Science supporting the Convention on Biological Diversity

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

David Cooper
Director, Science, assessment & monitoring
Secretariat, Convention on Biological Diversity

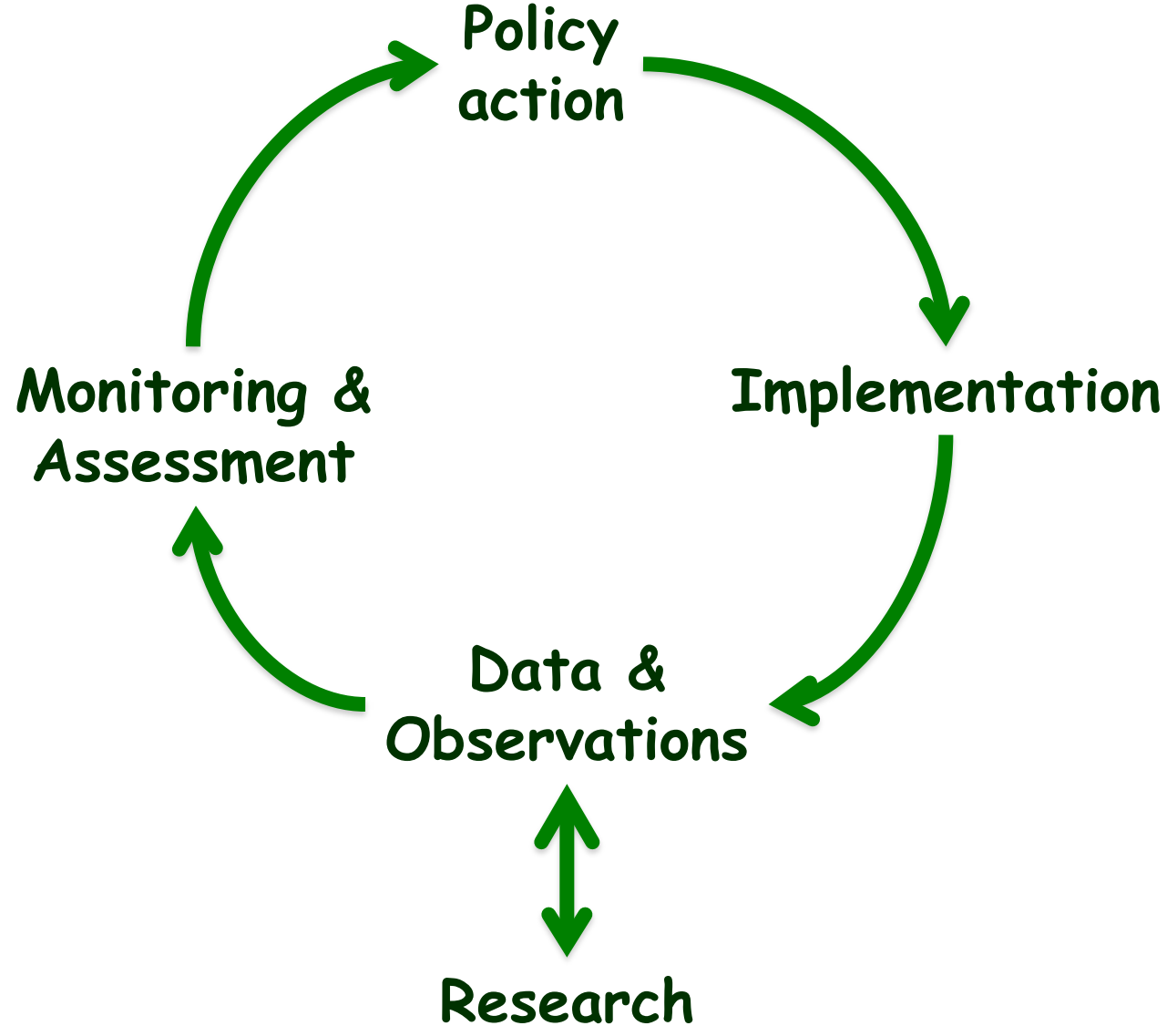
COP12 / MOP7 / MOP1
PYEONGCHANG KOREA 2014

Convention on Biological Diversity

United Nations Decade on Biodiversity

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.


Policy action
Implementation
Data & Observations
Research
Monitoring & Assessment

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.

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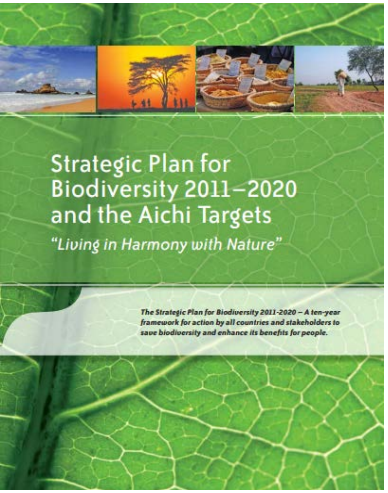
Connecting:

- 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

Mechanisms for research, monitoring and assessment:

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*)

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Convenio sobre la Diversidad Biológica

PNUMA

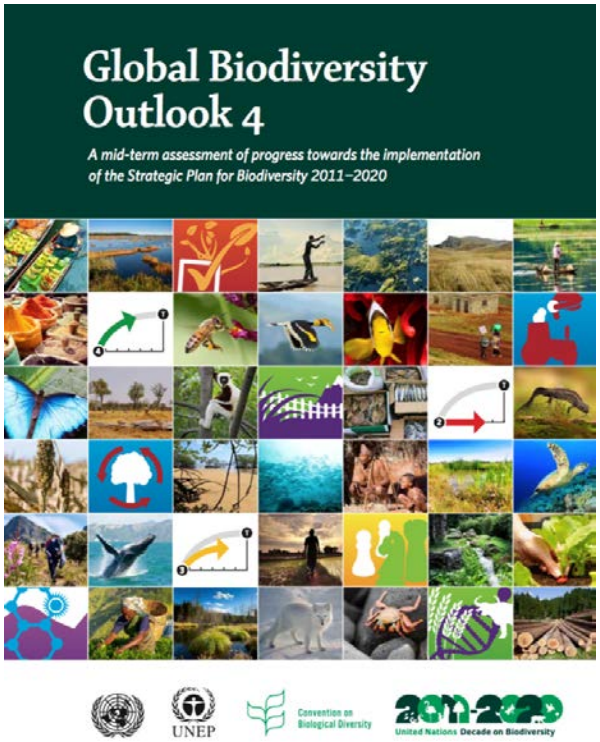
2011-2020

Decenio de Las Naciones Unidas sobre la Biodiversidad

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.

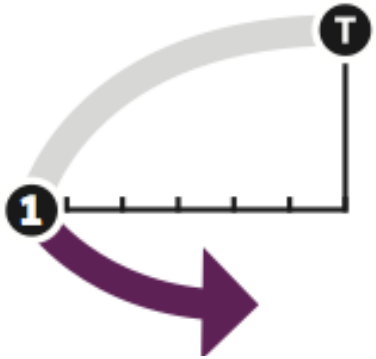


GBO-4 addressed four questions:

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?

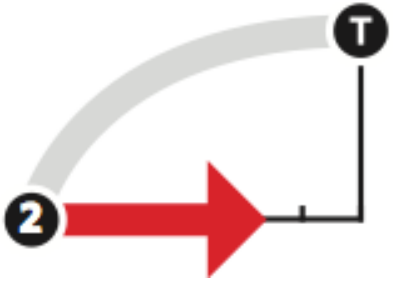
GBO-4 “dashboard”:

Assessment of progress towards the Aichi Biodiversity Targets

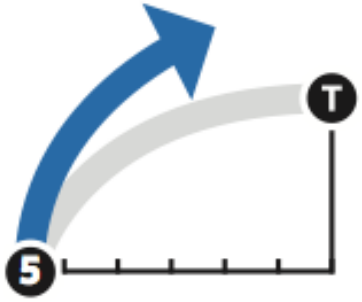


Moving away from Target

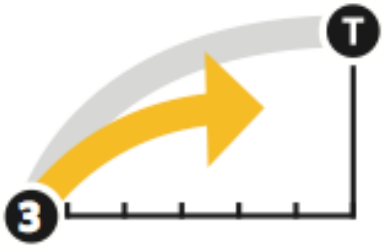
On track to achieve Target



No progress towards target



On track to exceed Target



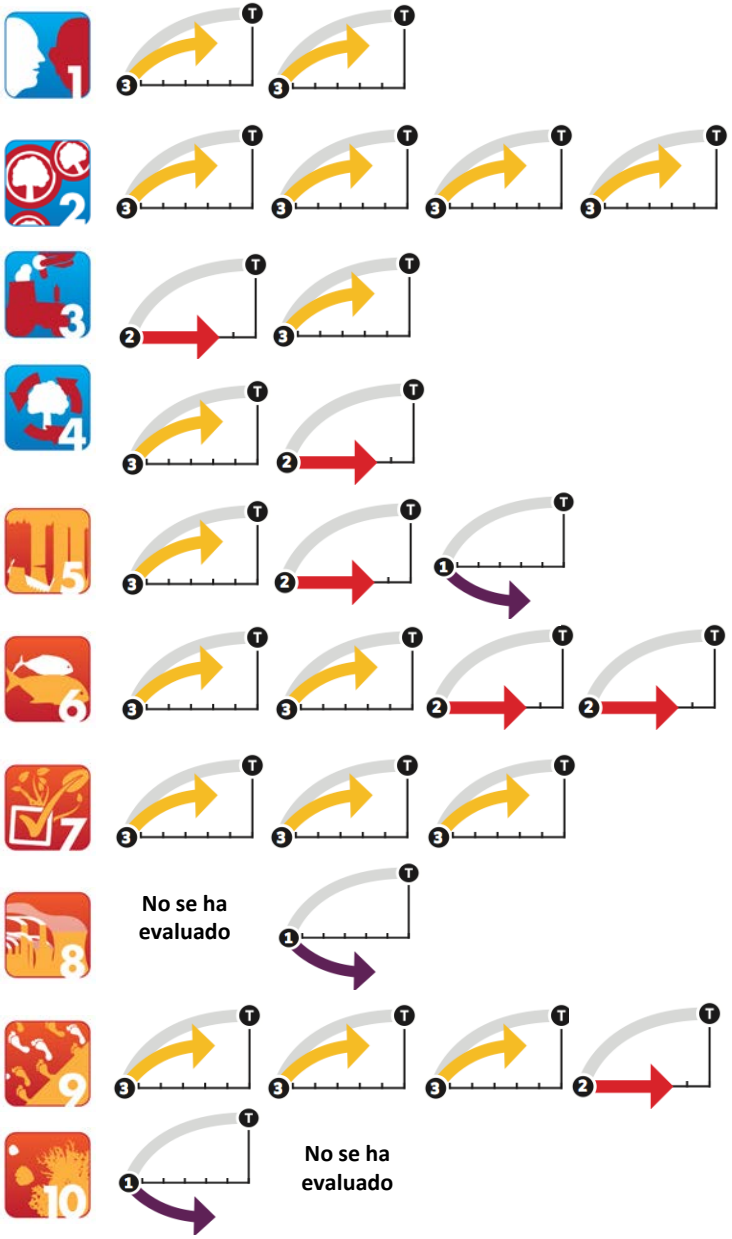
Progress towards target, but not to achieve it

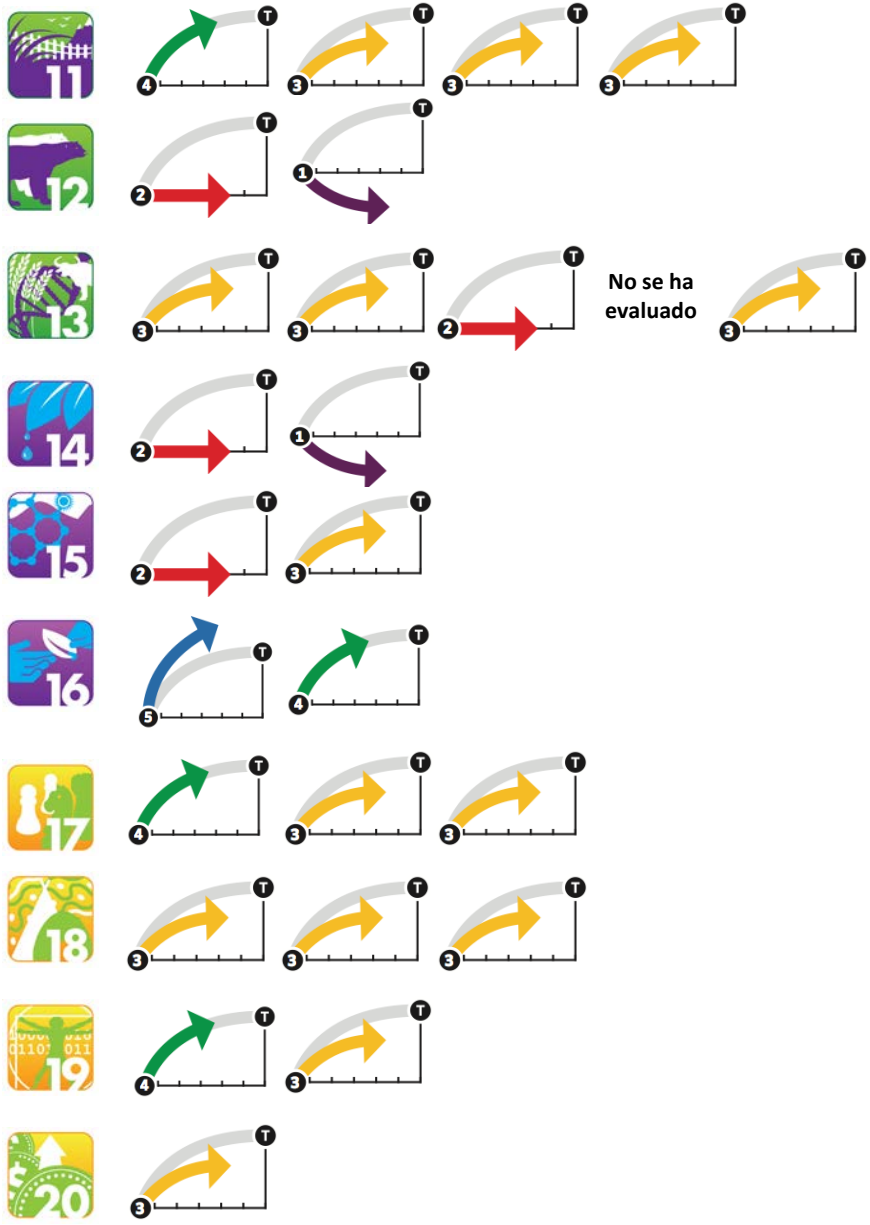
No clear evaluation

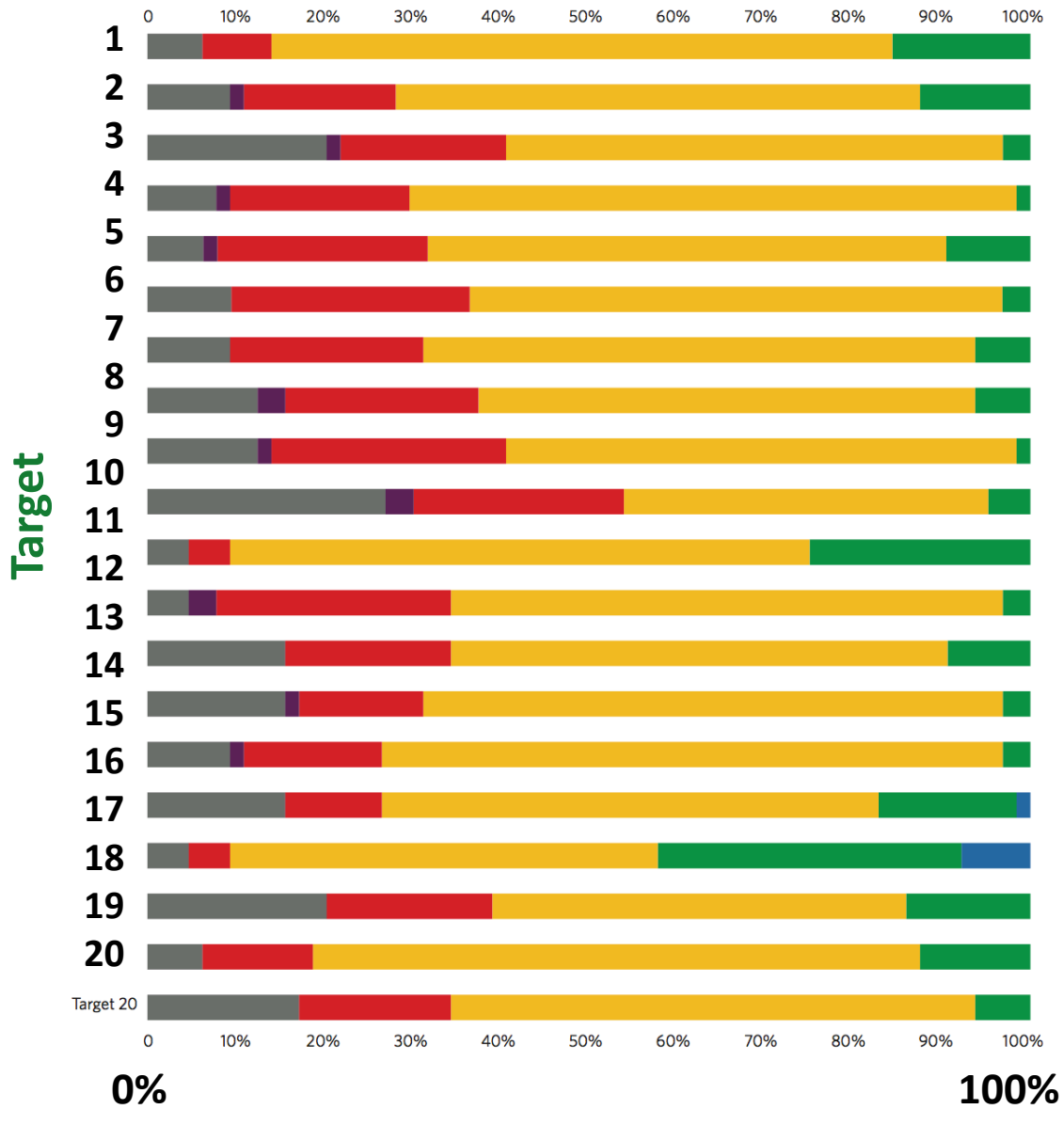
Insufficient information to evaluate progress

Progress towards the Aichi Biodiversity Targets

GBO-4 Assessment







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

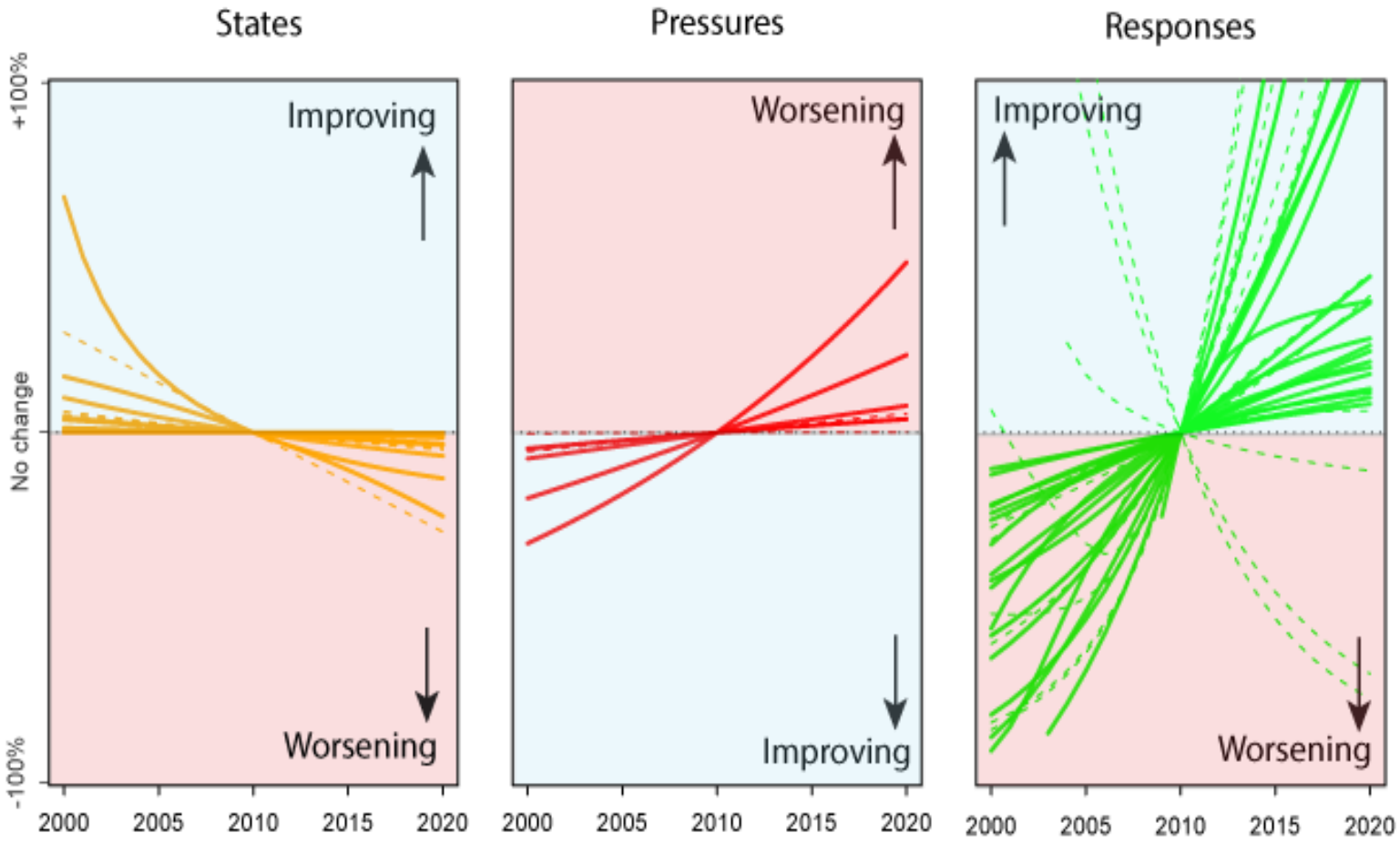
Based on 65 national reports

Convention on Biological Diversity

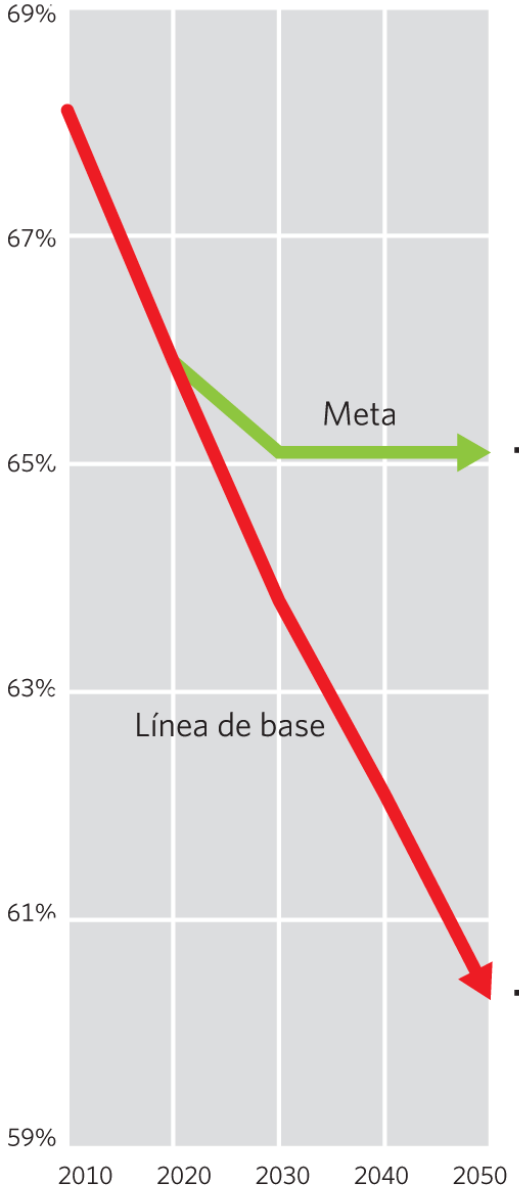
COP12 / MOP7 / MOP1
PYEONGCHANG KOREA 2014

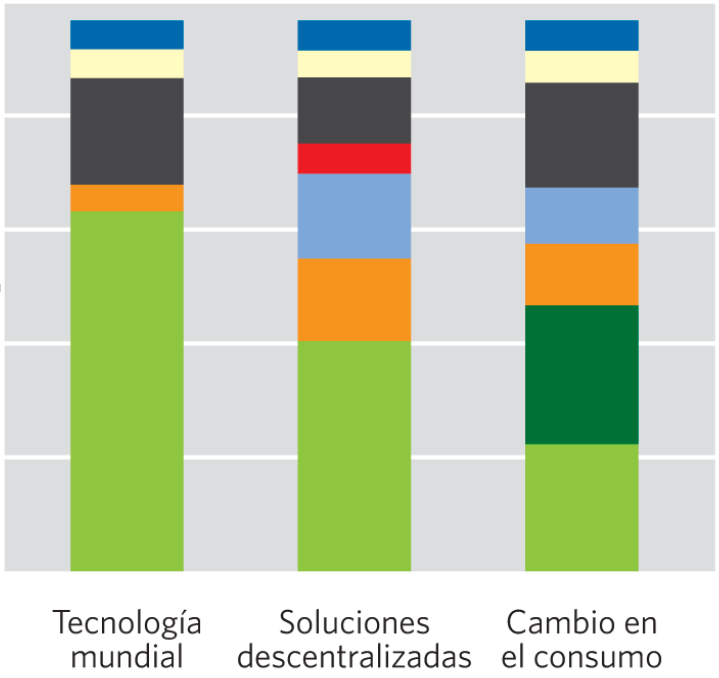
Overview of trends across 20 Aichi targets

55 indicators



It is possible to limit climate change, conserve biodiversity and meet other international objectives simultaneously





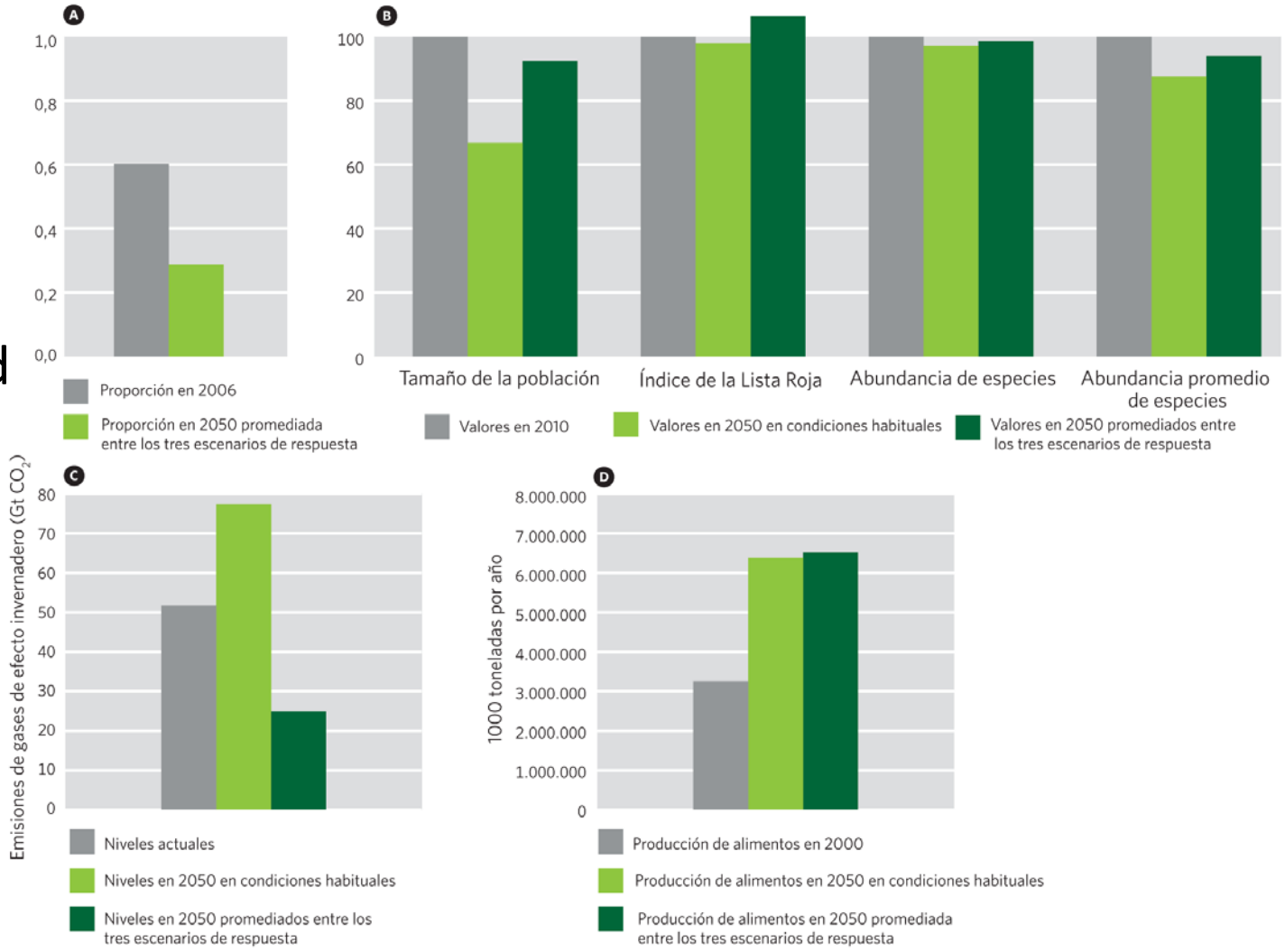
PNUMA

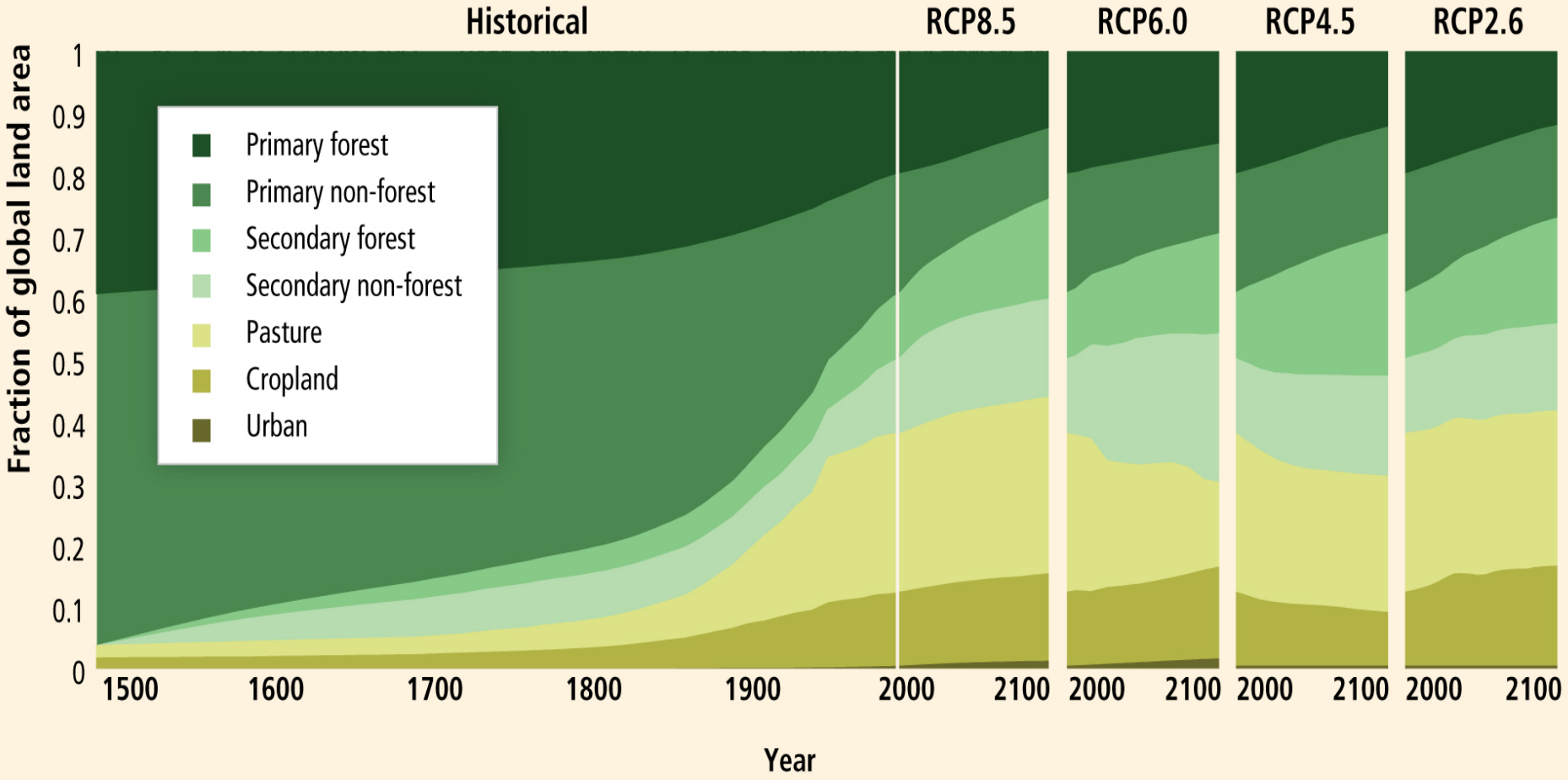
Convenio sobre la Diversidad Biológica

Decenio de Las Naciones Unidas sobre la Biodiversidad

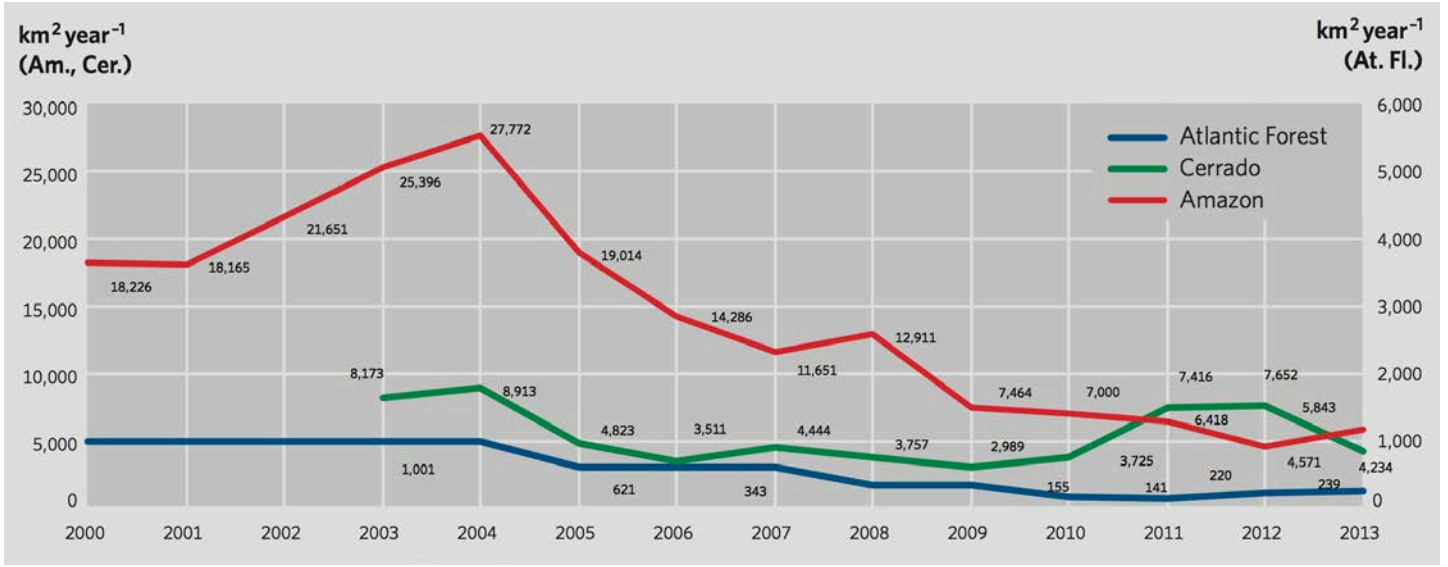
An international climate agreement will benefit biodiversity

It is possible to limit climate change, conserve biodiversity and meet other international objectives simultaneously

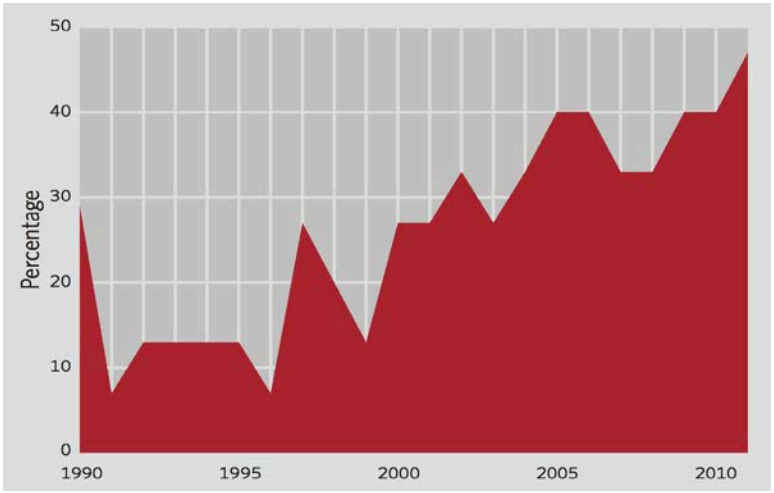



Historical
RCP8.5
RCP6.0
RCP4.5
RCP2.6
Fraction of global land area
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Primary forest
Primary non-forest
Secondary forest
Secondary non-forest
Pasture
Cropland
Urban
1500
1600
1700
1800
1900
2000
2100
2000
2100
2000
2100
2000
2100
Year

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

Key messages

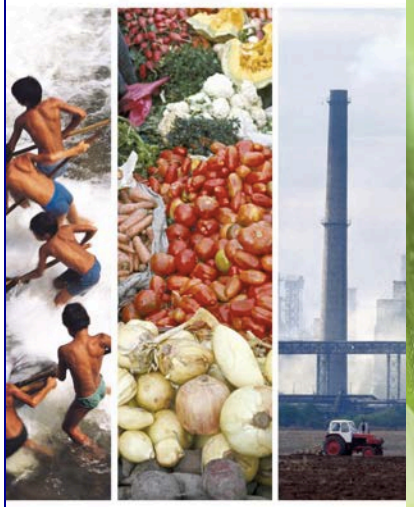
Attaining most of the Aichi Biodiversity Targets will require the implementation of a package of actions, typically including:

- 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;

CBD

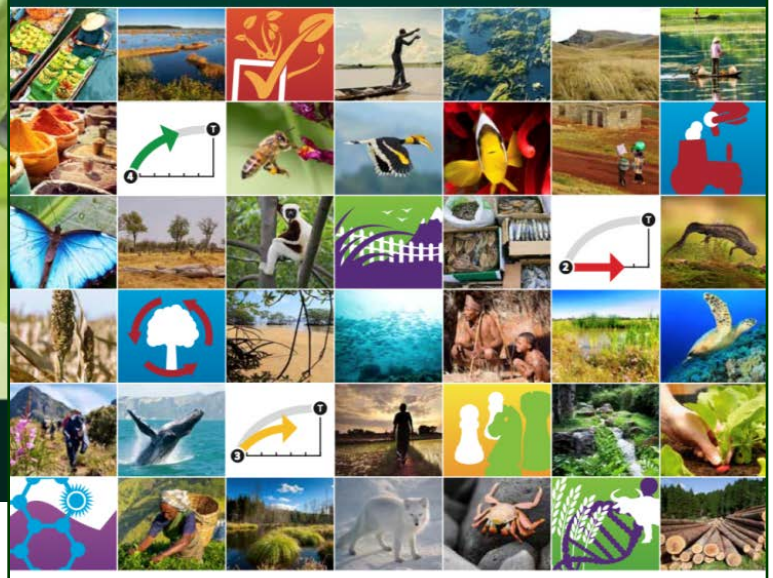
Global Biodiversity Outlook 2



Perspectiva Mundial sobre la Biodiversidad 3

Global Biodiversity Outlook 4

A mid-term assessment of progress towards the implementation of the Strategic Plan for Biodiversity 2011–2020



UNEP

Convention on Biological Diversity

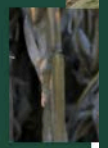
United Nations Decade on Biodiversity

Secretariat of the Convention on Biological Diversity

CBD Technical Series No. 65

65

BIOFUELS AND BIODIVERSITY



Secretariat of the Convention on Biological Diversity

CBD Technical Series No. 79

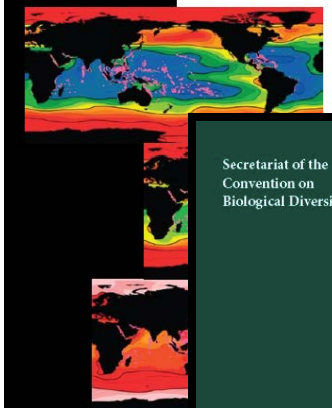
79

HOW SECTORS CAN CONTRIBUTE TO SUSTAINABLE USE AND CONSERVATION OF BIODIVERSITY

Secretariat of the Convention on Biological Diversity

CBD Technical Series No. 46

46

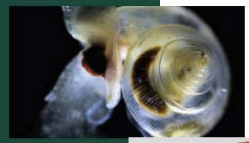


Scientific Synthesis of the Impacts of Ocean Acidification on Marine Biodiversity

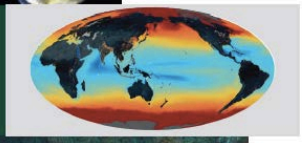
Secretariat of the Convention on Biological Diversity

CBD Technical Series No. 75

75



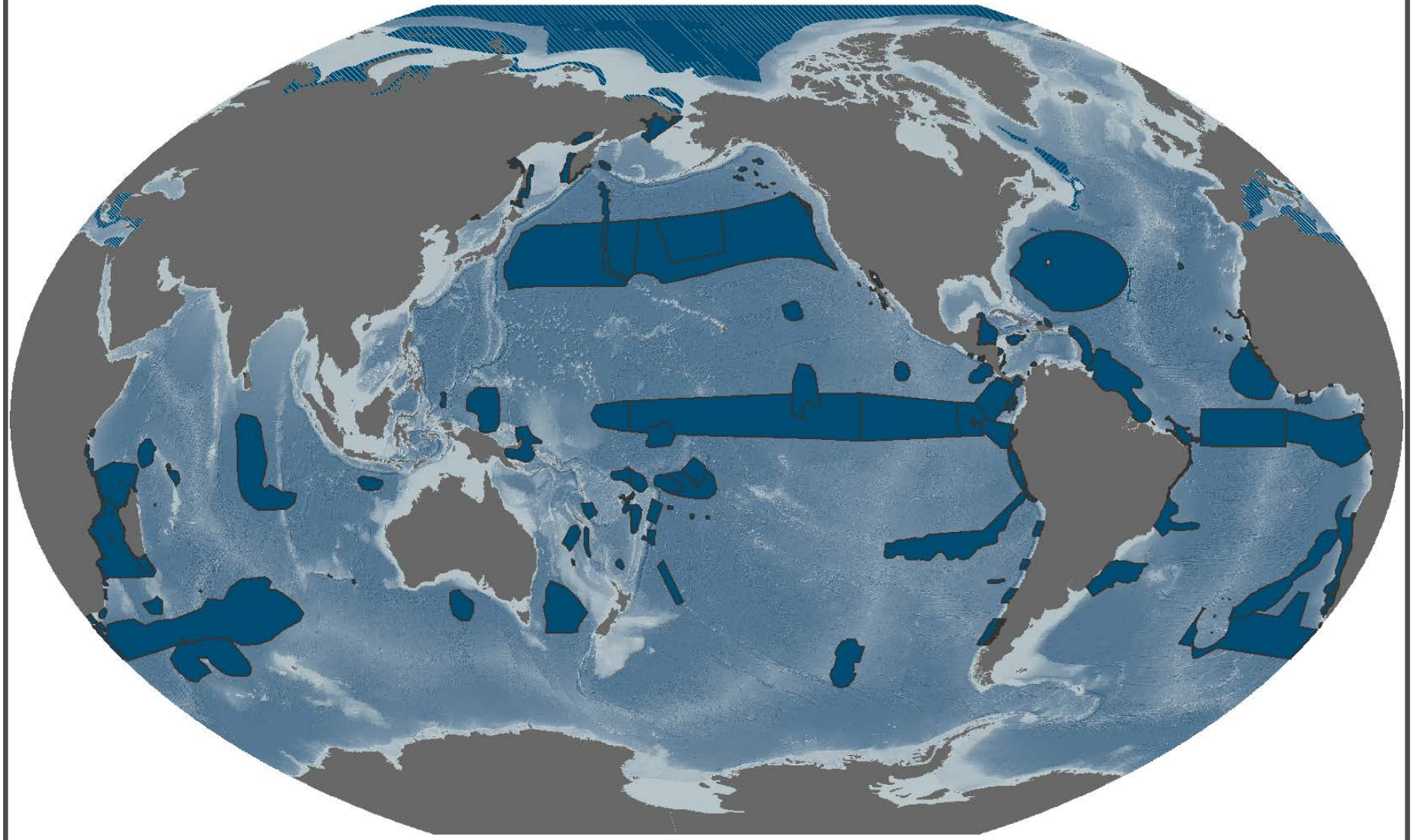
An Updated Synthesis of the Impacts of Ocean Acidification on Marine Biodiversity



UNEP

Convention on Biological Diversity

Areas meeting CBD Scientific Criteria for Ecologically or Biologically Significant Marine Areas (EBSAs, annex 1 to decision IX/20); Total 207 areas described

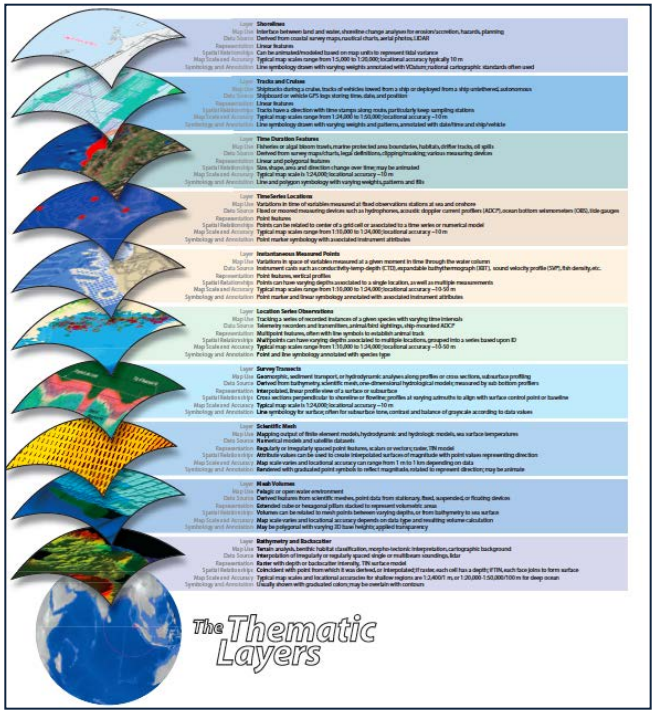


Disclaimer: This is an information ONLY for the presentation at this meeting. Some information on the map is yet to be finalized. This is NOT for QUOTE or Distribution.

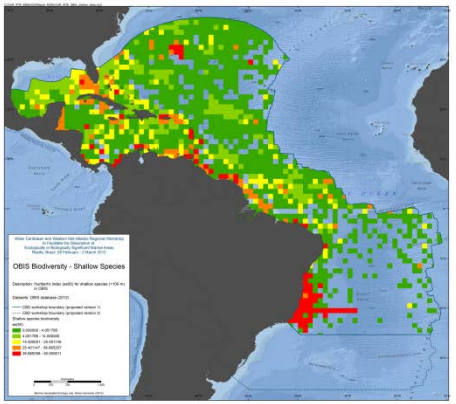
Compilation of scientific data & information

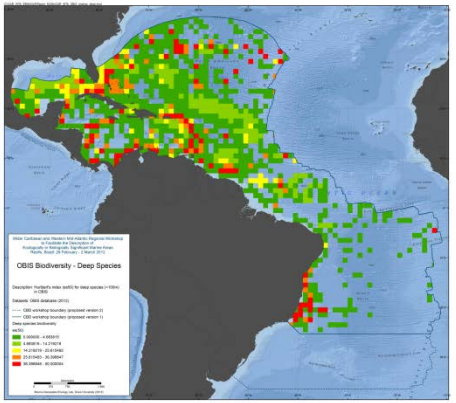
Data compilation and collection

Overlay & Analysis



Synthesis and Mapping





~40 GIS data layers of biogeography, biological and physical data

Convention on Biological Diversity

22 May 2012
INTERNATIONAL DAY FOR BIOLOGICAL DIVERSITY
Marine Biodiversity

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.

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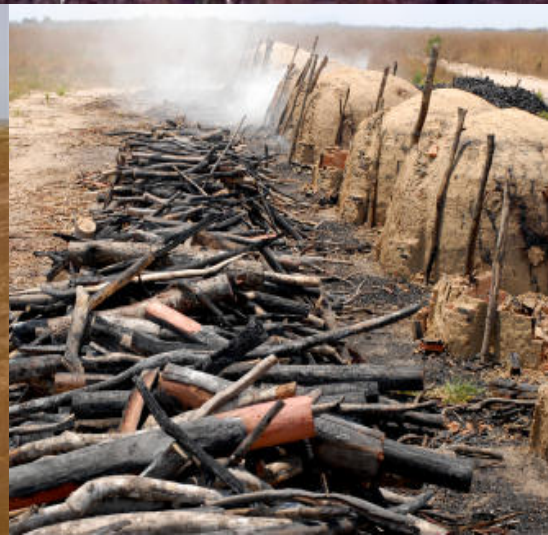
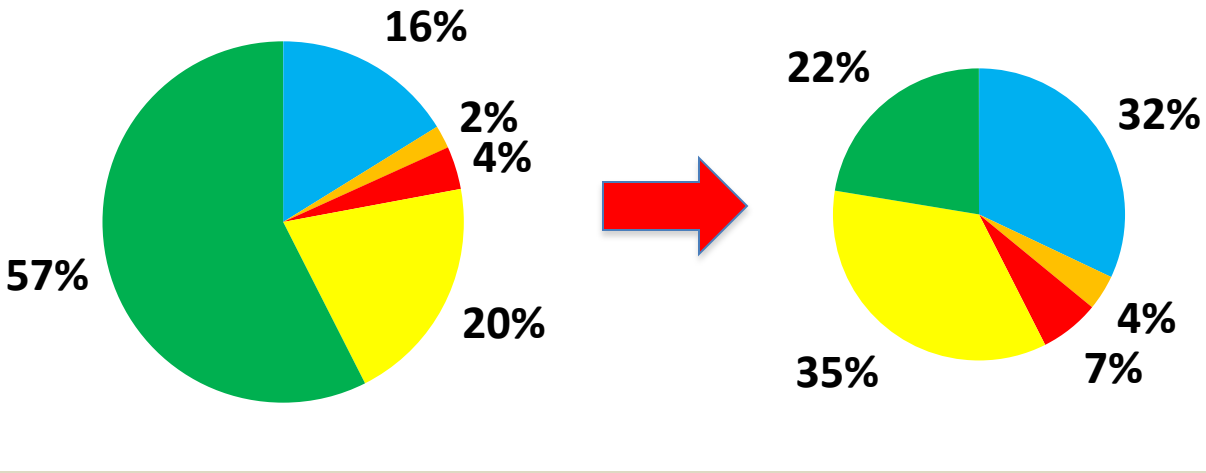
HUD: Silent Sam Speaks
TIME
Torching the Amazon
Can the rain forest be saved?

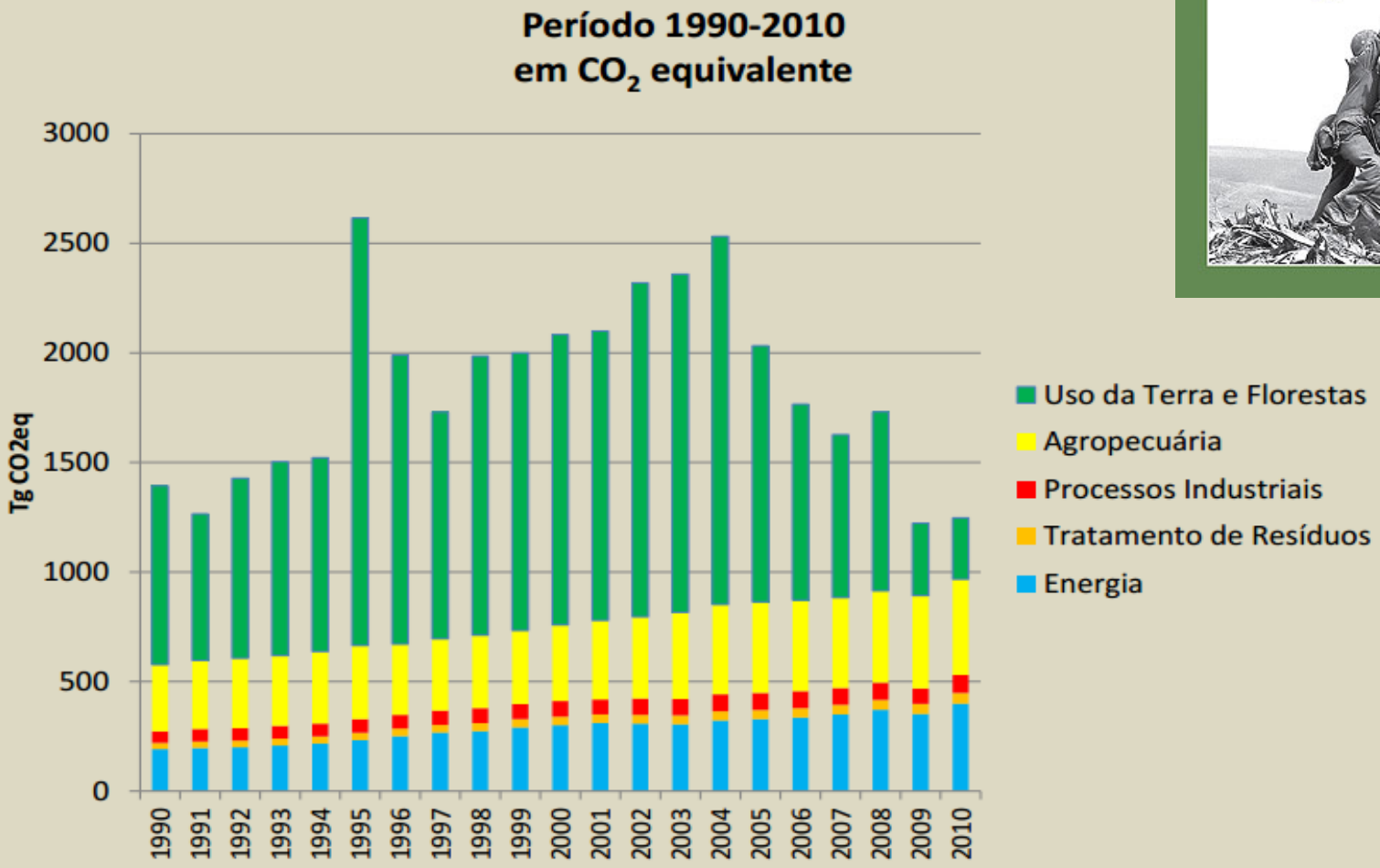

Cattle


Soybean




16%
2%
4%
57%
20%
22%
32%
4%
7%
35%


APRIL 28, 2008
Obama's Working-Class Woes
Why More Women Are Choosing C-Sections
Can Richard Branson Save the Airline Industry?
TIME
SPECIAL ENVIRONMENT ISSUE
How to Win The War On Global Warming
BY BRYAN WALSH


Período 1990-2010
em CO_2 equivalente
Tg CO2eq
3000
2500
2000
1500
1000
500
0
1990
1991
1992
1993
1994
1995
1996
1997
1998
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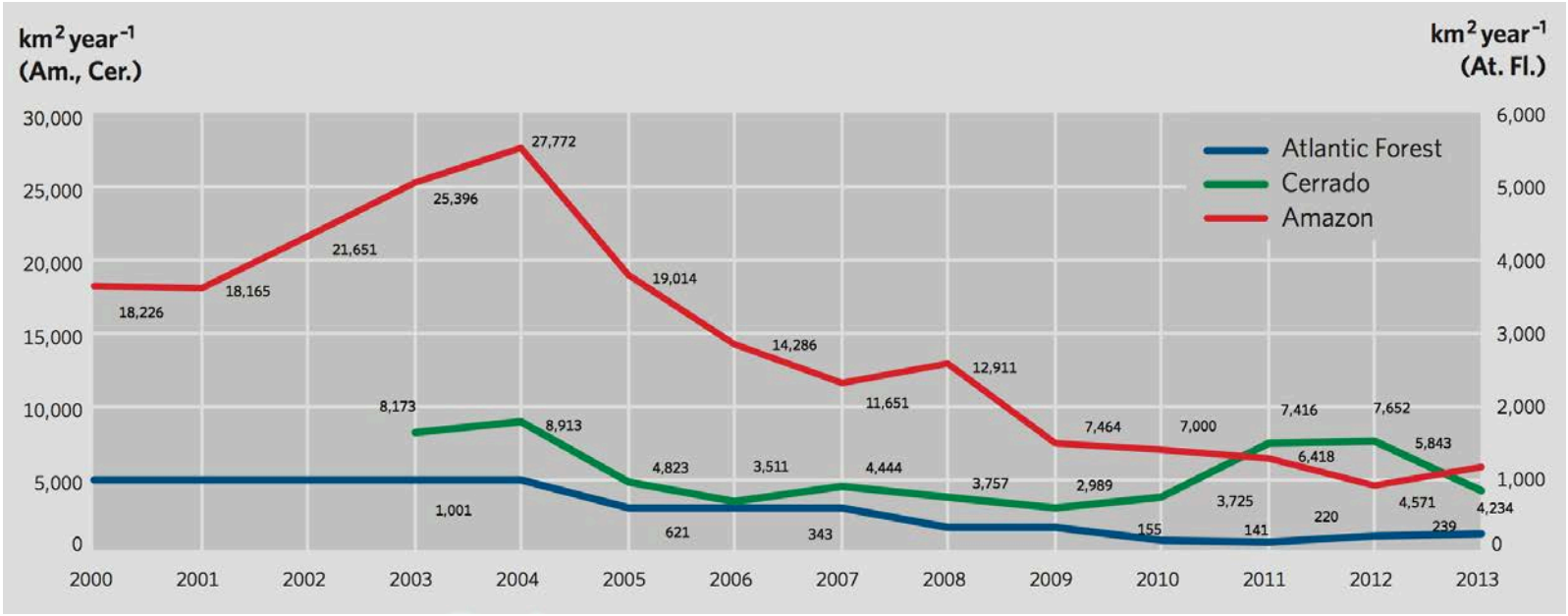
2004
2005
2006
2007
2008
2009
2010
Uso da Terra e Florestas
Agropecuária
Processos Industriais
Tratamento de Resíduos
Energia

Monitoring and Control
Integrated actions

Law Enforcement

Remote Sensing Centre

Reducing deforestation

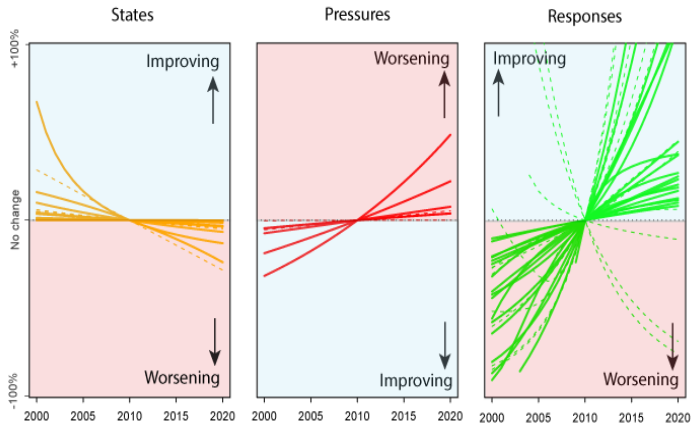


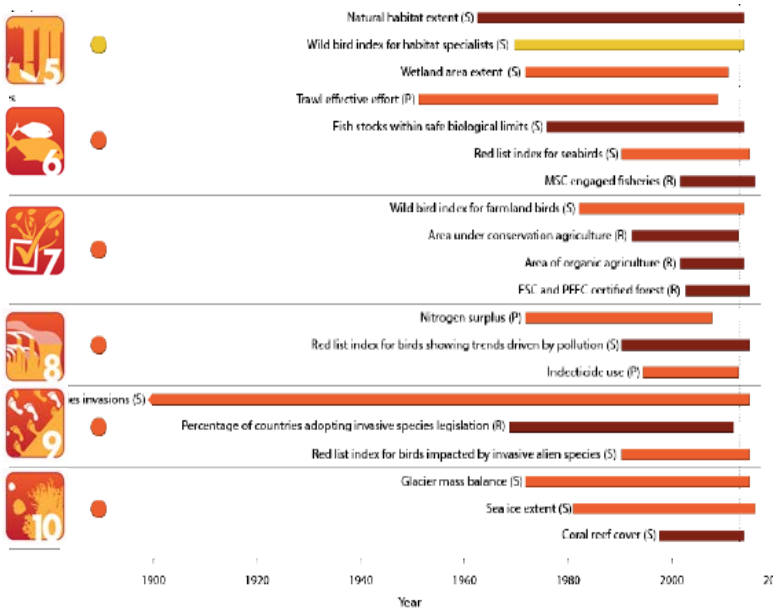
Reducing deforestation in Brazil has relied on a multi-faceted approach including:

- "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±22 $GtCO_2e$!

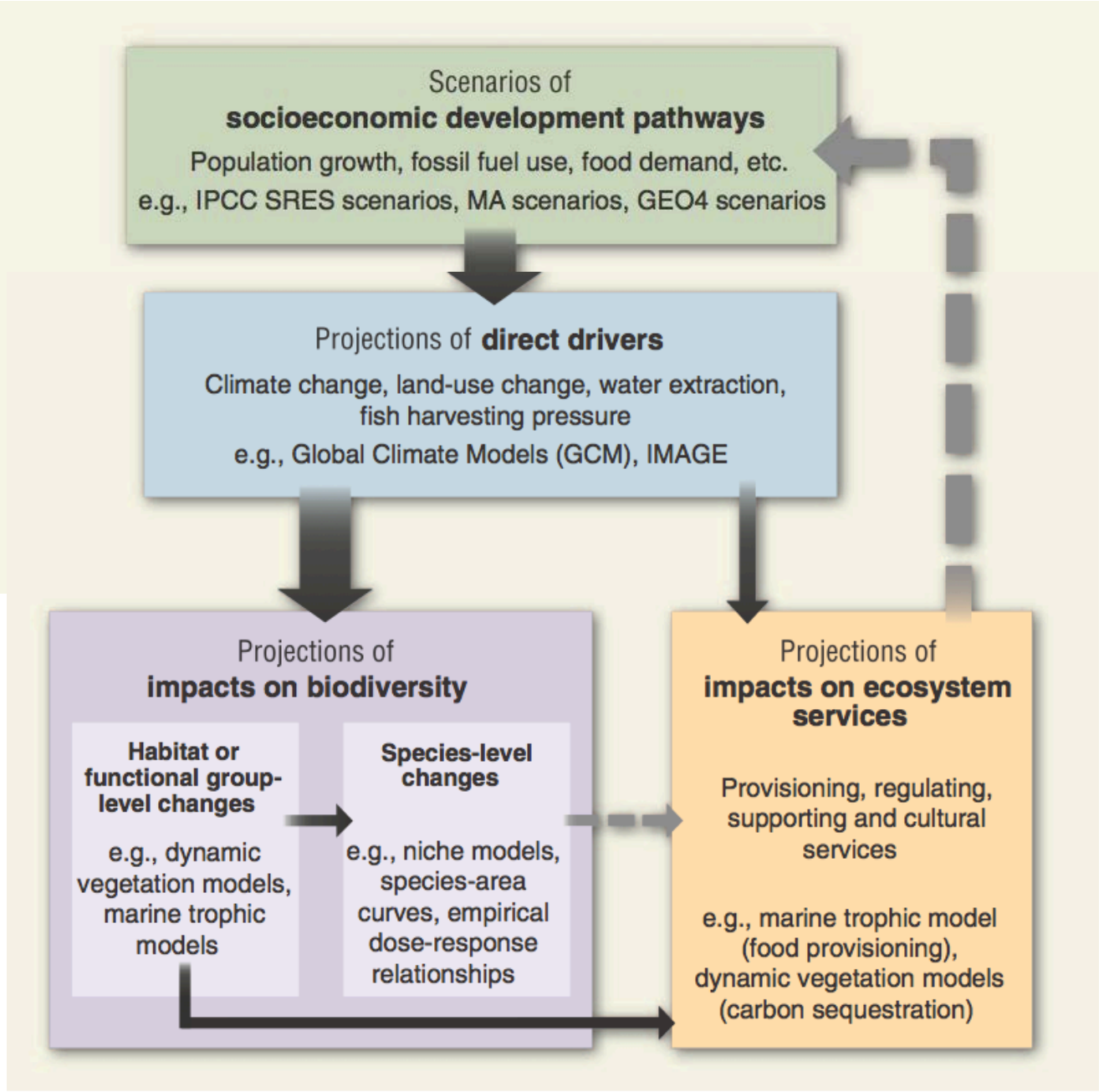
GBO4 (2014), Lapola et al. (2014), Soares-Filho et al. 2014

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

Pereira, Leadley et al. 2010. Science.

GEO-BON / CBD-SBSTTA Workshop on Enhancing Biodiversity Data and Observation Systems for implementation of the Strategic Plan for Biodiversity 2011-2020

Montreal, March 13th, 2013

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Convention on Biological Diversity

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;

SBSTTA 17: Data, monitoring, observation systems and indicators

- 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.

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

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 !

Secretariat of the
Convention on Biological Diversity
World Trade Centre
413 St. Jacques street, Suite 800
Montreal, Quebec, Canada H2Y 1N9
Tel. 1 (514) 288 2220
secretariat@cbd.int
www.cbd.int

COP12 / MOP7 / MOP1
PYEONGCHANG KOREA 2014

Convention on
Biological Diversity

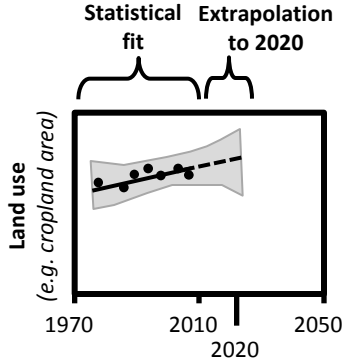
United Nations Decade on Biodiversity

Extrapolation of current trends

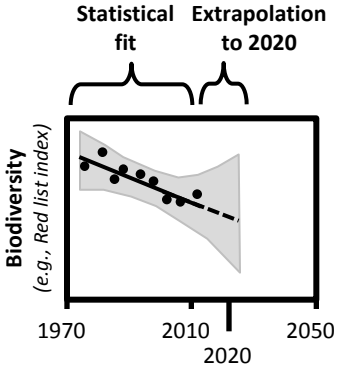
(e.g., this report)

Extrapolate from statistical fit to recent trends

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



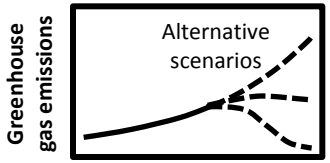
…and independently for impacts



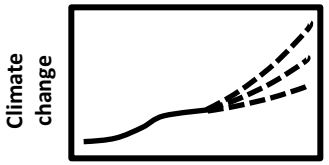
Plausible socio-economic scenarios

e.g., IPCC SRES, MA

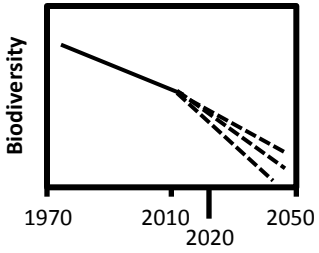
Scientists quantify several plausible socio-economic development pathways (e.g., greenhouse gas emissions)



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



That input to models of impacts on biodiversity and ecosystem services

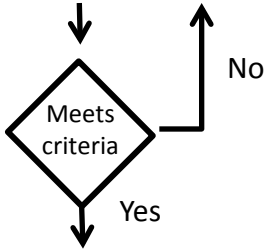


Backcasting or Desirable endpoints

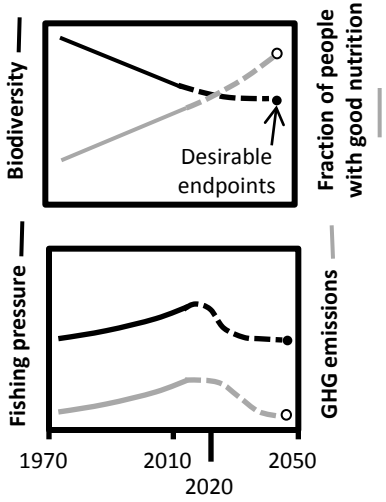
e.g., Rio+20 scenarios, PBL 2012

Define desirable multi-criteria endpoints for the future

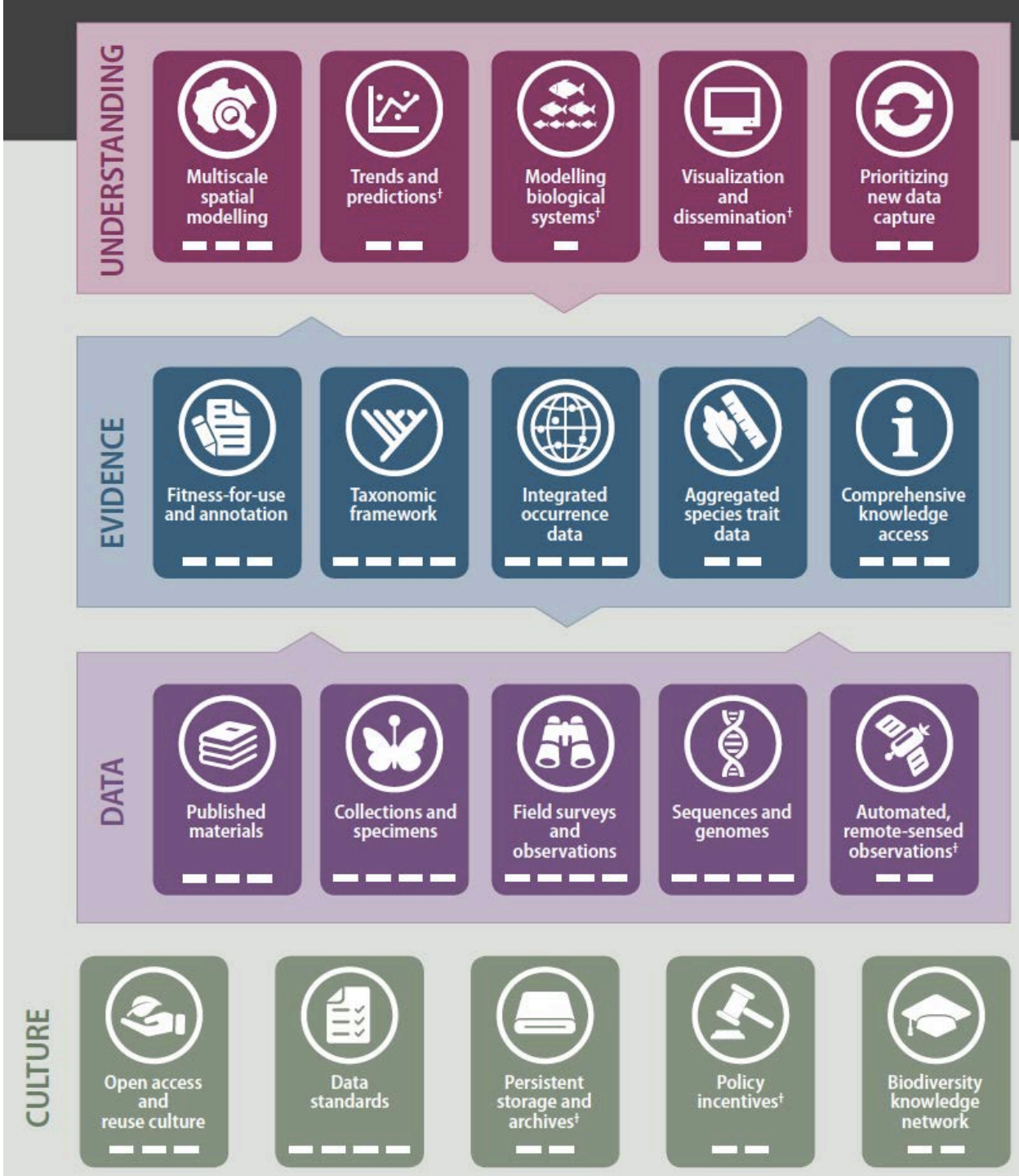
Alternative socio-economic scenarios + models of direct drivers + models of impacts

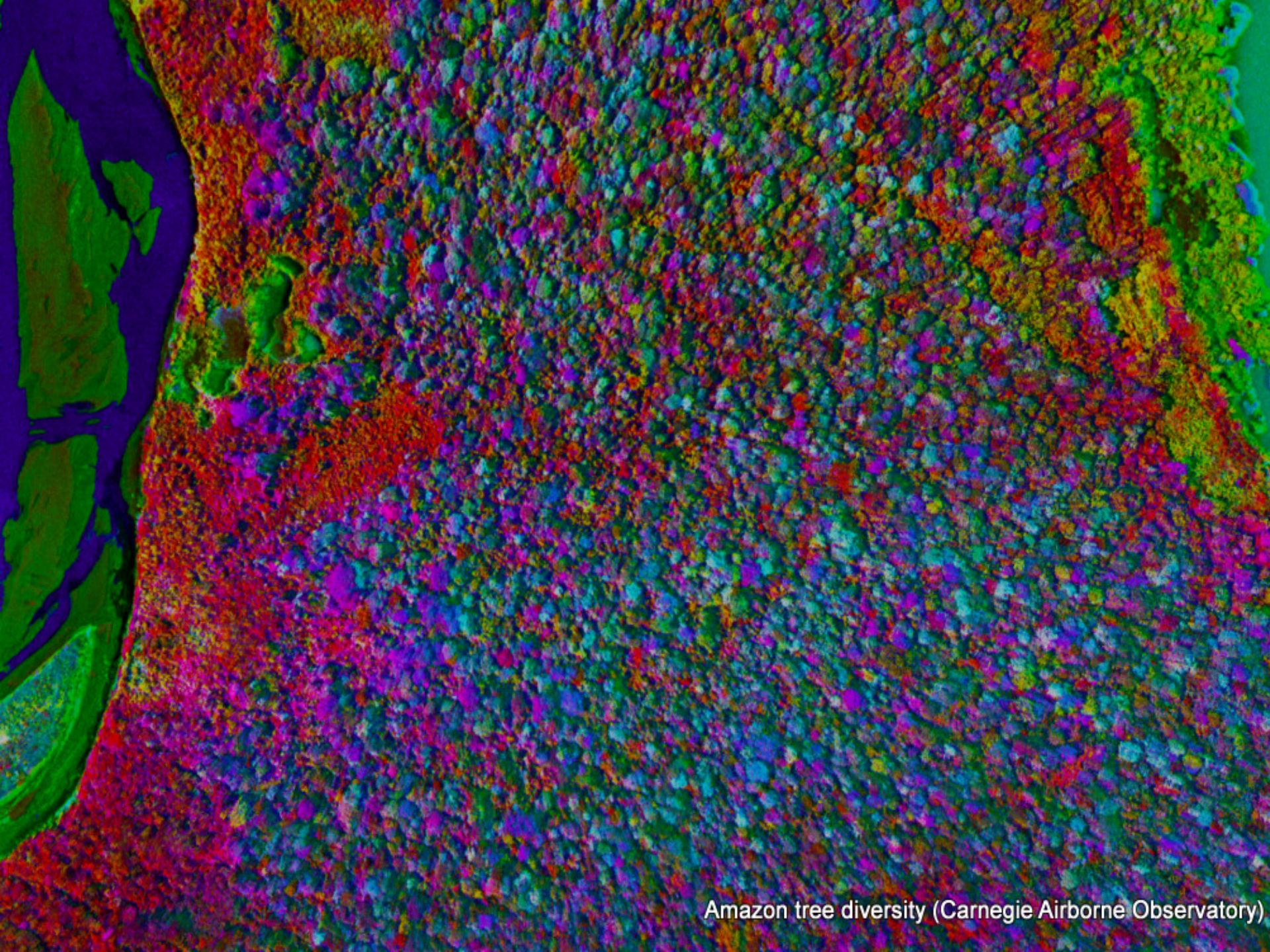


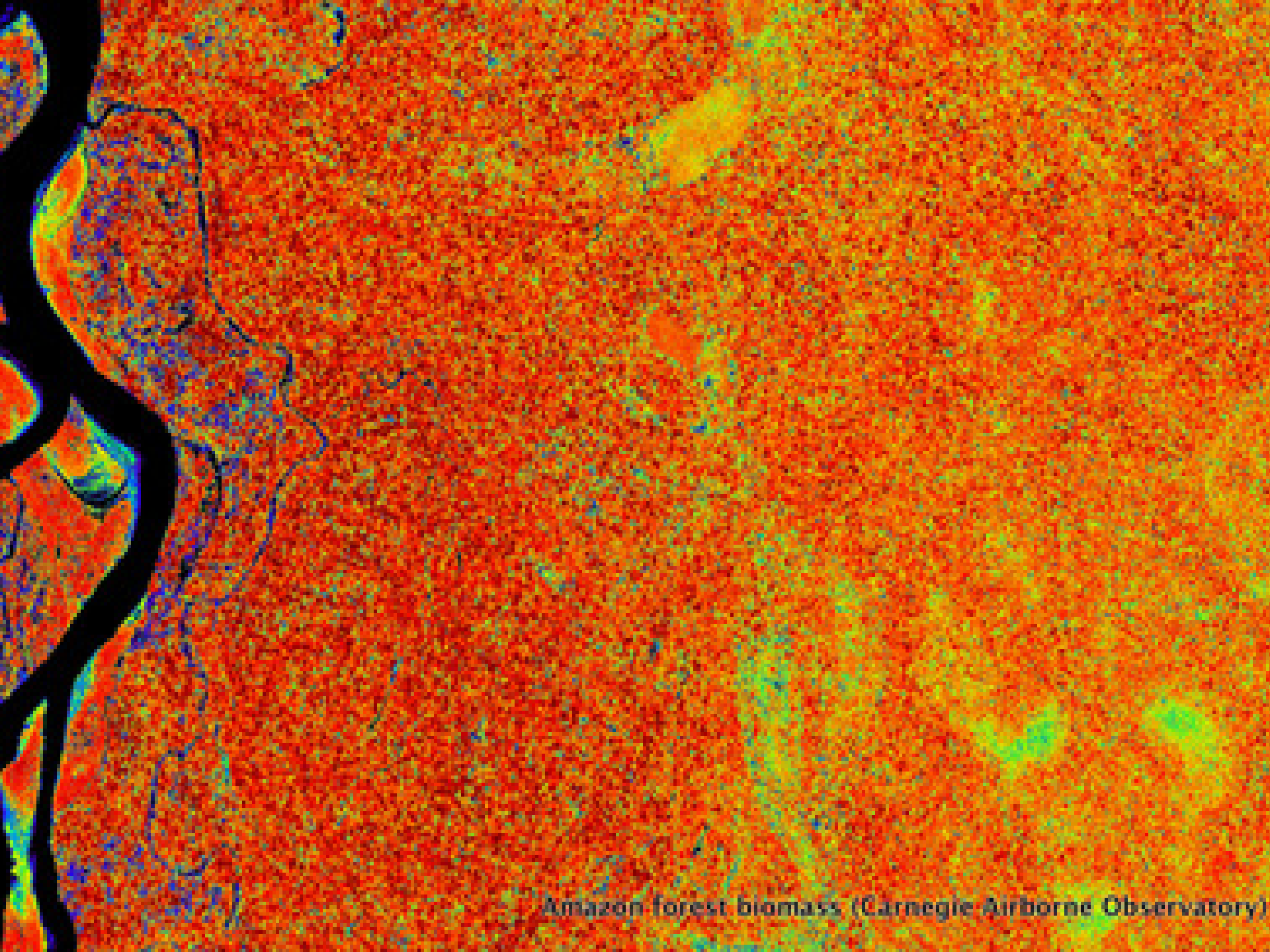
Plausible scenario that meets criteria

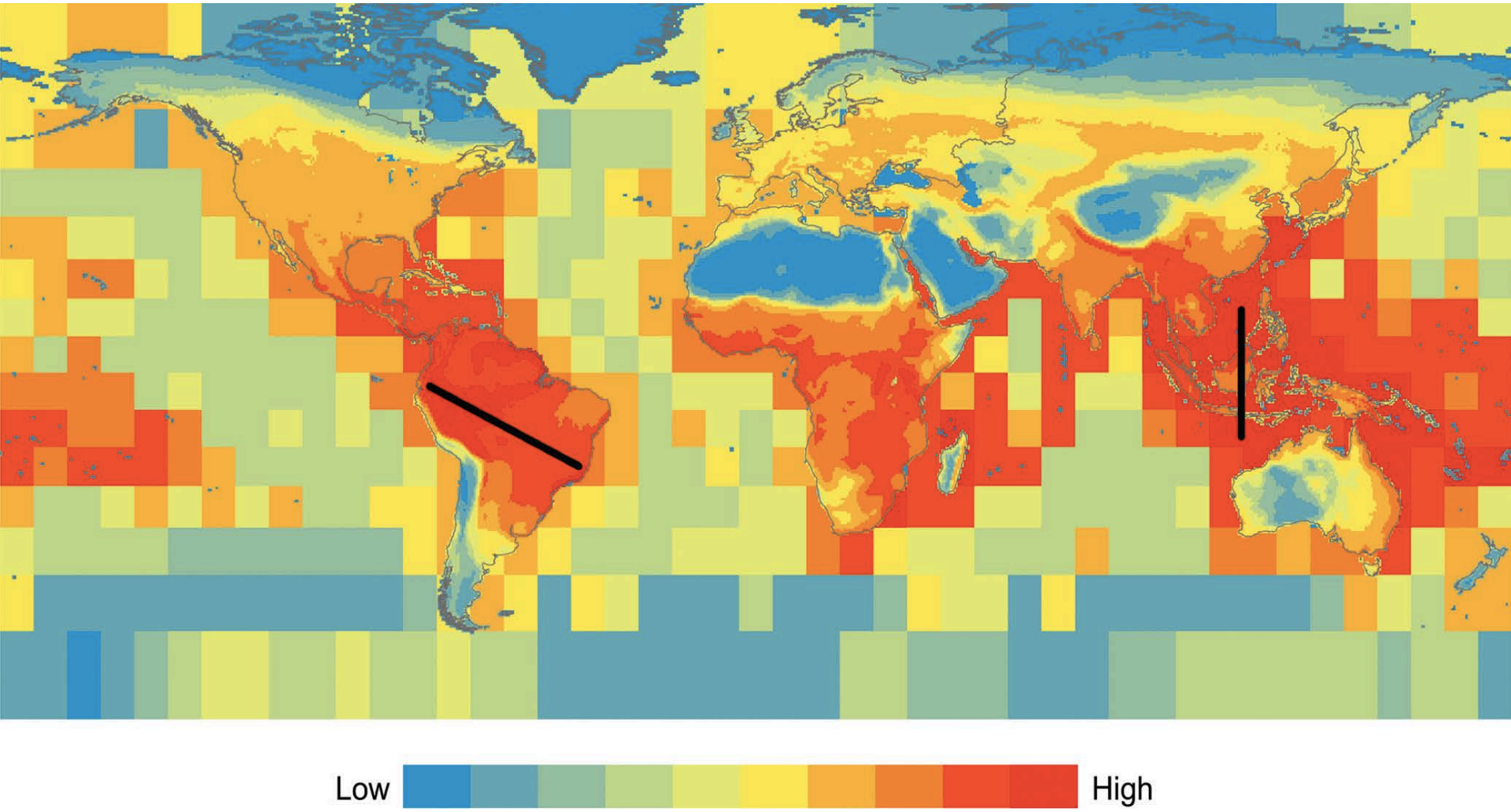


GLOBAL BIODIVERSITY INFORMATION FACILITY




Amazon tree diversity (Carnegie Airborne Observatory)


Amazon forest biomass (Carnegie Airborne Observatory)



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

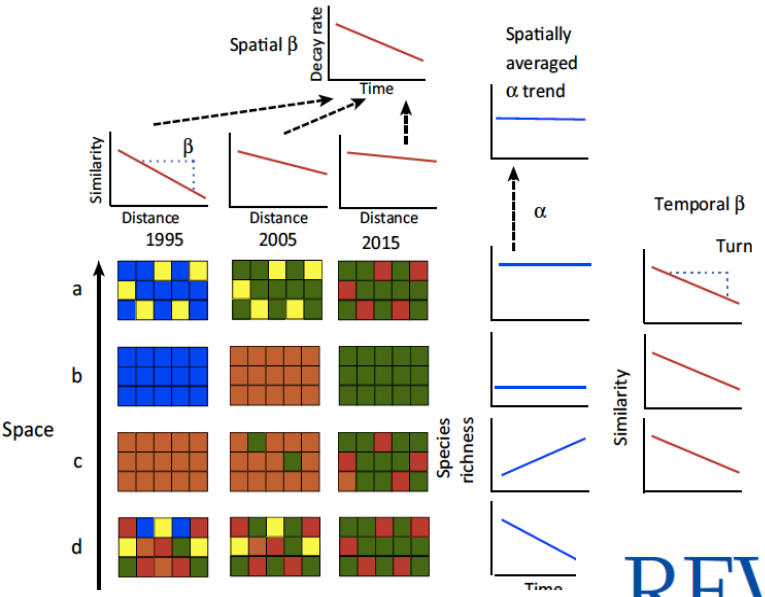
Review

Cell

Fifteen forms of biodiversity trend i the Anthropocene

Brian J. McGill[1], Maria Dornelas[2], Nicholas J. Gotelli[3], and Anne E. Magurra

[1] University of Maine, Orono, ME, USA
[2] University of St Andrews, St Andrews, UK
[3] University of Vermont, Burlington, VT, USA



Assemblage Tim Biodiversity Cha Systematic Loss

Maria Dornelas,[1]* Nicholas J. Gotelli,[2] B
Caya Sievers,[1] Anne E. Magurran[1]

The extent to which biodiversity change in loc
loss is poorly understood. We analyzed 100 ti
within assemblages is changing through time.
as change in local diversity, and temporal β c
Contrary to our expectations, we did not dete
composition changed systematically through t
Heterogeneous rates of environmental chang
and biotic homogenization may explain the d
Monitoring and understanding change in spe

REVIEW

doi:10.1038/nature11148

Global Biodiversity: Recent Declines

Stuart H. M. Butchart,[1,2]* Matt Walpole,[1] Ben Coll
Jörn P. W. Scharlemann,[1] Rosamunde E. A. Almon
Bastian Bomhard,[1] Claire Brown,[1] John Bruno.[5] K
Janice Chanson,[8] Anna M. C
Matt Foster,[12] Alessandro G
Richard D. Gregory,[16] Marc
Fiona Leverington,[17] Jonath
Anahit Minasyan,[22] Monica
Suhel Quader,[25] Carmen Re
Damon Stanwell-Smith,[1] Sin
Tristan D. Tyrrell,[1] Jean-Chri

Biodiversity loss and its impact on humanity

Bradley J. Cardinale[1], J. Emmett Duffy[2], Andrew Gonzalez[3], David U. Hooper[4], Charles Perrings[5], Patrick Venail[1], Anita Narwani[1],

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

Mark Vellend[a,1], Lander Baeten[b,c], Isla H. Myers-Smith[a,d], Sarah C. Elmendorf[e], Robin Beauséjour[a], Carissa D. Brown[a], Pieter De Frenne[b], Kris Verheyen[b], and Sonja Wipf[f]

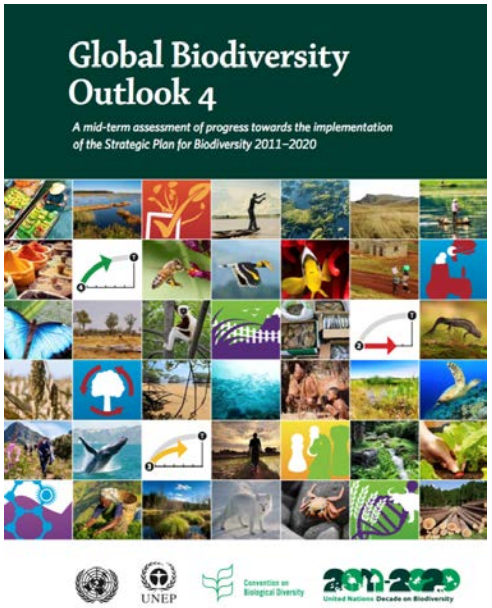
Tipping Points

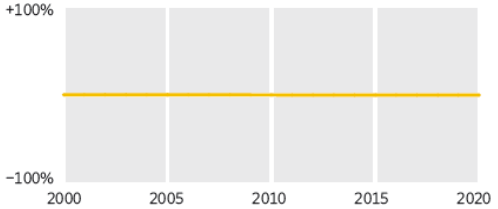
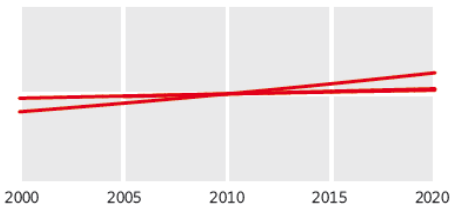
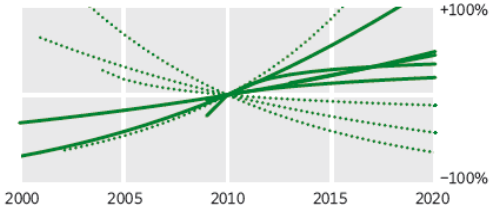
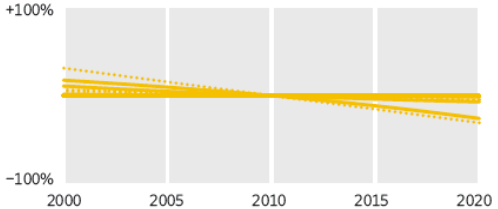
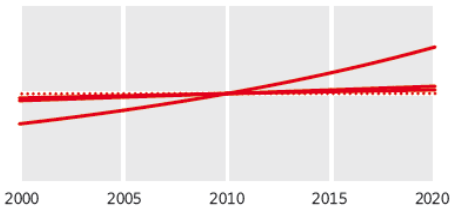
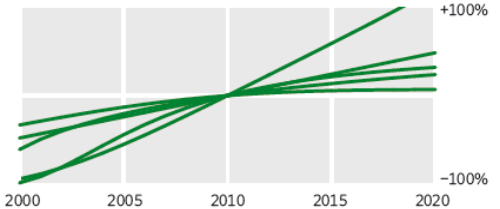
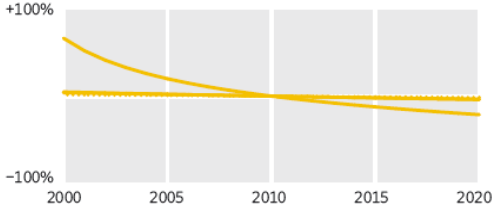
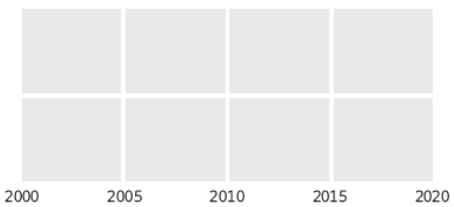
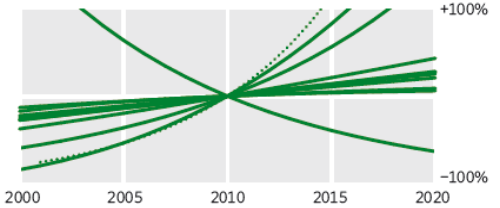
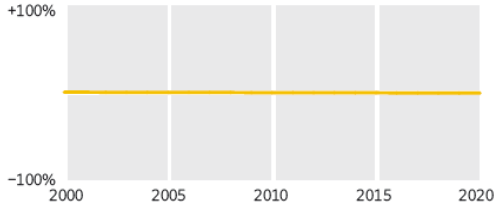
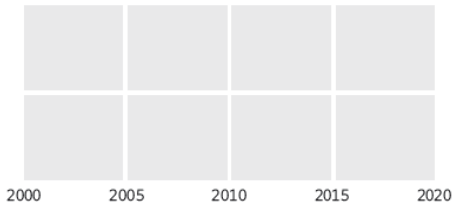
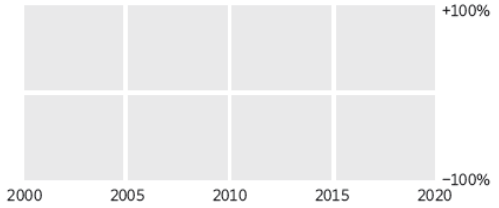
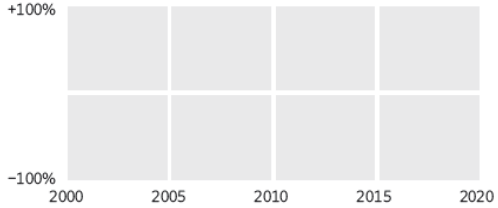
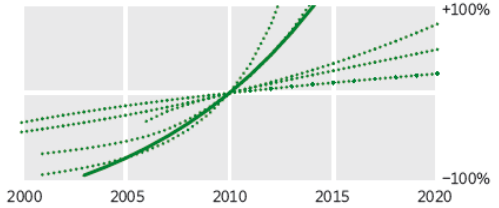
Deterioro del amazonas

Eutrofización

Colapso de arrecifes de corales


ipcc
INTERGOVERNMENTAL PANEL ON climate change
CLIMATE CHANGE 2014
Impacts, Adaptation, and Vulnerability
Summary for Policymakers
WG II
WORKING GROUP II CONTRIBUTION TO THE
FIFTH ASSESSMENT REPORT OF THE
INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE
WMO
UNEP

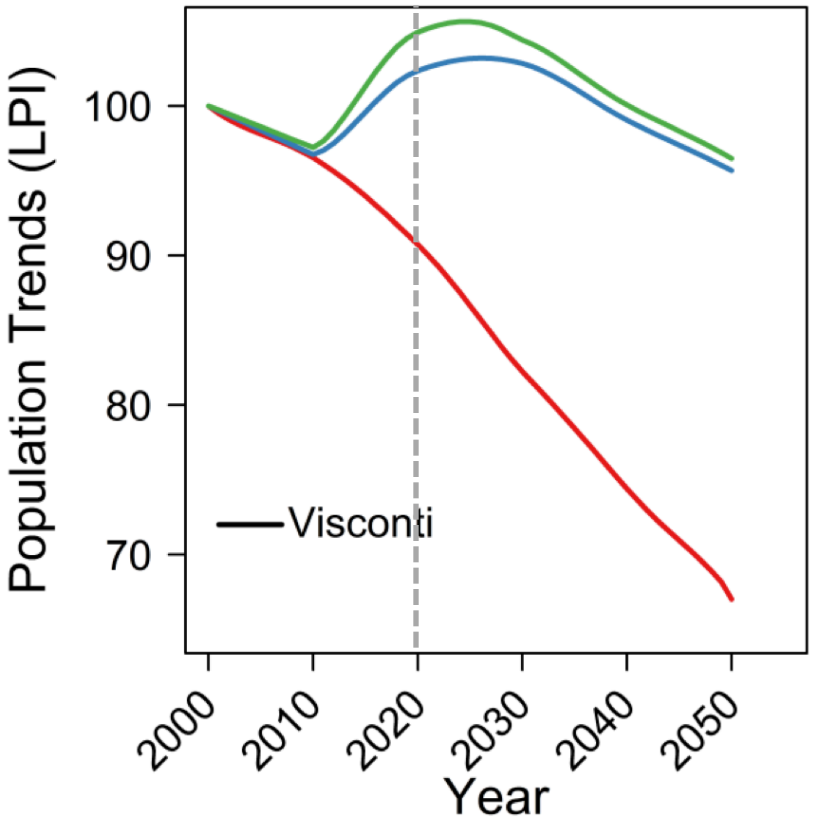

Global Biodiversity Outlook 4
A mid-term assessment of progress towards the implementation of the Strategic Plan for Biodiversity 2011–2020
UNEP
Convention on Biological Diversity
2011-2020
United Nations Decade on Biodiversity

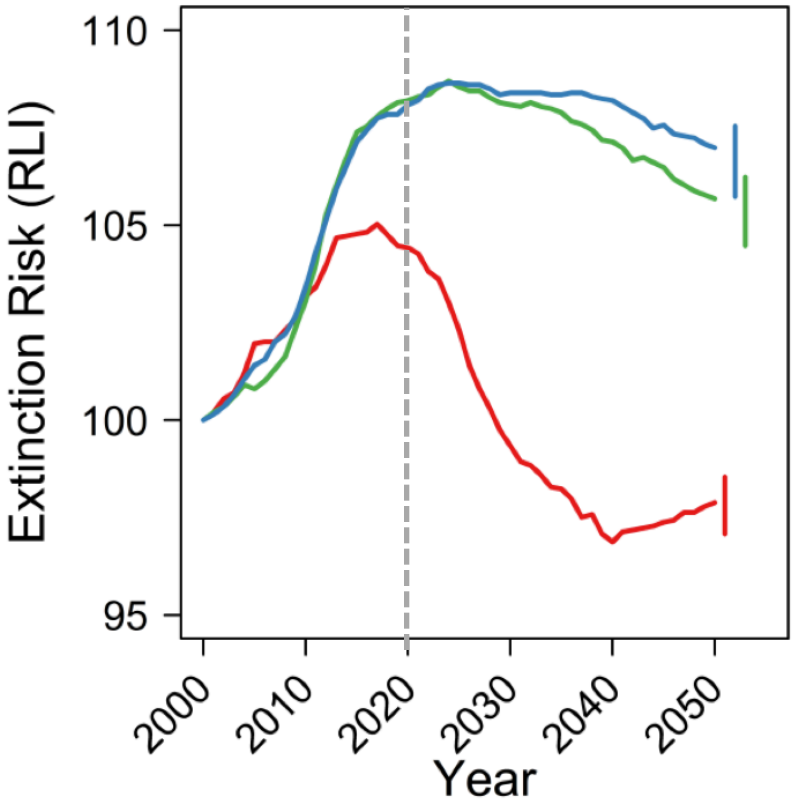
	Pressures	State	Responses
Strategic Goal A			
Strategic Goal B			
Strategic Goal C			
Strategic Goal D			
Strategic Goal E			

Living Planet Index & Red List Index

Scenario-based projections to 2020 and out to 2050

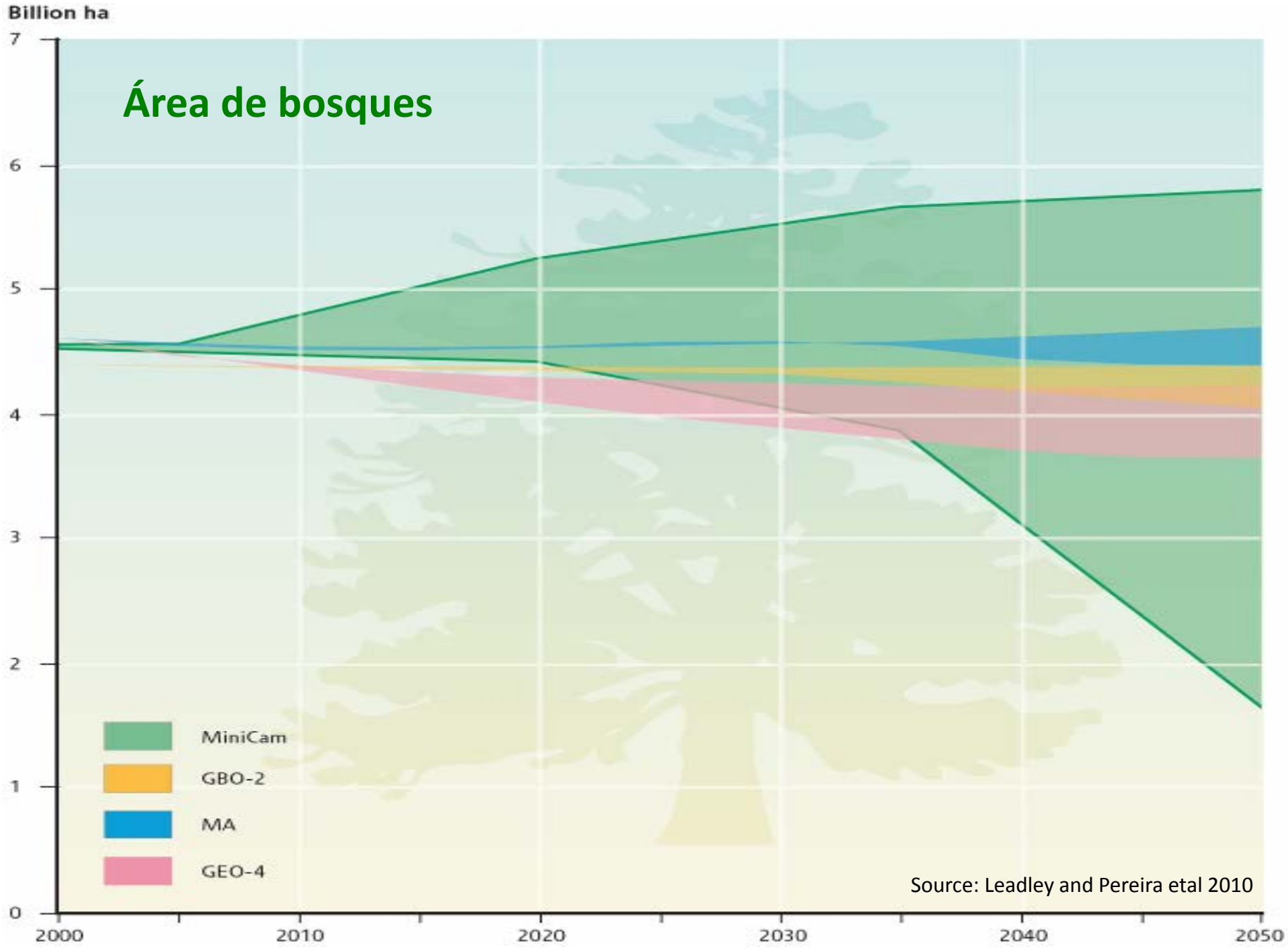
LPI and RLI for mammals and ungulates





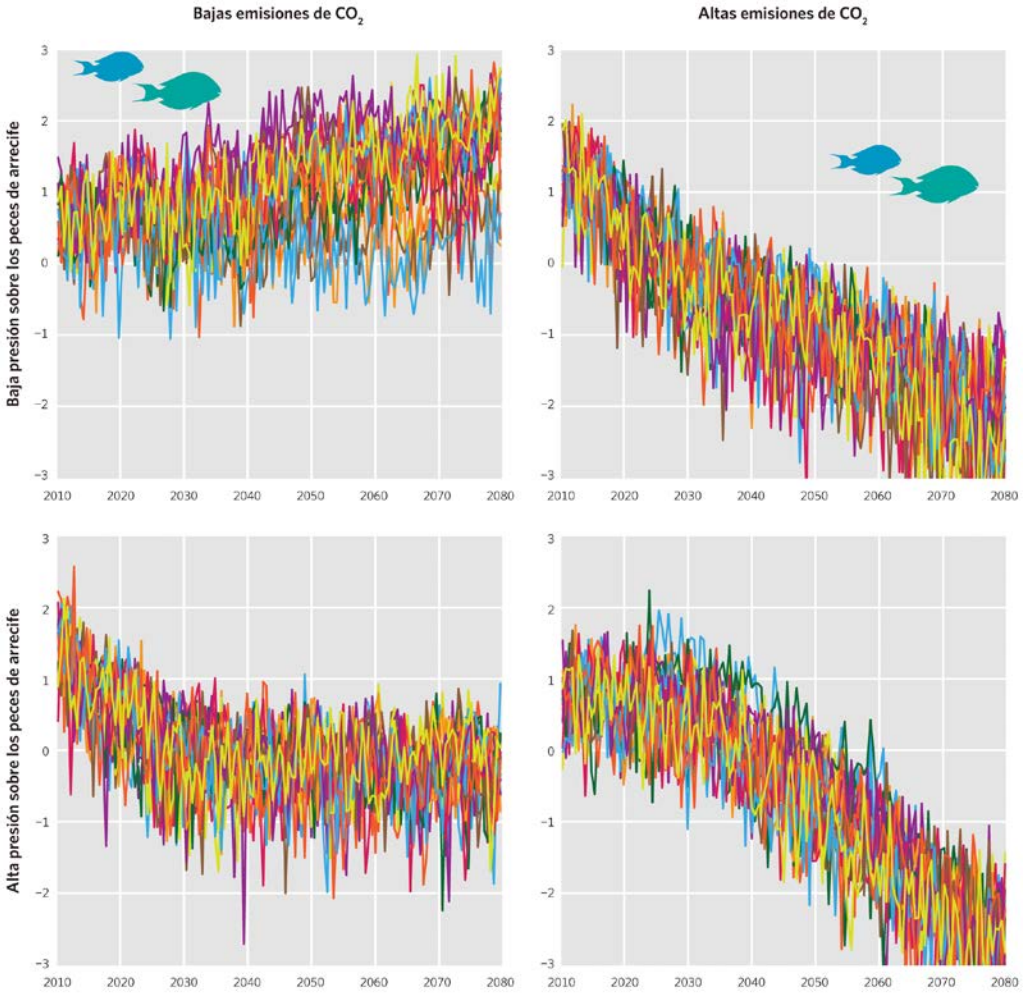
Business-as-usual (=trend)
Consumption change
Global technology pathway

Alternative desirable endpoint socio-economic scenarios


Billion ha
Área de bosques
7
6
5
4
3
2
1
0
2000
2010
2020
2030
2040
2050
MiniCam
GBO-2
MA
GEO-4
Source: Leadley and Pereira etal 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.

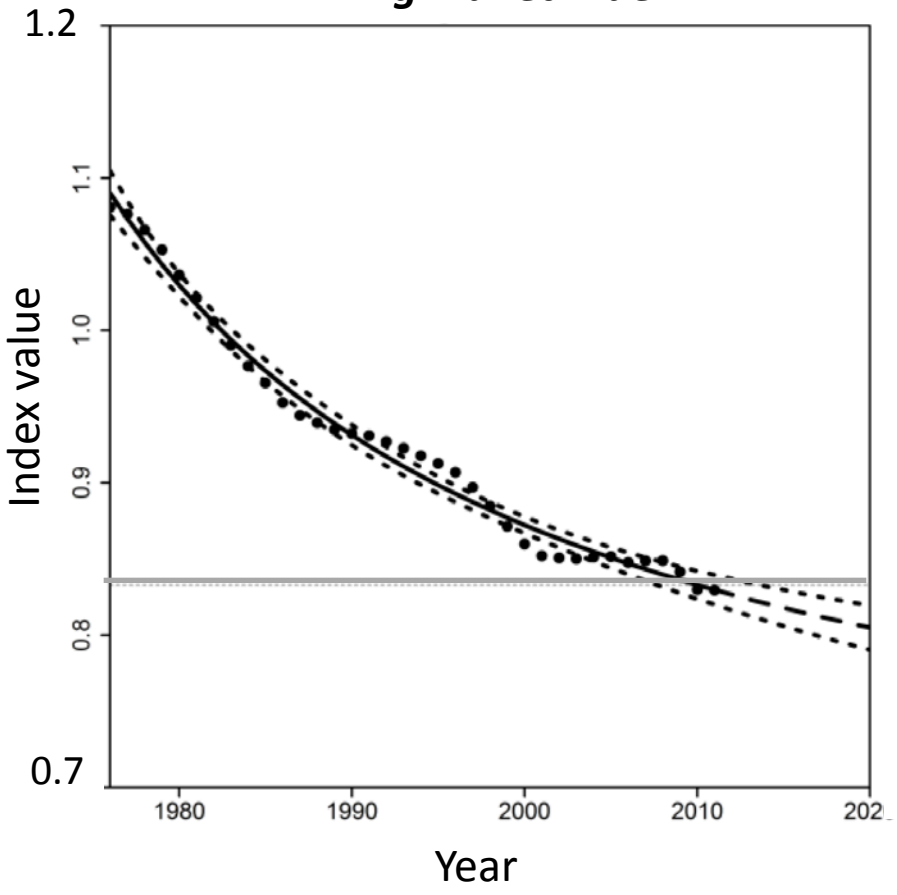
❖ **Implications of** the post-2015 United Nations development agenda and the **SDGs** and of other relevant international processes for the future work of the Convention.

❖ Determination of funding needs to inform the GEF-7 replenishment for the 2018-2022 cycle.

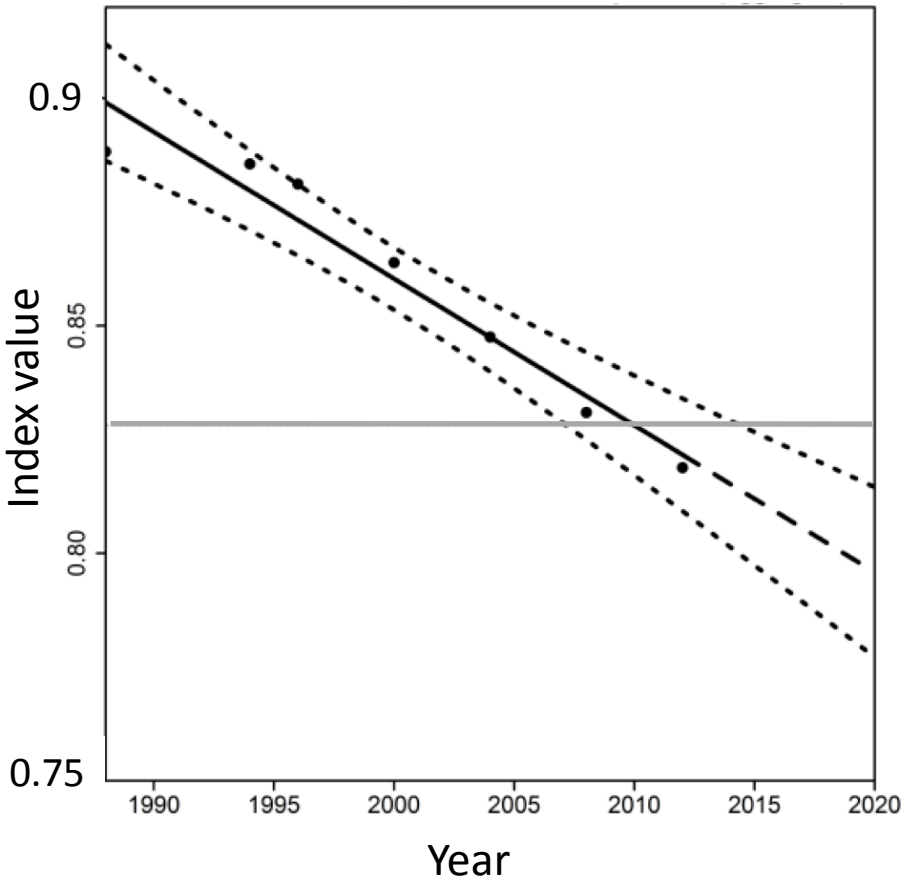
Living Planet Index & Red List Index

Trends, status and statistical extrapolation to 2020

Living Planet Index



Red List Index
(birds, mammals & amphibians)

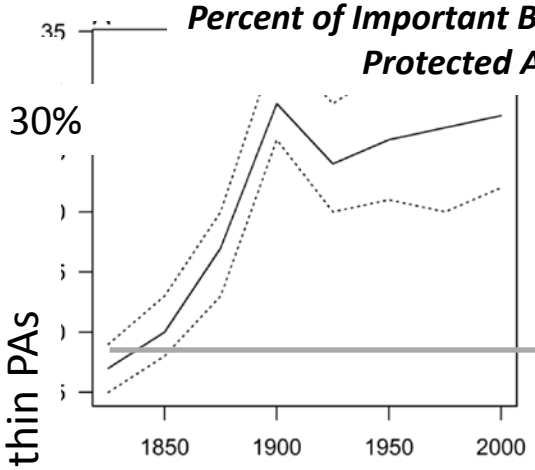


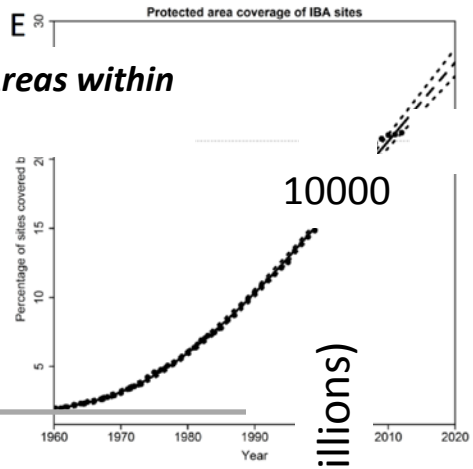
Assumption that underlying socio-economic and direct drivers follow recent trends

Extinctions
Status & trends

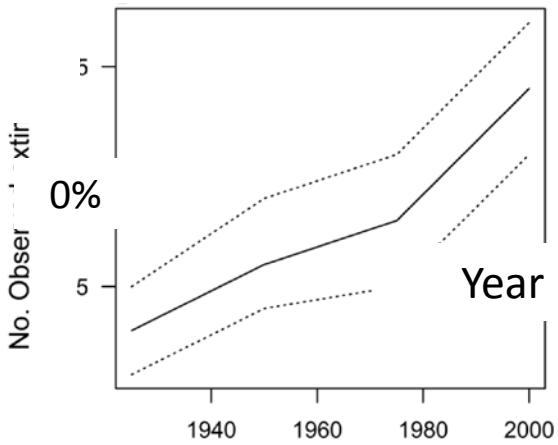
Extinctions of Birds & Mammals
(extinctions per 25 year period)

Percent of Important Bird Areas within Protected Areas



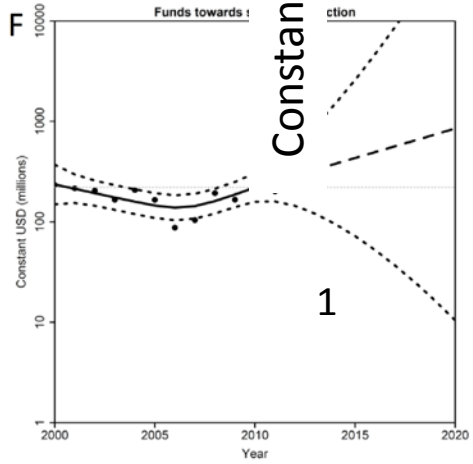


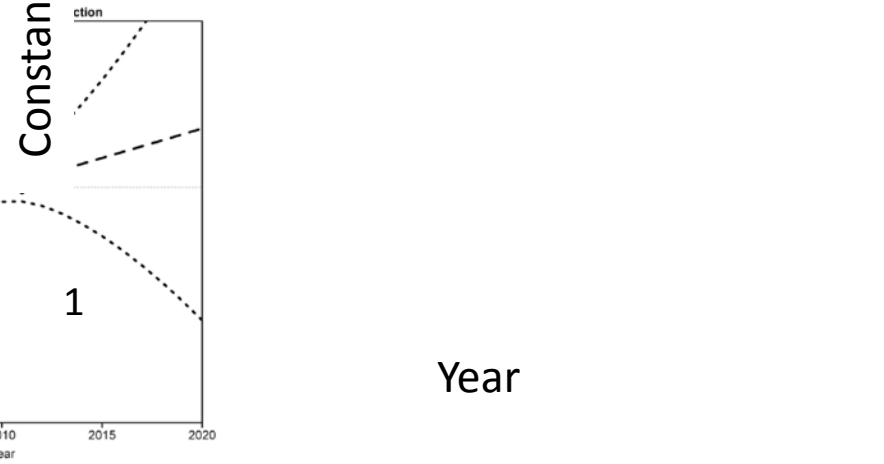
tinctions of Freshwater Fish
(tinctions per 25 year period)



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

Funds for species protection

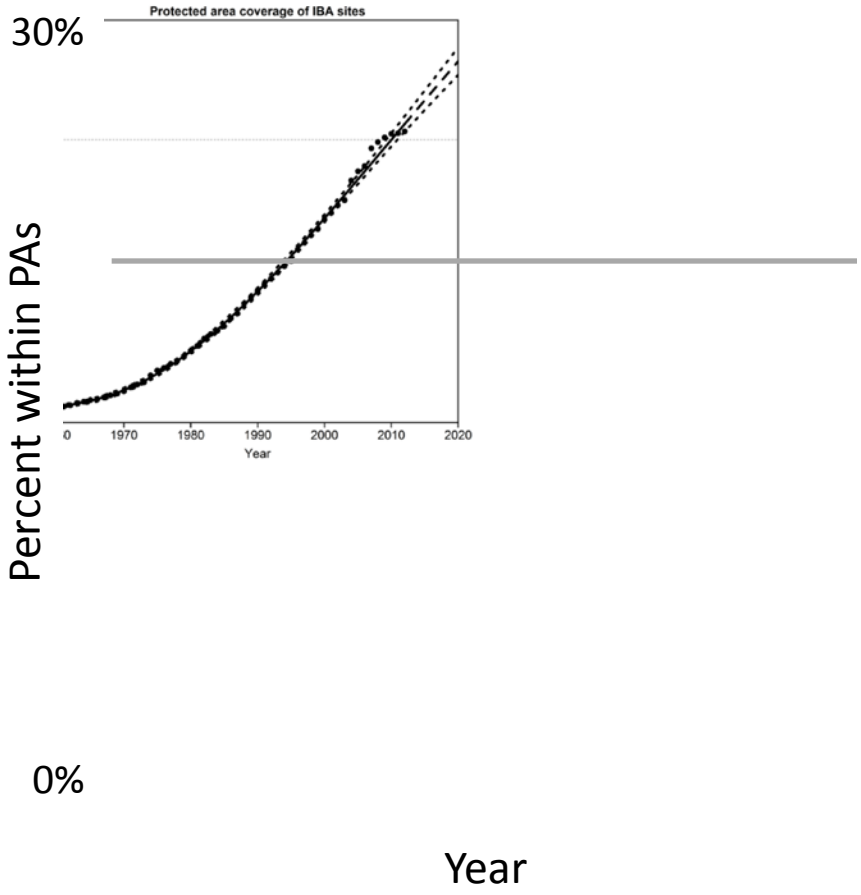




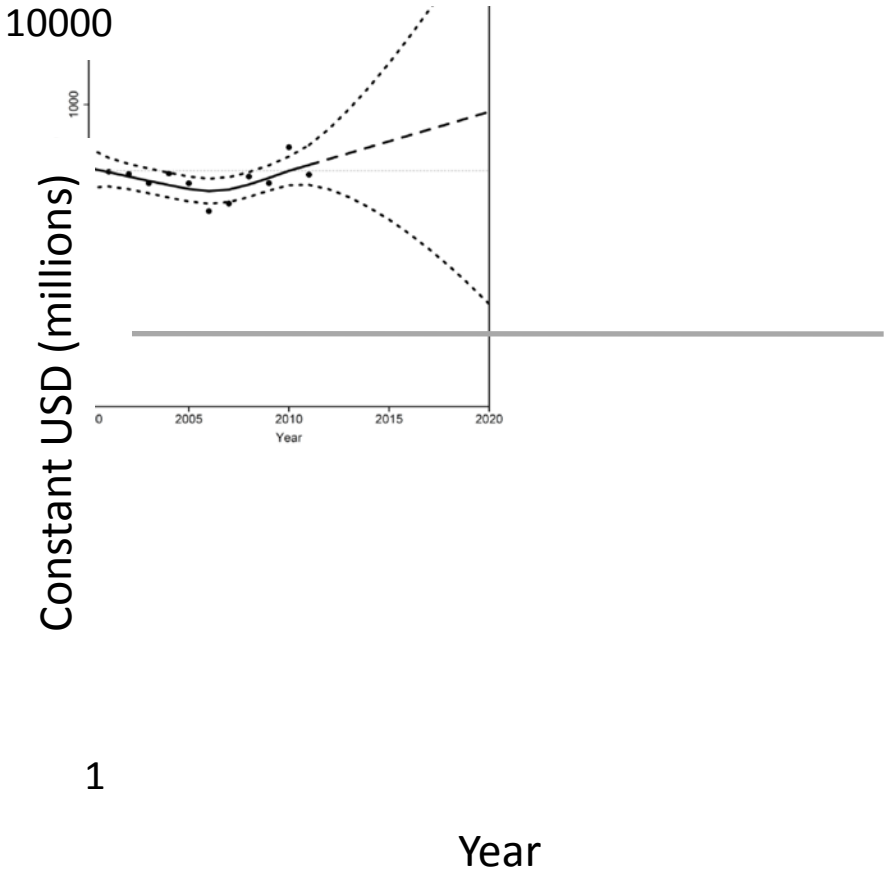
Living Planet Index & Red List Index

Trends and extrapolations of responses

Percent of Important Bird Areas within Protected Areas

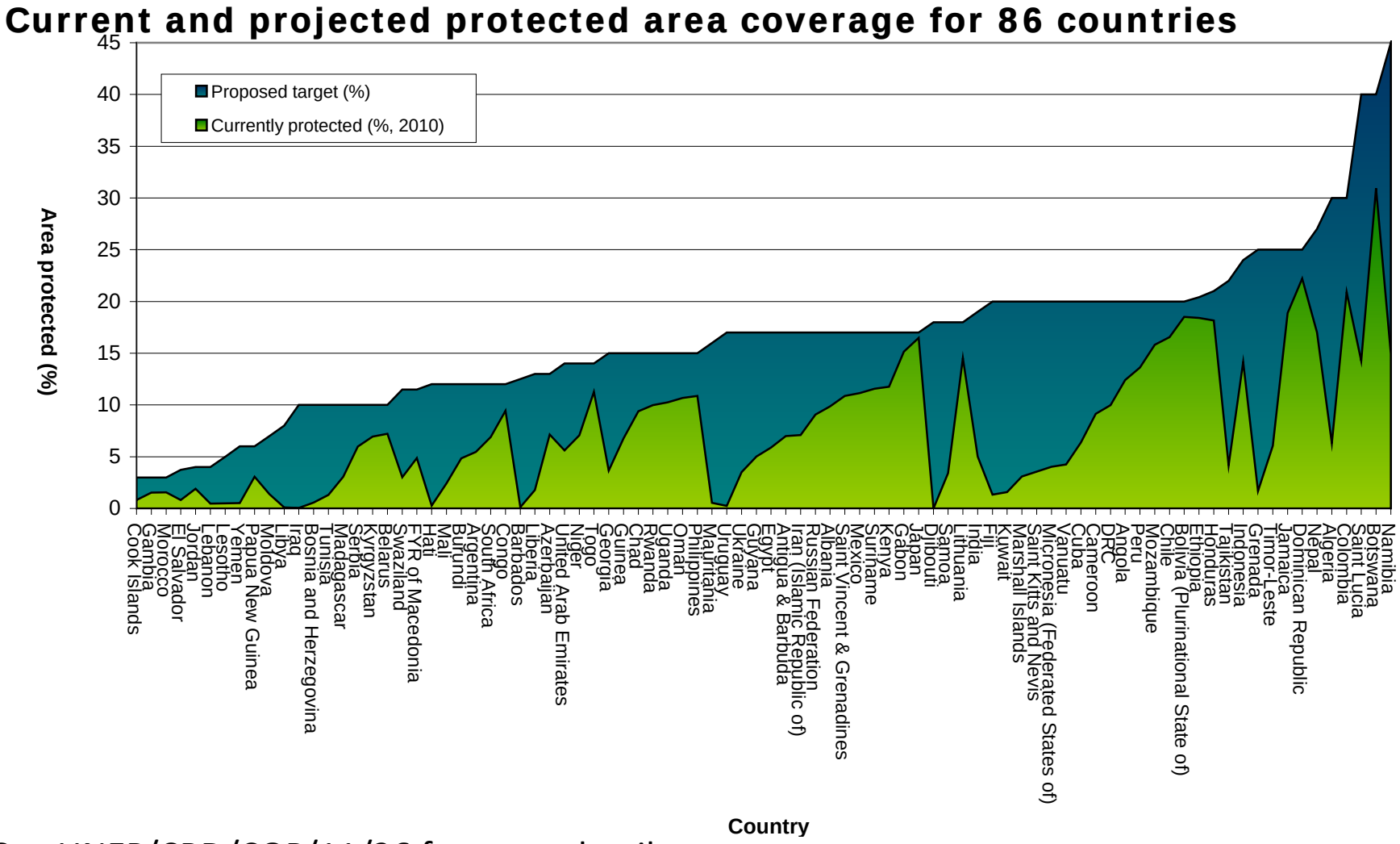


Funds for species protection



Other information provided by Parties

Target 11: Protected Areas



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