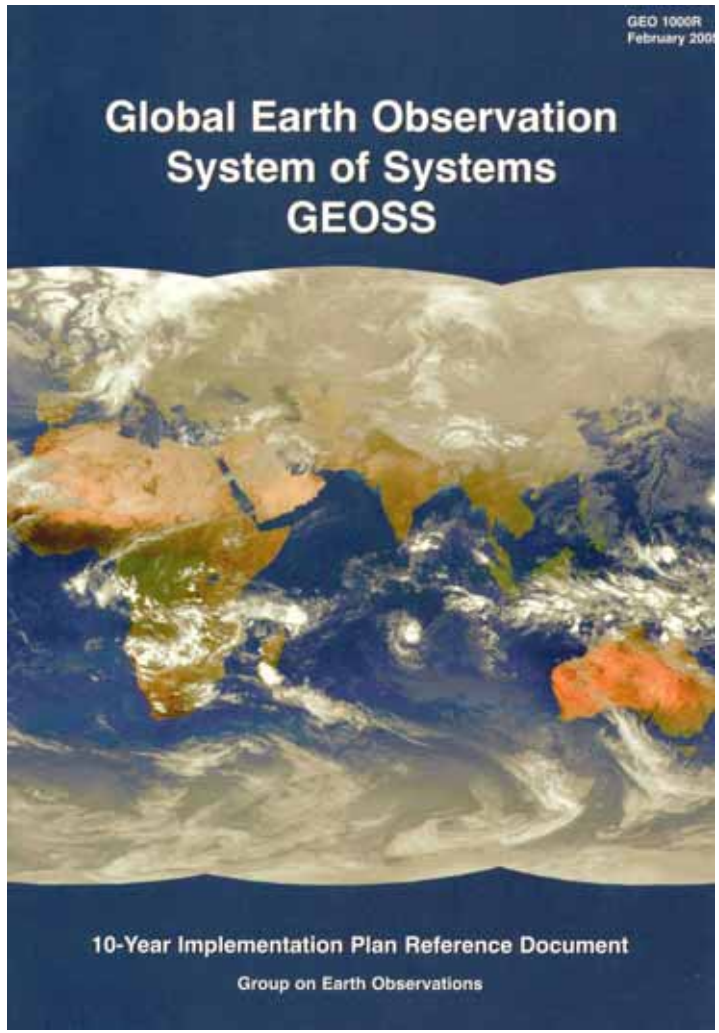
The context of GEO BON

GROUP ON
EARTH OBSERVATIONS

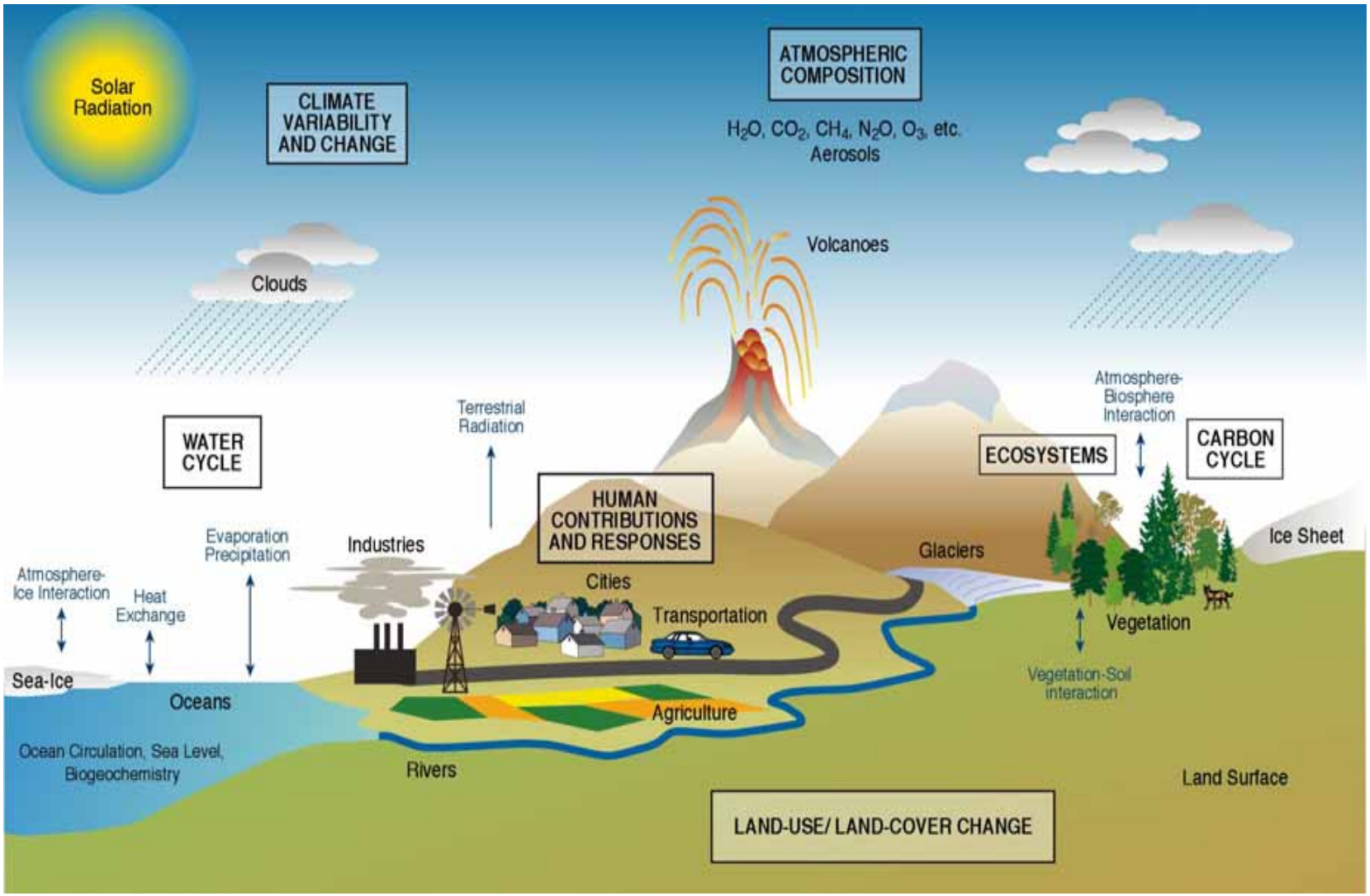
An Intergovernmental Organization with 73 Members
and 52 Participating Organizations

The context of GEO BON

- **2005: Group on Earth Observation establishes Global Earth Observation System of Systems**
  - **Biodiversity is one of nine "Societal Benefit Areas"**



The Earth is a complex system of systems



Any Single Problem Requires Many Data Sets

A Single Data Set Will Serve Many Communities

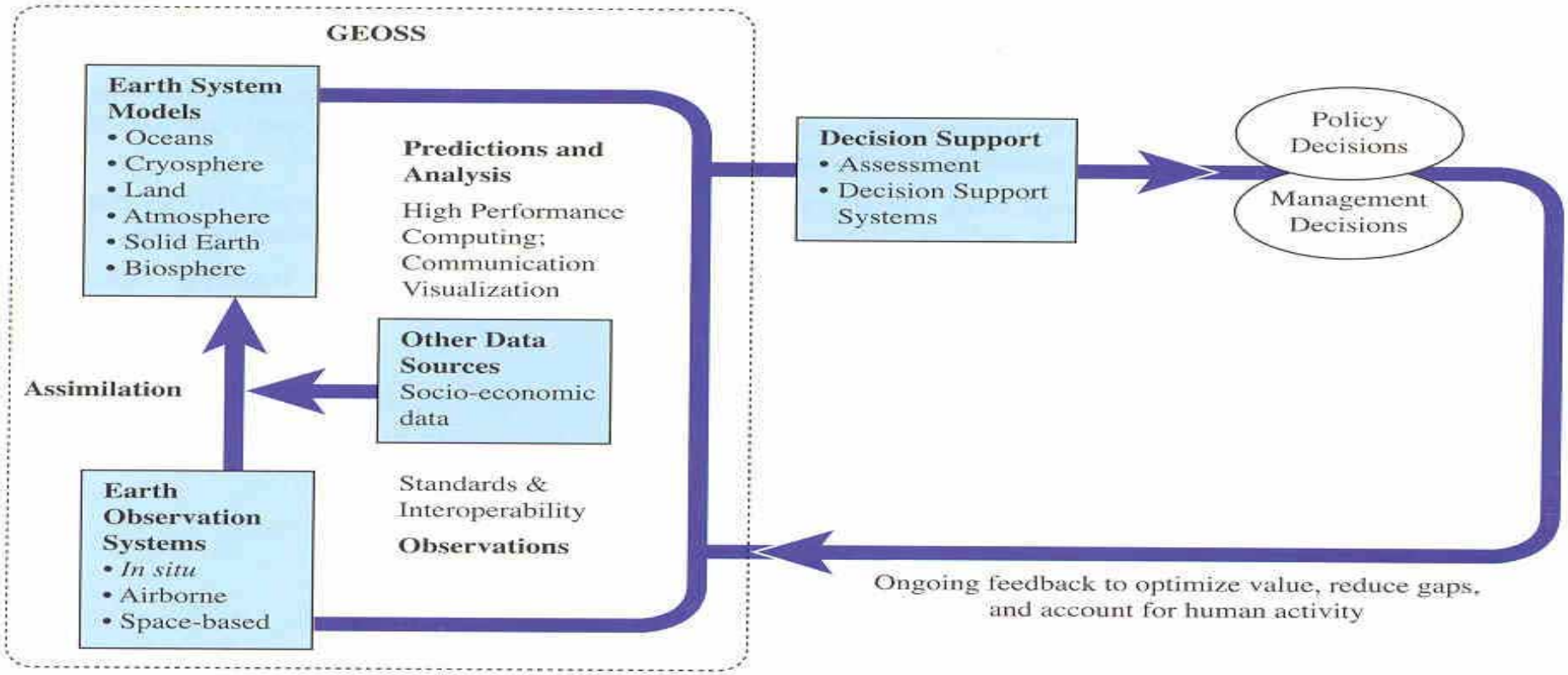
Key design issues

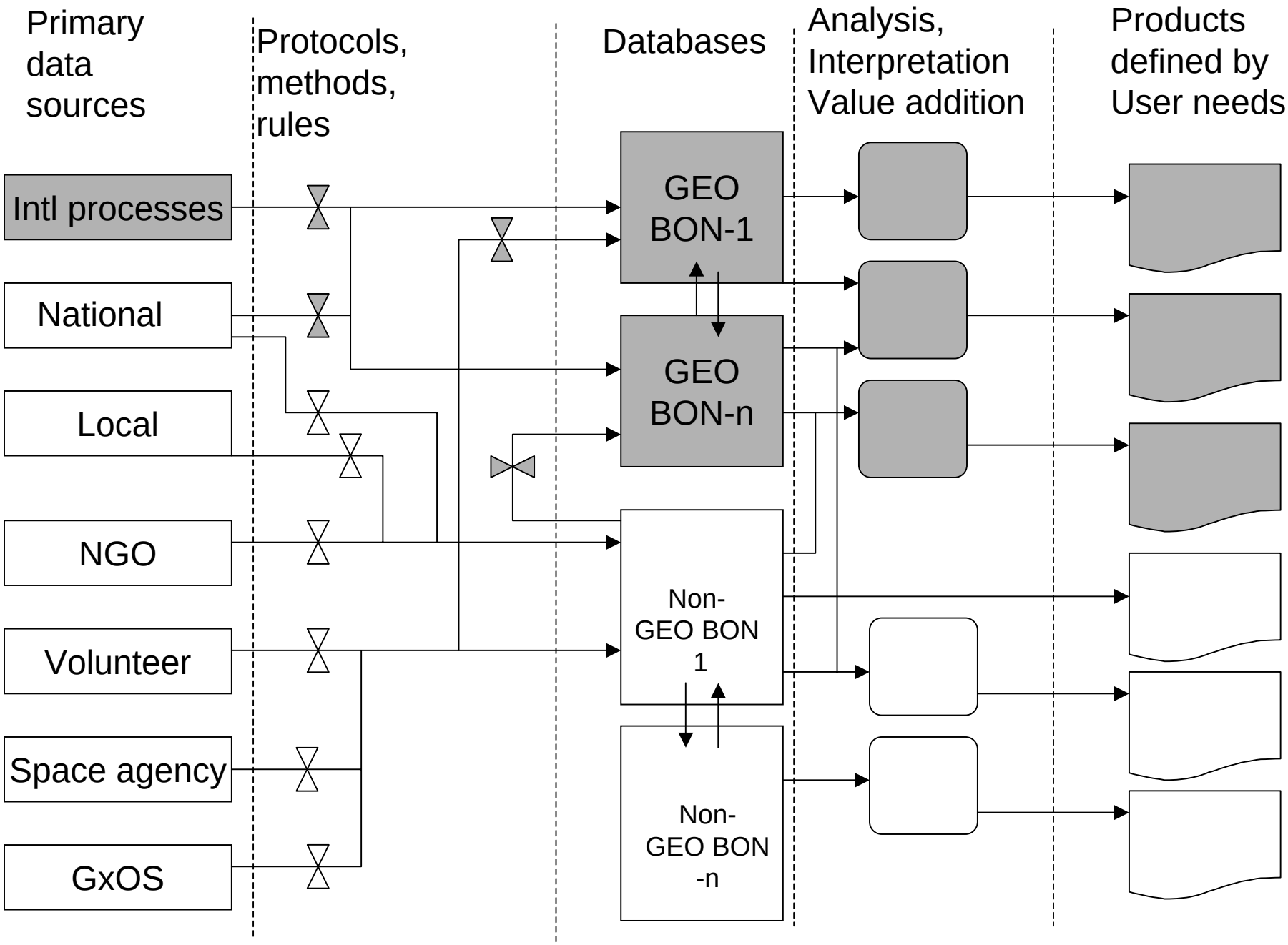
- How far down the value-added path should an observing system extend?
- Should non-biodiversity observations (especially socieconomic ones be included?
- State only, or Drivers-Pressures-State-Impact-Response?

Observing systems

…are more than just ways of collecting data

- Complete chain from observation to use
- Seamless continuum from observations to




Primary data sources
Protocols, methods, rules
Databases
Analysis, Interpretation Value addition
Products defined by User needs
Intl processes
National
Local
NGO
Volunteer
Space agency
GxOS
GEO BON-1
GEO BON-n
Non-GEO BON 1
Non-GEO BON -n

What is an observation product?

- Standardised datasets
  - Including images, collection records, field observations, remotely sensed observations
- Time series
  - including of selected indicators
  - modelled patches for missing data
- Spatial coverages
  - Including modelled interpolations
- Statistical analyses
  - Trends, change detection, distributions, significance
- Integrated products
  - Combinatorial or inferential products, observation-based

FAQs

- What is ‘in’ biodiversity?
- Who owns the data?
- Who is responsible for quality control?
- Who will pay for the system?
- How might the system be governed?
- Who might be part of the network?

Data policy

- Providers *always* own the primary data
  - And take responsibility for its quality
- The default case is free and open access
  - With limited exceptions to protect biodiversity
- Use must be accompanied by acknowledgement
- Users take responsibility for how they use it

Resourcing model

- GEO BON will not primarily reduce the cost of observations, it will increase their benefit
- It is a marginal incremental cost, with high payback due to synergies
- Basic observation costs continue to be paid by the agencies that have that in their mandate
- Incremental costs by voluntary contribution of financial, human or infrastructural resources
  - There may be a suggested scale of contribution

The future of GEO BON

The tabled document is a ***draft***
Nothing in it is not open to discussion, and modification if agreed
Sufficient consensus amoung the user and provider community is essential
if we want political and resource support

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…and you!

Now is the time!