Science supporting the Convention on Biological Diversity

Global Biodiversity Monitoring – a future earth symposium
May 4-6, 2015, Yale University

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The Convention on Biological Diversity

- Adopted at the 1992 “Earth Summit” alongside the Climate Convention
- Objectives: conservation; sustainable use; sharing of benefits from genetic resources. A convention for sustainable development
- 196 Parties (from May 5)
- Conference of the Parties meet every 2 years. Supported by subsidiary bodies for science, and implementation.
- Implemented mainly at national level – 184 countries have national biodiversity strategies and action plans.
Science supporting the Convention on Biological Diversity:

- Monitoring progress
- Supporting implementation of policy action (identification of priorities, adaptive management, public engagement, enforcement)
- Understanding biodiversity, role in supporting human well-being, and consequences of change.
Connecting:

• Unify data sets from “chance” observations of individual research programmes and citizen science with those from regular surveys
• Unify disparate data sets from different sources (including remote sensing and on-the-round observations)
• Unify historical data; current observations, extrapolations & models
• Different concepts and indicators (MSA, LPI, RLI .....)
• Geographical areas – need to fill gaps in tropical countries
• Global, regional, national and local scales
• Encompass marine, freshwater and terrestrial systems/communities
• Biodiversity – Society (address gaps or lack of connections of biophysical parameters to socio-economic data)
• Communities of practice: earth observation; biodiversity scientists; decision makers at global and national levels
Strategic Plan for Biodiversity 2011-2020 –
A globally agreed framework for action

**Vision**
Living in harmony with nature. By 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people.

**Mission**
Take effective and urgent action to halt the loss of biodiversity in order to ensure that by 2020 ecosystems are resilient and continue to provide essential services, thereby securing the planet’s variety of life, and contributing to human well-being, and poverty eradication.

5 Global goals & 20 “Aichi Biodiversity Targets”, mostly for 2020
Means of implementation, monitoring and review
Strategic Plan for Biodiversity 2011-2020

VISION
By 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people.

MISSION
Take effective and urgent action to halt the loss of biodiversity...

STRATEGIC GOAL A
Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society

STRATEGIC GOAL B
Reduce the direct pressures on biodiversity and promote sustainable use

STRATEGIC GOAL C
Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity

STRATEGIC GOAL D
Enhance the benefits to all from biodiversity and ecosystem services

STRATEGIC GOAL E
Enhance implementation through participatory planning, knowledge management and capacity building

IMPLEMENTATION SUPPORT MECHANISMS
The following are among the key elements to ensure effective implementation of the Strategic Plan:

**Global monitoring of biodiversity**: work is needed to monitor the status and trends of biodiversity, maintain and share data, and develop and use indicators and agreed measures of biodiversity and ecosystem change – GEO-BON, with further development and adequate resourcing, could facilitate this, together with GBIF and the BIP.

**Regular assessment** of the state of biodiversity and ecosystem services, future scenarios and effectiveness of responses: this could be provided through an enhanced role for the SBSTTA as well as IPBES;

**Ongoing research** on biodiversity and ecosystem function and services and their relationship to human well-being -- This is facilitated by, inter alia, DIVERSITAS, PECS and other global change research programmes of the International Council for Science (ICSU) (Now Future Earth)
By 2020, the rate of loss of all natural habitats, including forests, is at least halved & where feasible brought close to zero, & degradation and fragmentation is significantly reduced.

By 2020, at least 17% of terrestrial & inland water, and 10% of coastal & marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved (...)

By 2020, ecosystem resilience & the contribution of biodiversity to carbon stocks has been enhanced, through conservation & restoration, including restoration of at least 15% of degraded ecosystems, thereby contributing to climate change mitigation & adaptation & to combating desertification.
GBO-4 addressed four questions:

1. Are we on track to reach the Aichi Biodiversity Targets by 2020?

2. What national and regional commitments, plans and targets have been adopted?

3. What is the level of implementation of the Strategic Plan?

4. What actions need to be taken to achieve the Aichi Targets?

5. How do the Aichi Targets and progress towards them position us to realize the 2050 Vision of the Strategic Plan?

6. How does implementation of the Strategic Plan and progress towards the Aichi Targets contribute to the MDGs?
GBO-4 “dashboard”: Assessment of progress towards the Aichi Biodiversity Targets

1. Moving away from Target
2. No progress towards target
3. Progress towards target, but not to achieve it
4. On track to achieve Target
5. On track to exceed Target

No clear evaluation
Insufficient information to evaluate progress
Progress towards the Aichi Biodiversity Targets
GBO-4 Assessment

[Diagram showing progress towards Aichi Biodiversity Targets 1 to 20]

No se ha evaluado

Progress towards:
1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 
11. 
12. 
13. 
14. 
15. 
16. 
17. 
18. 
19. 
20.
Based on 65 national reports

- No information
- Moving away from target
- No progress
- Progress but at insufficient rate
- On track to meet the target
- On track to exceed the target

Target
Overview of trends across 20 Aichi targets
55 indicators
It is possible to limit climate change, conserve biodiversity and meet other international objectives simultaneously.
An international climate agreement will benefit biodiversity

It is possible to limit climate change, conserve biodiversity and meet other international objectives simultaneously.
Brazil: Reducing deforestation

UK: Improving sustainability of fisheries

New Zealand: bringing invasive alien species under control
Key messages

• Significant progress towards meeting some components of the majority of the Aichi Biodiversity Targets. But, in most cases, not sufficient to achieve the targets set for 2020.

• Additional action is required to keep the Strategic Plan for Biodiversity 2011-2020 on course. Key potential actions for each target are listed.

• Based on current trends, pressures on biodiversity will continue to increase at least until 2020, and that the status of biodiversity will continue to decline. Despite that society’s responses to the loss of biodiversity are increasing. This may be due to time lags; insufficient responses.

• Scenarios to 2050 show that it is possible to limit climate change (2°C), protect biodiversity and achieve food security and meet other SDGs. Meeting the Aichi Biodiversity Targets would contribute significantly to broader global
Attaining most of the Aichi Biodiversity Targets will require the implementation of a package of actions, typically including:

- legal or policy frameworks;
- socioeconomic incentives aligned with such frameworks;
- public and stakeholder engagement;
- monitoring; and
- enforcement.

Coherence of policies across sectors and the corresponding government ministries is necessary to deliver an effective package of actions;
BIOFUELS AND BIODIVERSITY

HOW SECTORS CAN CONTRIBUTE TO SUSTAINABLE USE AND CONSERVATION OF BIODIVERSITY

An Updated Synthesis of the Impacts of Ocean Acidification on Marine Biodiversity
Areas meeting CBD Scientific Criteria for Ecologically or Biologically Significant Marine Areas (EBSAs, annex 1 to decision IX/20); Total 207 areas described.

Disclaimer: This is an information ONLY for the presentation at this meeting. Some information on the map is yet to be finalized. This is NOT for QUOTE or Distribution.
Compilation of scientific data & information

Data compilation and collection

Overlay & Analysis

Synthesis and Mapping

~40 GIS data layers of biogeography, biological and physical data
Science supporting the Convention on Biological Diversity:

- Supporting implementation of policy action (identification of priorities, adaptive management, enforcement)
- Monitoring progress
- Understanding biodiversity, role in supporting human well-being, and consequences of change.
Torching the Amazon
Can the rain forest be saved?
Monitoring and Control
Integrated actions

Monitoring systems

Law Enforcement

Remote Sensing Centre
Reducing deforestation in Brazil has relied on a multi-faceted approach including:

- “Real-time”, publically available monitoring of deforestation
- Enforcement campaigns to crack down on illegal deforestation and logging
- Involvement of businesses and stakeholders to reduce deforestation.
- Incentive measures, including restricting credit for rural landowners with the highest rates of deforestation.
- Expansion of protected areas and demarcation of indigenous lands: ecosystems in these areas store $117\pm22 \mathrm{GtCO}_2\mathrm{e}$!
55 of the 178 indicators evaluated met five criteria:

1. Relevance to an Aichi Target and clear link with the status of biodiversity;

2. Scientific or institutional credibility;

3. A start point before 2010 and end-point after 2010 (or a long series of data points ending as near to 2010 as possible);

4. At least 5 annual data points in the time-series

5. Broad geographic (preferably global) coverage.
Scenarios & Models of Global Change, Biodiversity and Ecosystem Services

SBSTTA-17 identified **key scientific and technical** needs related to the implementation of the Strategic Plan for Biodiversity 2011-2020, including:

(a) **Social science** - better ways to draw on social sciences to motivate choices consistent with the objectives of the Strategic Plan, inter alia, better understanding of behavioural change, production and consumption patterns ....

(b) **Data and information** - more accessible, affordable, comprehensive, reliable and comparable data and information streams through, inter alia, facilitated access to remote sensing, use of in-situ observations, proxies, citizen science, modelling, biodiversity monitoring networks, better application of data standards and interoperability ....;

(c) **Evaluation and assessment** - The need for improving and promoting methodologies for assessing the status and trends of species and ecosystems, hotspots and conservation gaps as well as ecosystem functions, ecosystem services and human well-being, at national, regional and global levels;

(d) **Planning and mainstreaming** - biodiversity safeguards, tools and methods for spatial planning, including integrated land use and coastal and marine planning, valuation of biodiversity, ecosystem functions and ecosystem services; and mainstreaming biodiversity into sustainable development and other relevant policy sectors;
Citizen and community based initiatives have an important and growing role to play.

Systematic use of remote sensing data and cost-effective, standardized *in-situ* observations.

Traditional and Local knowledge and monitoring efforts a critical source

Need for long-term data series to facilitate the monitoring of change.

Dialogue between policymakers and the Earth observation community.

Free and open access to satellite data.

Salience of remote sensing data much improved if it can be made available in near-real-time and processed into key products that are useful to decision makers (e.g. land-use maps). Near-real-time data also promotes greater public interest and participation in policymaking.

National, regional & global biodiversity observing systems require data standards, interoperability & coordination among institutions, capacity-building & sustained funding.

Importance of regional collaborative programmes, or regional centres.

EBVs, once clearly defined and tested, could improve the efficiency by focusing observations on a limited number of key attributes.

A toolkit (“BON-in-a-Box”) that can be tailored to national and regional needs would fill a major gap. Such a toolkit might include a handbook, EBVs in support of indicators and database structures, strategies to integrate remotely-sensed and *in-situ* data, and guidance on terminology, methods and standards.
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Opportunities:

June 2015: Technical Expert Group on Biodiversity Indicators.

October 2015: CBD-Future Earth Workshop

November 2015: SBSTTA 19

November 2015: GEO Plenary, Mexico

April 2016: SBSTTA 20

December 2016: COP-13, Mexico
Thank you!

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Scientists quantify several plausible socio-economic development pathways (e.g., greenhouse gas emissions)

Extrapolate from statistical fit to recent trends

for drivers (e.g., land use change)

That input to models of direct drivers (e.g., climate change)

That input to models of impacts on biodiversity and ecosystem services

Define desirable multi-criteria endpoints for the future

Alternative socio-economic scenarios + models of direct drivers + models of impacts

Plausible scenario that meets criteria

Backcasting or Desirable endpoints

E.g., IPCC SRES, MA

Extrapolation of current trends

(e.g., this report)

Extrapolate from statistical fit to recent trends

for drivers (e.g., land use change)

...and independently for impacts

Statistical fit Extrapolation to 2020

...and independently for impacts

Statistical fit Extrapolation to 2020

Biodiversity (e.g., Red list index)

Greenhouse gas emissions

Climate change

Biodiversity

Fishing pressure

GHG emissions

2010
2020
2050

Biodiversity

1970
2010
2020
2050

Fraction of people with good nutrition

Desirable endpoints

1970
2010
2020
2050

Yes

No
Terrestrial vertebrate diversity (Pereira et al. 2012) and marine diversity (Tittensor et al. 2010). The color gradient represents species richness and uses a geometric scale.

Leadley et al 2014 Bioscience
Global Biodiversity: Recent Declines

Biodiversity loss and its impact on humanity

Global meta-analysis reveals no net change in local-scale plant biodiversity over time
Tipping Points

Deterioro del Amazonas  Eutrofización  Colapso de arrecifes de corales
Pressures | State | Responses
--- | --- | ---
Strategic Goal A | | |
Strategic Goal B | | |
Strategic Goal C | | |
Strategic Goal D | | |
Strategic Goal E | | |
Living Planet Index & Red List Index
Scenario-based projections to 2020 and out to 2050

**LPI and RLI for mammals and ungulates**

- **Populations Trends (LPI)**
  - Black line: Visconti
  - Red: Business-as-usual (=trend)
  - Green: Consumption change
  - Blue: Global technology pathway

- **Extinction Risk (RLI)**
  - Red: Alternative desirable endpoint
  - Green: Socio-economic scenarios

Year:
Área de bosques

Source: Leadley and Pereira et al 2010
Biodiversity offers solutions to climate change challenges

Enhancing resilience to change
MYPOW (Decision XII/31) – issues for COP-13

- Interim review of progress towards the implementation of the Strategic Plan for Biodiversity 2011-2020 and the achievement of the Aichi Biodiversity Targets, and related means of implementation.

- Further consideration of the implications of the findings of GBO-4 and fifth national reports.

- Strategic actions to enhance national implementation, in particular through mainstreaming and the integration of biodiversity across relevant sectors, including agriculture, forests and fisheries.

- Ways and means to enhance the implementation of Article 12 of the Convention, in particular training and capacity building for developing countries to support implementation of the SPfB 2011-2020.

- Integration among the Convention and its Protocols.

- Guidelines for the 6th national reports and modalities for future editions of GBO.

- Implications of the post-2015 United Nations development agenda and the SDGs and of other relevant international processes for the future work of the Convention.

- Determination of funding needs to inform the GEF-7 replenishment for the 2018-2022 cycle.
Living Planet Index & Red List Index
Trends, status and statistical extrapolation to 2020

Assumption that underlying socio-economic and direct drivers follow recent trends
Extinctions
Status & trends

Extinctions of Birds & Mammals
(extinctions per 25 year period)

Percent of Important Bird Areas within Protected Areas

Extinctions of Freshwater Fish
(extinctions per 25 year period)

Living Planet Index & Red List Index
Trends and extrapolations of responses

Funds for species protection

Percent within PAs

Constant USD (millions)

Year

Year
Living Planet Index & Red List Index
Trends and extrapolations of responses

**Percent of Important Bird Areas within Protected Areas**

- 30%
- 0%

Year

**Funds for species protection**

- 10000
- 1

Constant USD (millions)

Year
Other information provided by Parties

Target 11: Protected Areas

Current and projected protected area coverage for 86 countries

See UNEP/CBD/COP/11/26 for more details