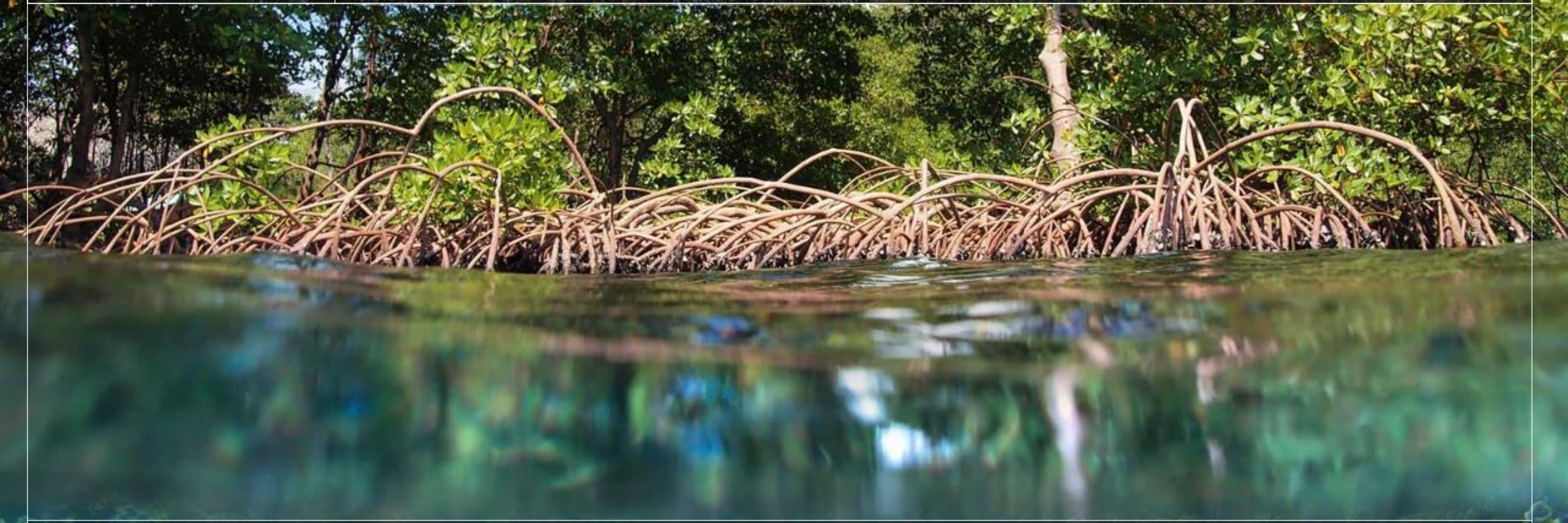
UN environment WCMC

UN Environment
World Conservation Monitoring Centre



PROTEUS *GLOBAL BIODIVERSITY AGENDA* WEBINAR SERIES
CLIMATE CHANGE AND BIODIVERSITY: BEYOND DIRECT IMPACTS

Valerie Kapos

01/11/2018

Welcome

Global Biodiversity Agenda webinar

- A series of webinars for Proteus Partners sharing information and insights into the latest trends and developments in biodiversity and ecosystem services policy, initiatives, data and tools.

Logistics

- **Frequency:** Quarterly
- **Scheduling:** AM & PM sessions
- **Rules:** Chatham House rule for discussion, but presentation is recorded
- **Topics:** Your suggestions are welcome

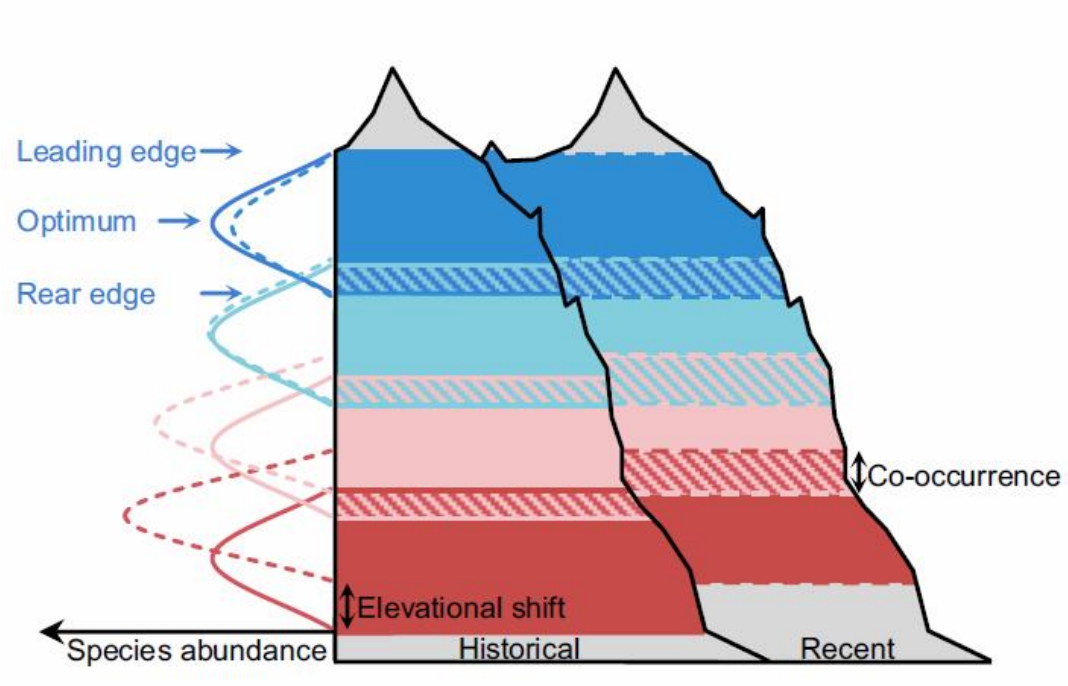
Climate change and biodiversity: beyond direct impacts

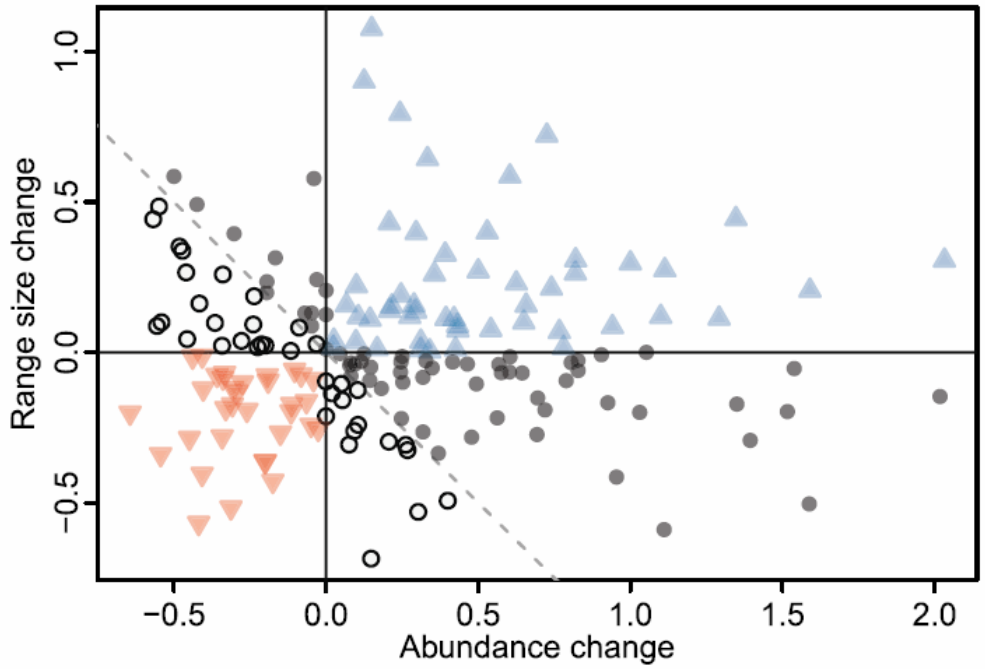
Outline

- Direct impacts on biodiversity
  - Species and ecosystems
- Human responses to climate change
  - Climate change impacts on people
  - Climate-related policies & management – mitigation and adaptation
- Response options and opportunities
- Challenges and ways forward

DIRECT IMPACTS ON BIODIVERSITY

Impacts on species - Range change

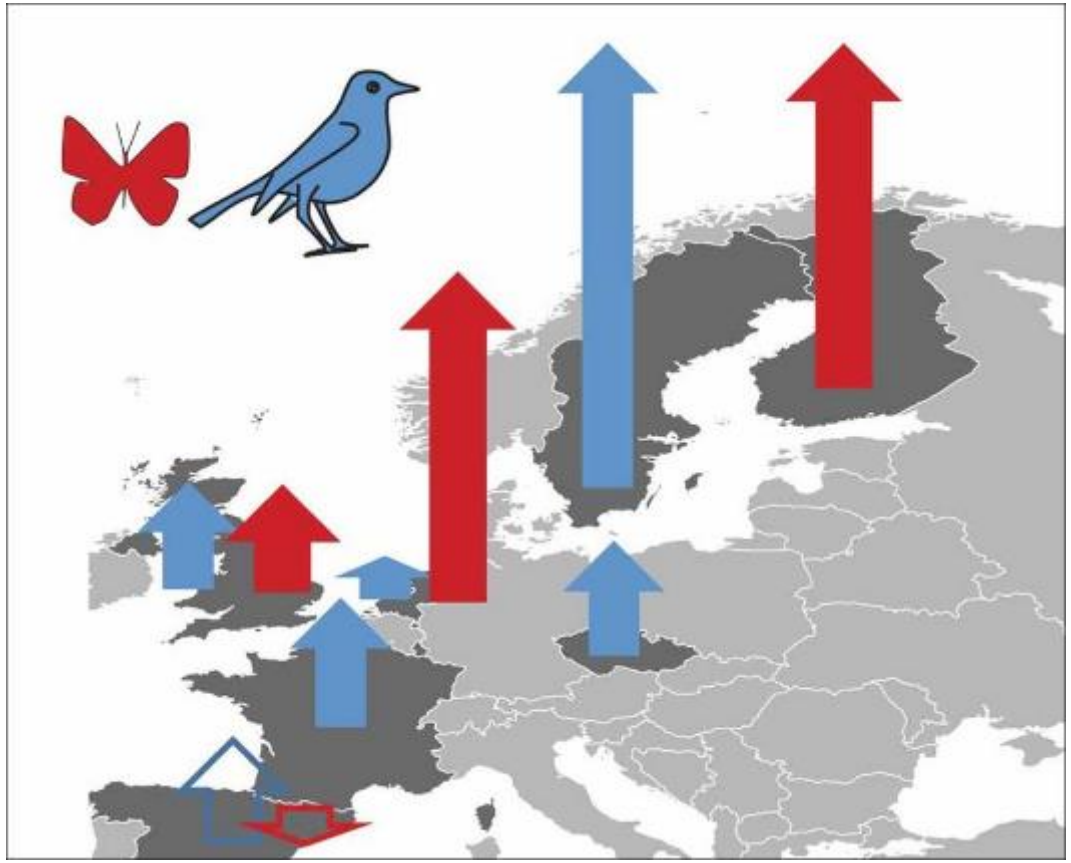




Range size vs. abundance change for 183 mountain plant species of the European Alps (▲'winners'; ▼ 'losers')

Rumpf et al. 2018. PNAS.

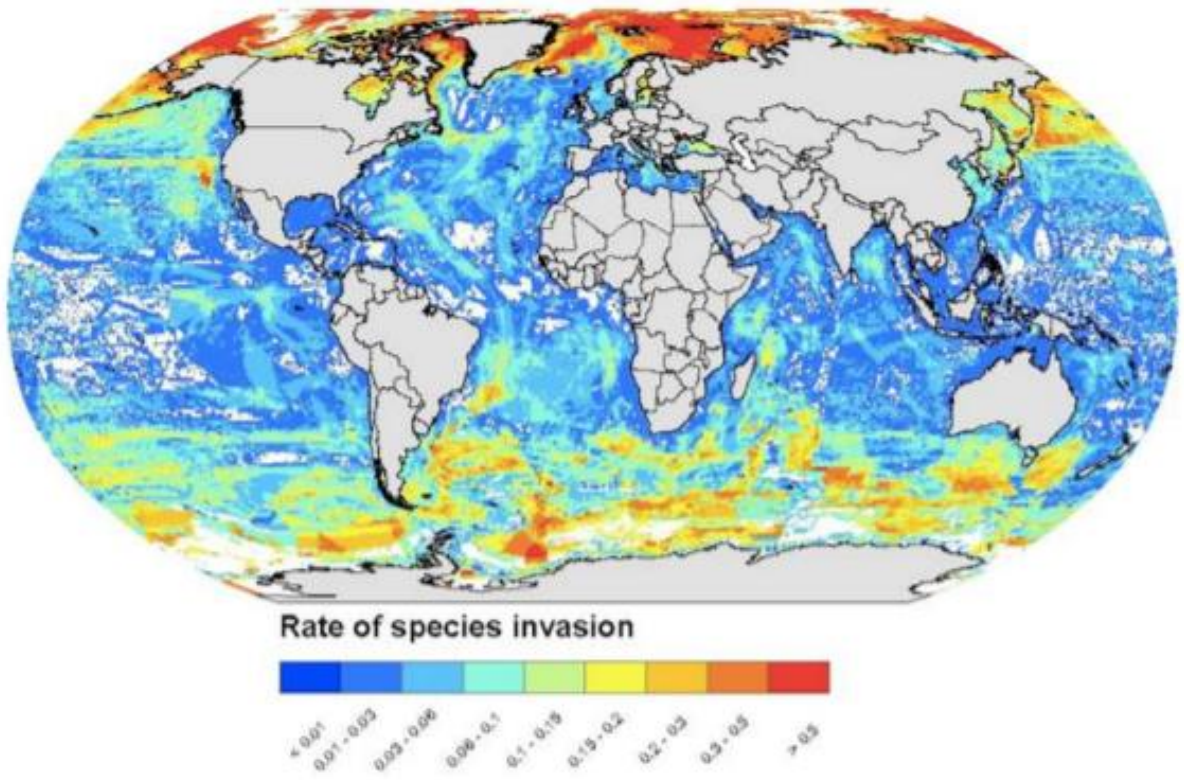
Impacts on species – Range change

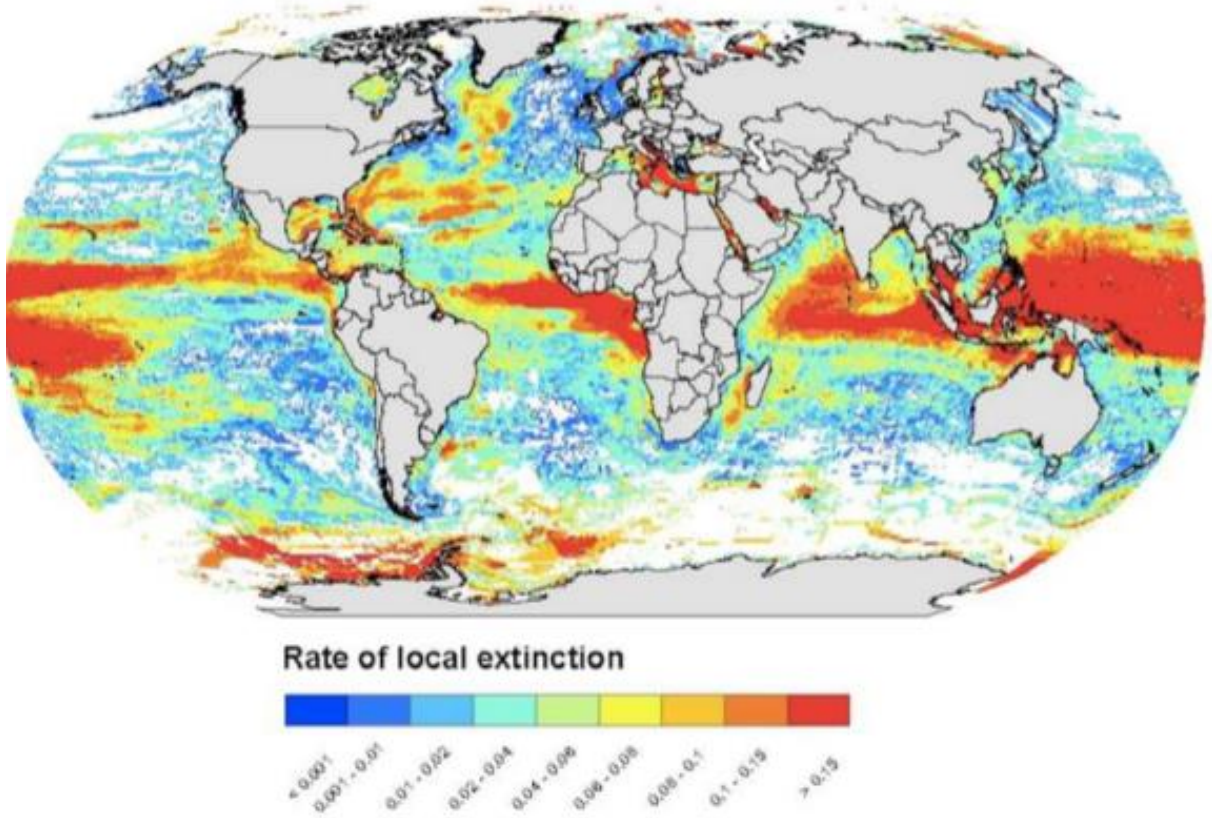


Community temperature index European birds and butterflies
Average northward range shift over 2 decades: Birds: 37 km Butterflies: 114 km
BUT temperature shifts 249 km ➔ **'climate debt'**

De Victor et al. 2012; Lindstrom et al. 2013.

Impacts on species - Range change



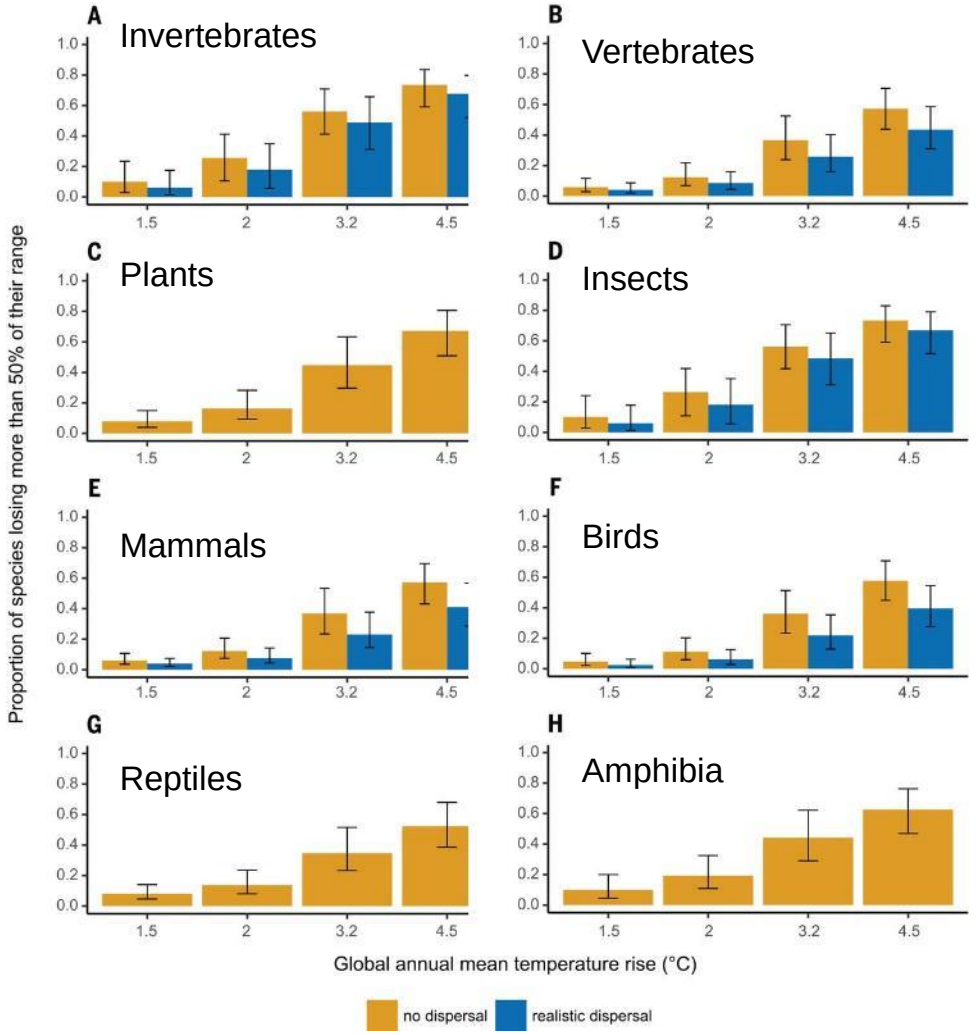


Distributions of marine fish species expected to shift with altered ocean conditions.

Projections of species invasions and local extinctions by 2050 under the IPCC's business as usual scenario.

Jones and Cheung. 2015.

The proportion of modelled species losing more than half their climatically determined range by 2100 at specific levels of global warming.



R. Warren et al. Science 2018;360:791-795

Impacts on species - Phenology

The New York Times

5 Plants and Animals Utterly Confused by Climate Change

Global warming is causing spring to arrive early and autumn to come late in many places, and not all species are adapting at the same rate.

By Livia Albeck-Ripka (https://www.nytimes.com/by/livia-albeck-ripka) and Brad Plumer (https://www.nytimes.com/by/brad-plumer)

April 4, 2018

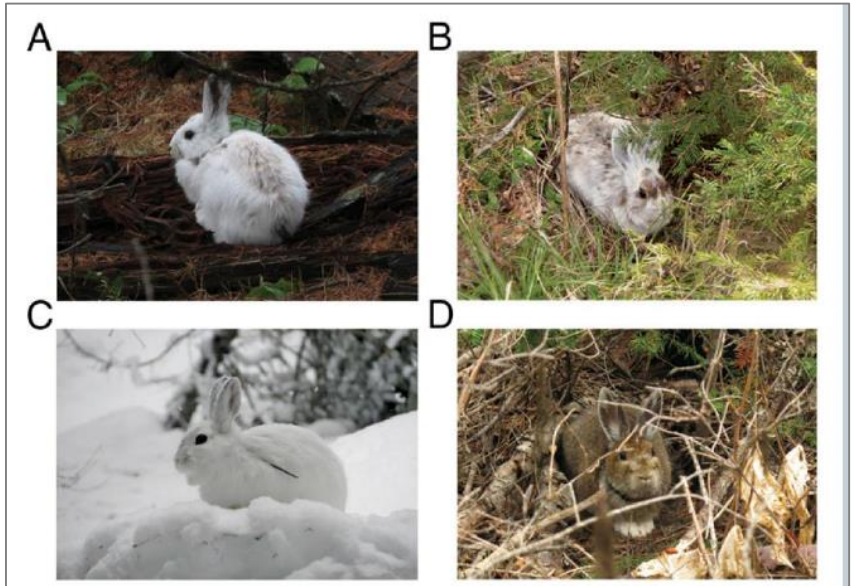
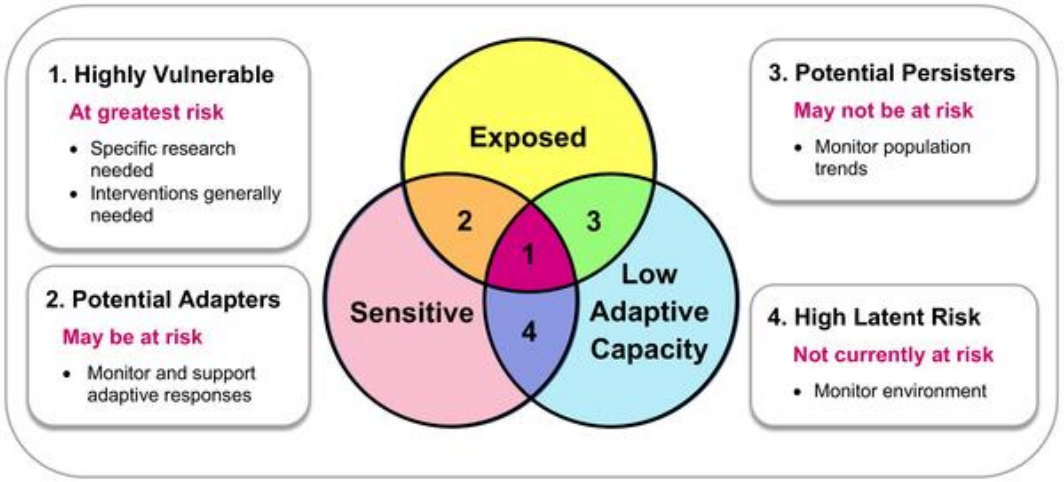
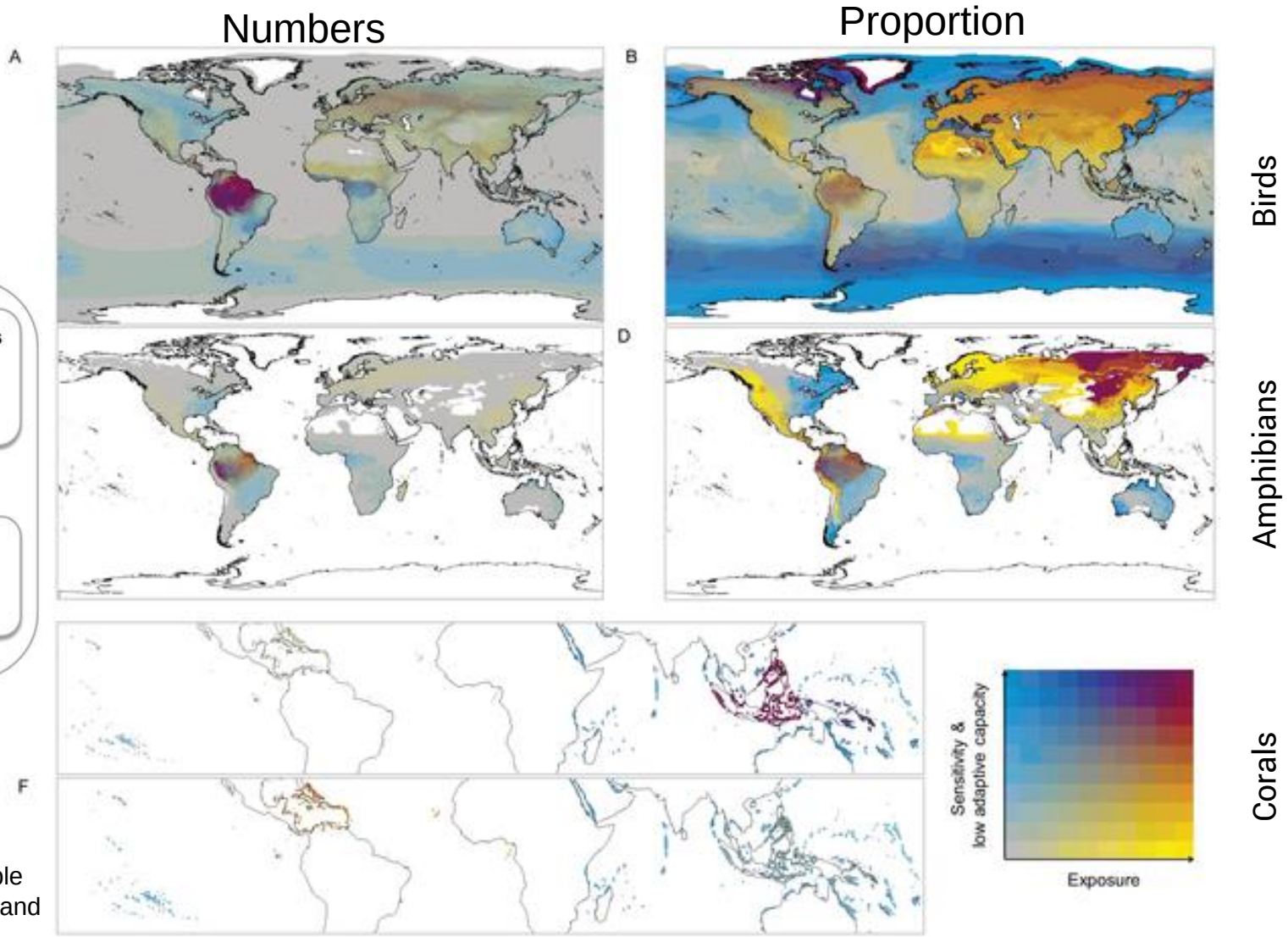


Fig. 2. Types of contrast between seasonal coat color and snow background. Radiocollared snowshoe hares from this study showing (*A*) 100% contrast (mismatch), (*B*) 60% contrast (mismatch), (*C*) 0% contrast (no mismatch), and (*D*) 0% contrast (no mismatch).

Mills et al 2013. Camouflage mismatch in seasonal coat colour due to decreased snow duration PNAS 110 (18)

Concentrations of climate change vulnerable species

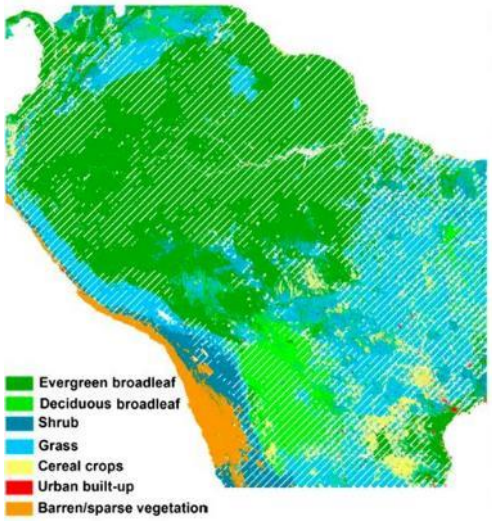


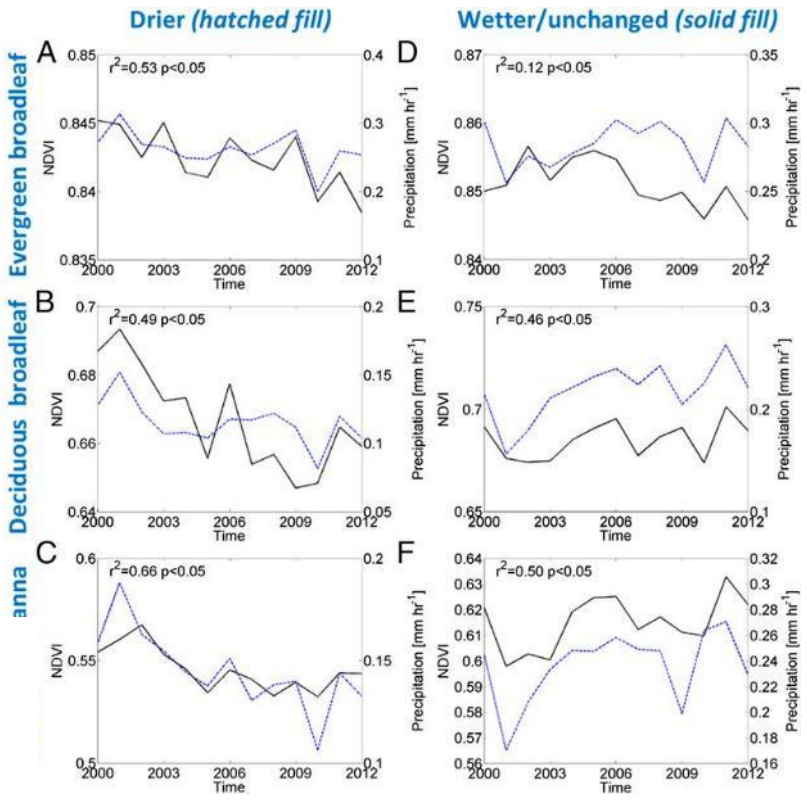


PLOS ONE

Foden et al. 2013. Identifying the World's Most Climate Change Vulnerable Species: A Systematic Trait-Based Assessment of all Birds, Amphibians and Corals. PLOS ONE.

Impact on ecosystems - Loss of forest cover/savanna expansion in Amazonia due to altered rainfall



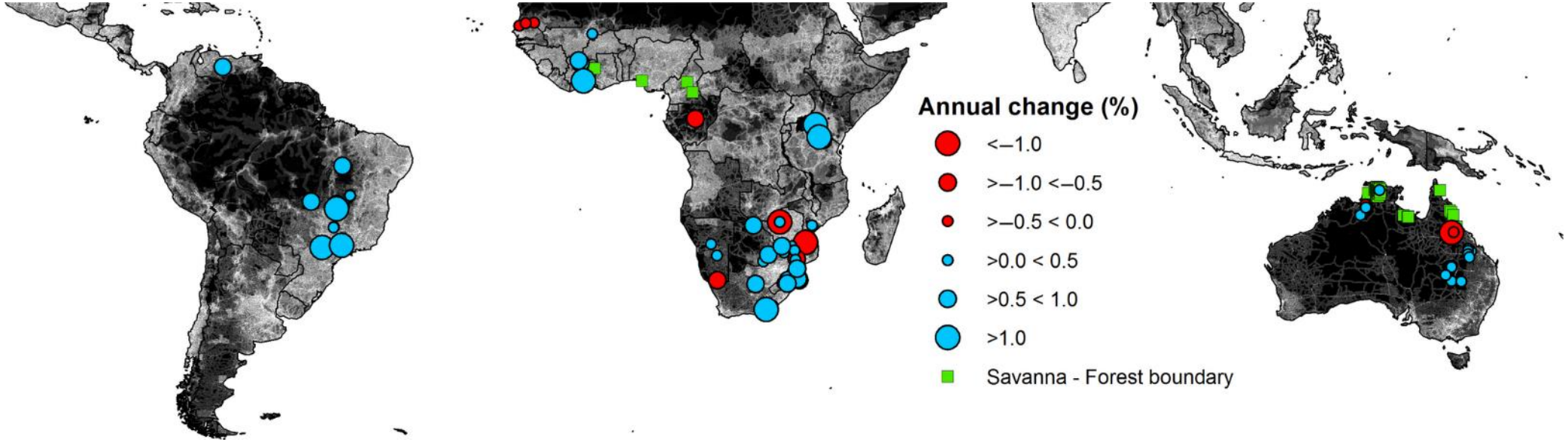


Changes in NDVI & precipitation by land cover.

Hilker et al. 2014. PNAS

Inti - https://www.flickr.com/photos/inti/3102164531/in/photostream/, CC BY 2.0, https://commons.wikimedia.org/w/index.php?curid=5636455

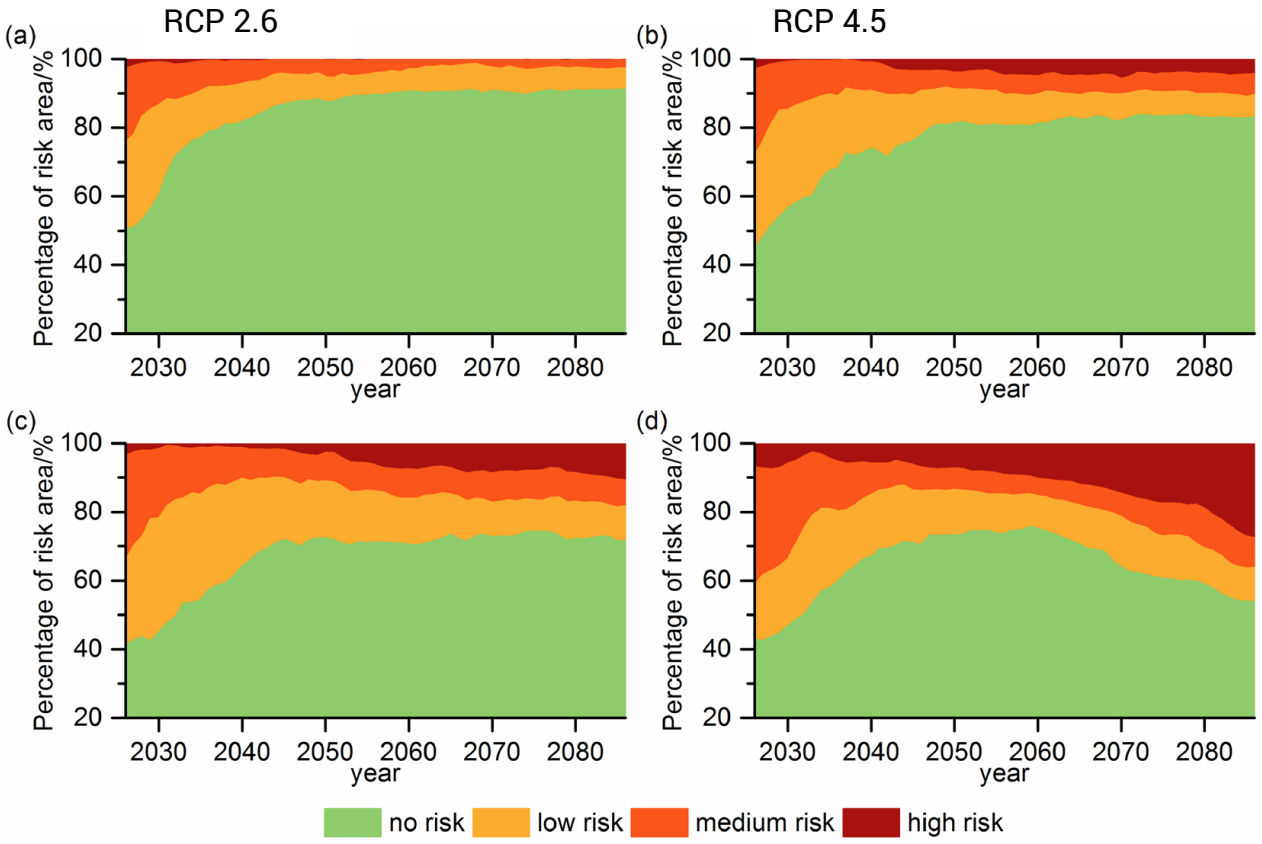
Impact on ecosystems - Savanna woody encroachment is widespread across three continents

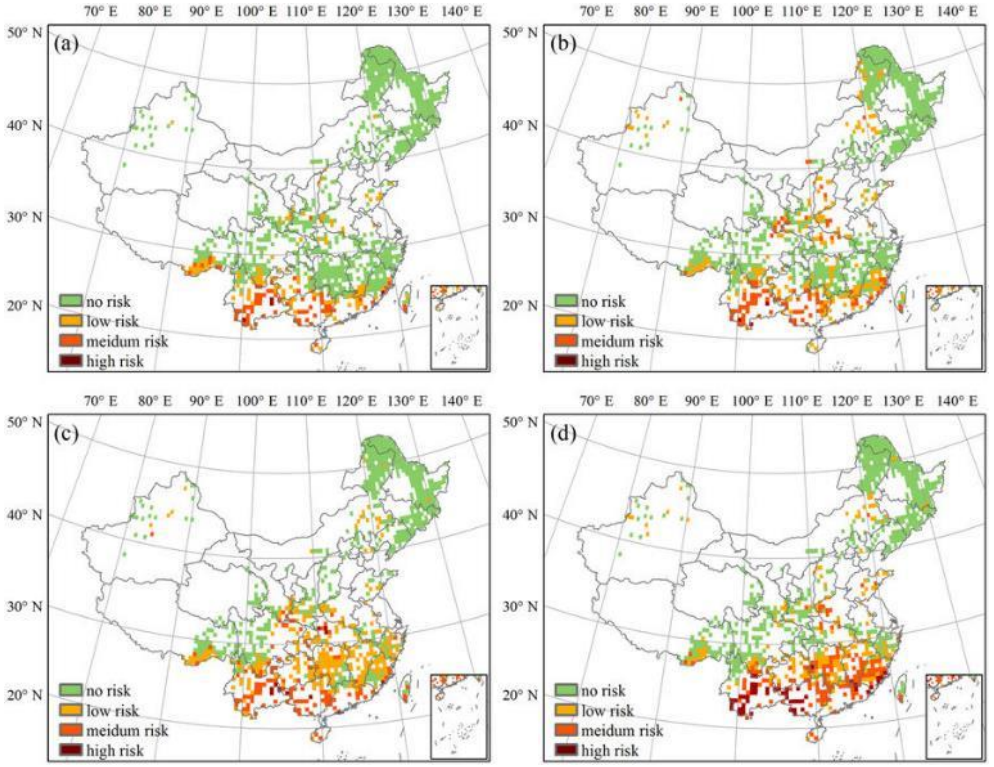


Stevens et al. 2016. PNAS: 23: 235-244

Impact on ecosystems - Ecosystem structure & process changes

Impact on ecosystems - Climate change risk to forest productivity in China

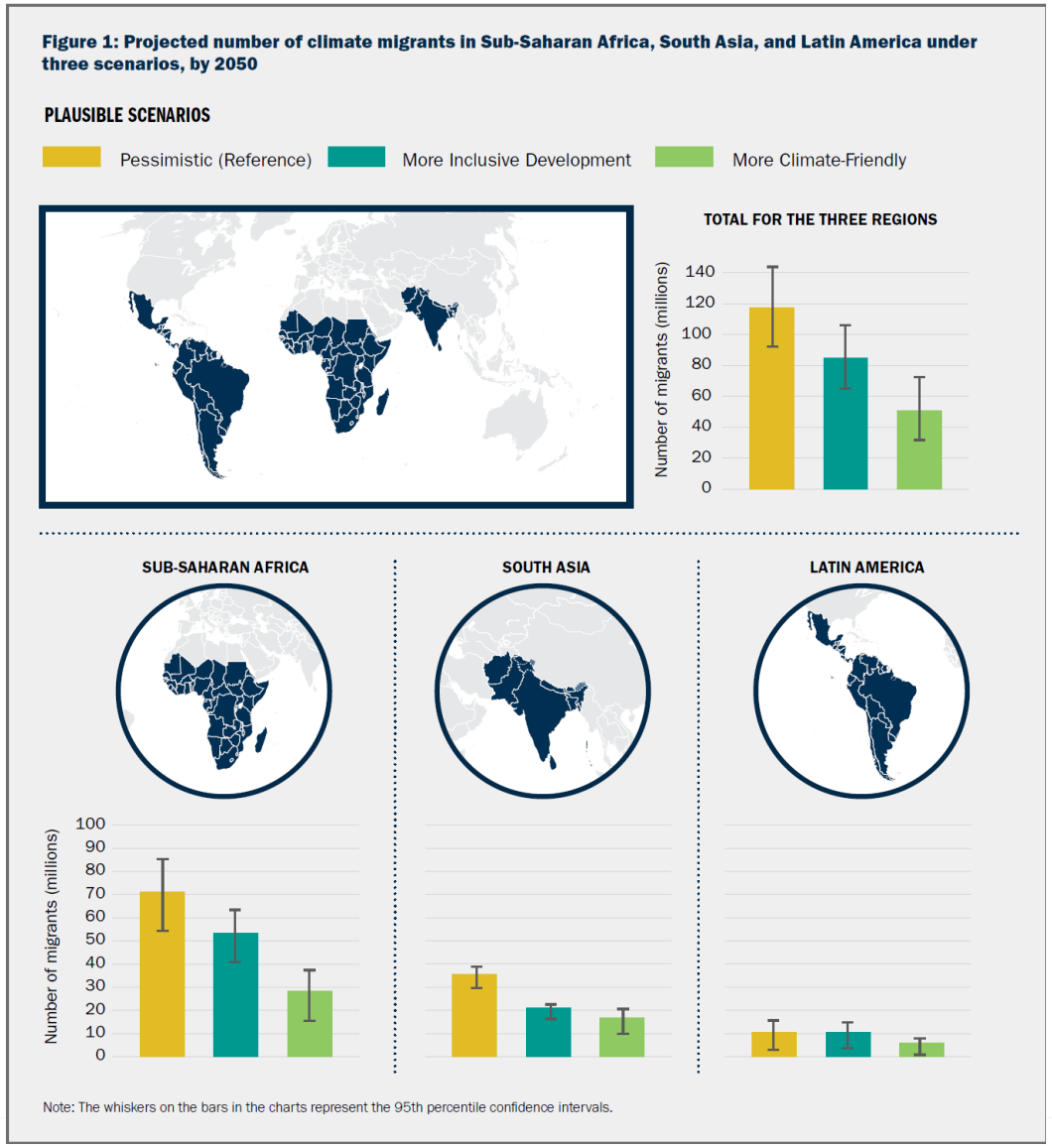




YIN ET AL. (2018). CLIMATE CHANGE RISK TO FORESTS IN CHINA ASSOCIATED WITH WARMING. NATURE SCIENTIFIC REPORTS, 8(1), 1–13.

HUMAN RESPONSES TO CLIMATE CHANGE

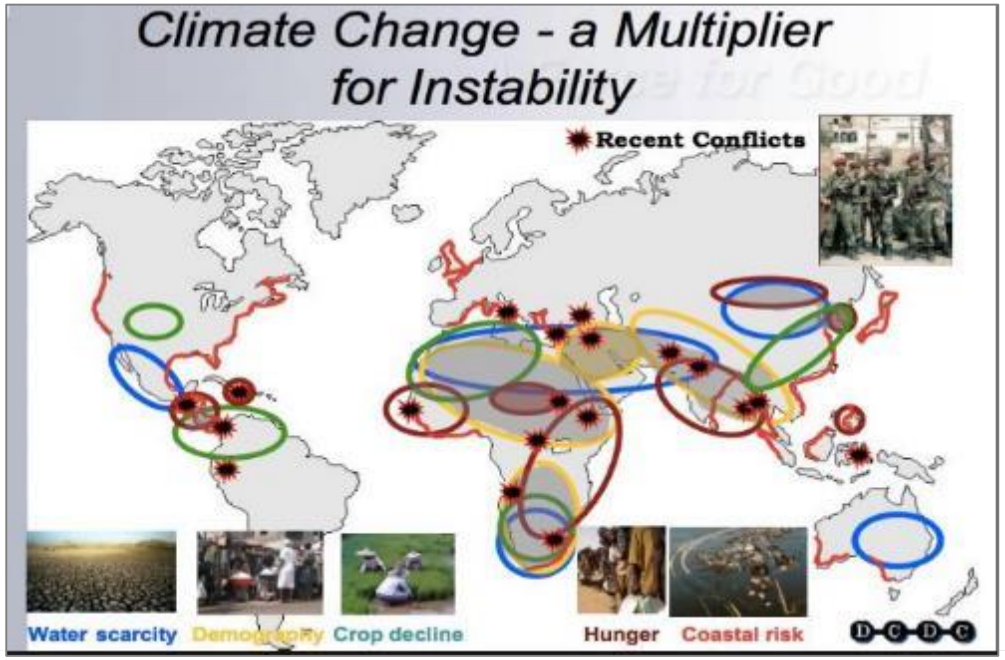
Migration



"By 2050 . . . climate change could force more than 143 million people [~2.8% of the population] to move within their countries."

Kumari Rigaud et al 2018. *Groundswell.* World Bank

Conflict


Climate Change - a Multiplier for Instability
Recent Conflicts
Water scarcity
Crop decline
Hunger
Coastal risk

Agricultural expansion and land use change

HUMAN RESPONSES TO CLIMATE CHANGE - MITIGATION

Human responses to climate change - Mitigation

Bioenergy

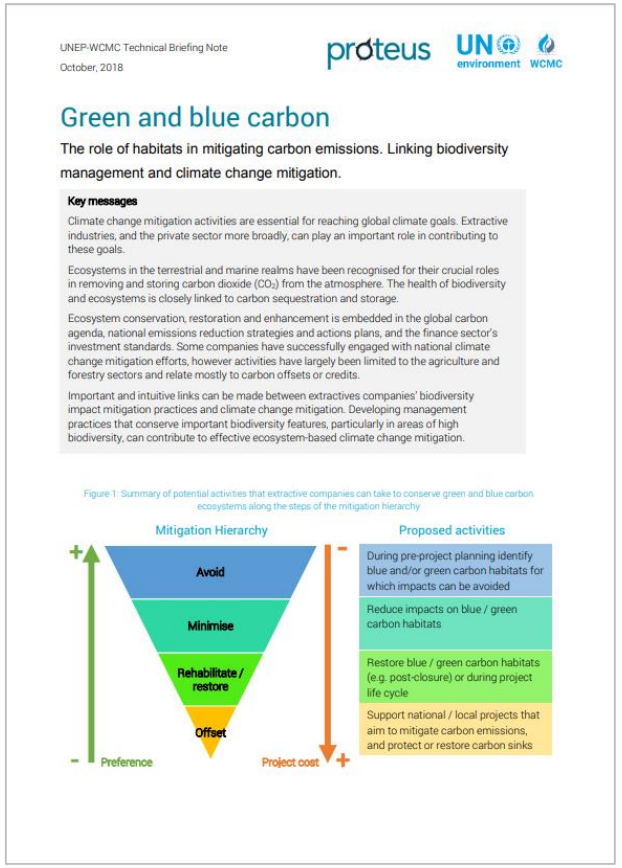
Other renewable energy

Mitigation in agriculture

REDD+

Peatland management

Management and restoration of other ecosystems



UNEP-WCMC Technical Briefing Note
October, 2018

proteus UN environment WCMC

Green and blue carbon

The role of habitats in mitigating carbon emissions. Linking biodiversity management and climate change mitigation.

Key messages

Climate change mitigation activities are essential for reaching global climate goals. Extractive industries, and the private sector more broadly, can play an important role in contributing to these goals.

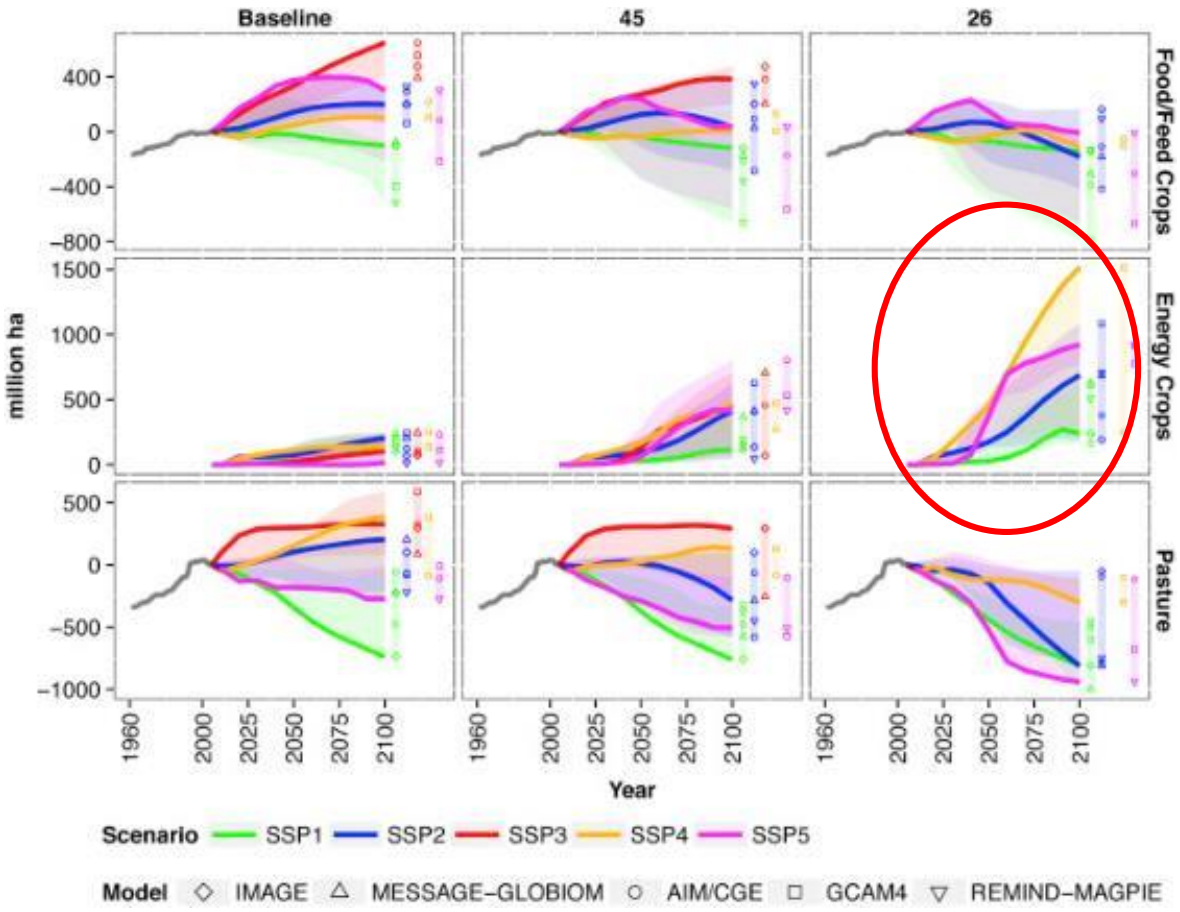
Ecosystems in the terrestrial and marine realms have been recognised for their crucial roles in removing and storing carbon dioxide (CO_2) from the atmosphere. The health of biodiversity and ecosystems is closely linked to carbon sequestration and storage.

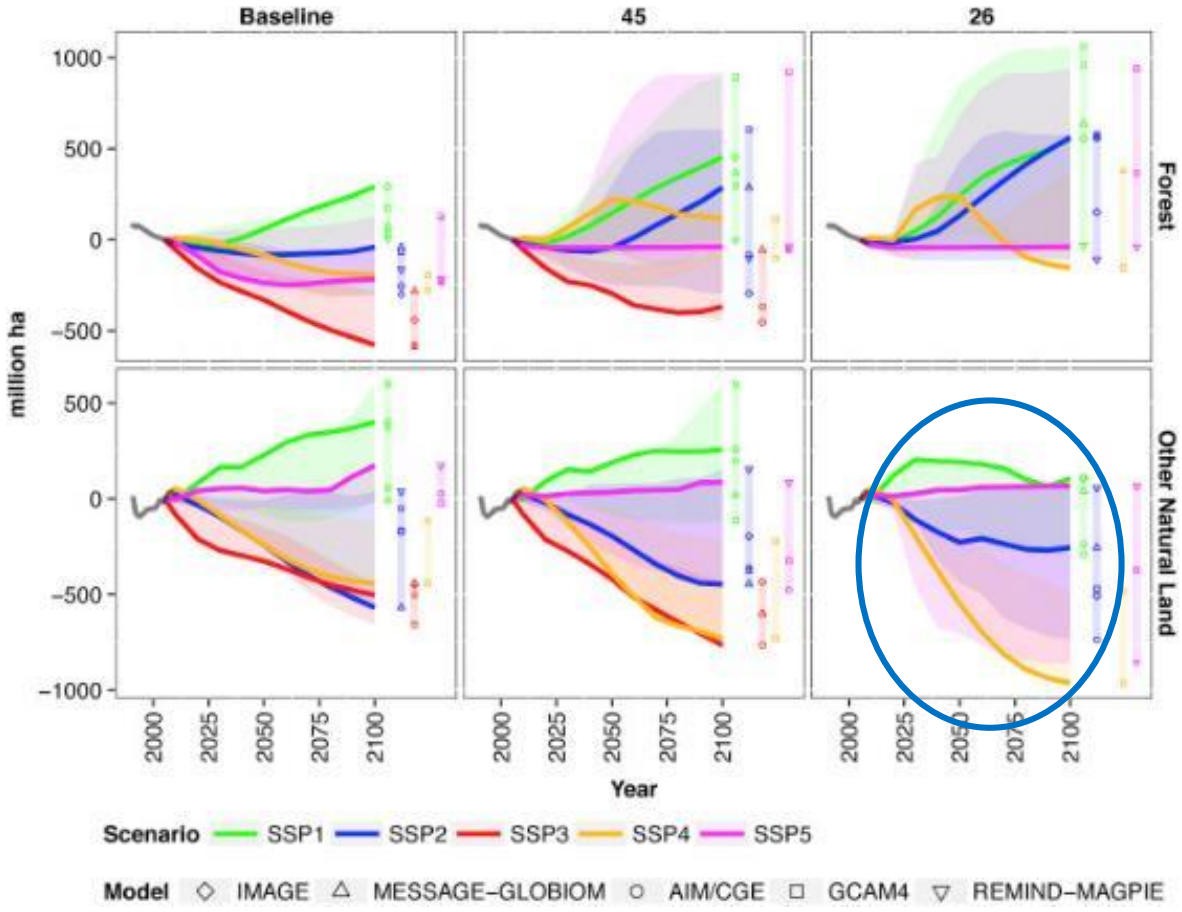
Ecosystem conservation, restoration and enhancement is embedded in the global carbon agenda, national emissions reduction strategies and actions plans, and the finance sector's investment standards. Some companies have successfully engaged with national climate change mitigation efforts, however activities have largely been limited to the agriculture and forestry sectors and relate mostly to carbon offsets or credits.

Important and intuitive links can be made between extractives companies' biodiversity impact mitigation practices and climate change mitigation. Developing management practices that conserve important biodiversity features, particularly in areas of high biodiversity, can contribute to effective ecosystem-based climate change mitigation.

Figure 1. Summary of potential activities that extractive companies can take to conserve green and blue carbon ecosystems along the steps of the mitigation hierarchy

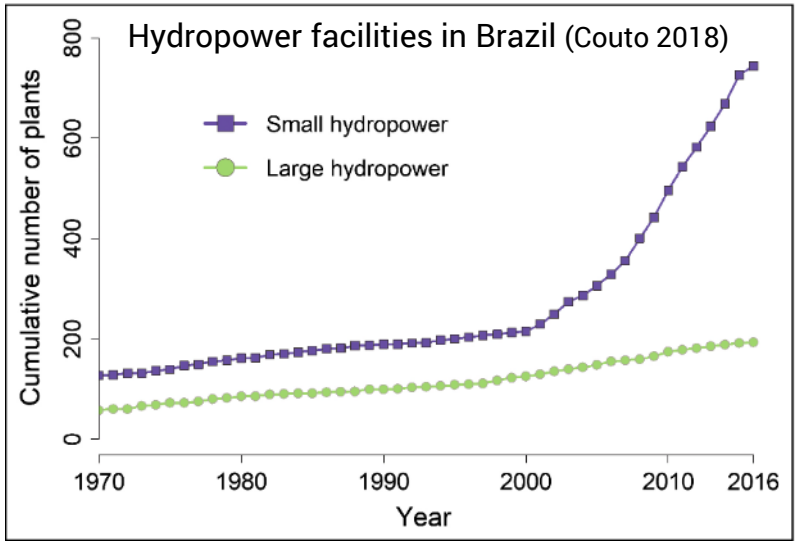
Bioenergy - global land demand





POPP ET AL. (2017). LAND-USE FUTURES IN THE SHARED SOCIO-ECONOMIC PATHWAYS. GLOBAL ENVIRONMENTAL CHANGE, 42, 331 –345.

Other renewable energy - direct mortality, habitat change



Low Carbon Agriculture - Agroforestry, ‘Conservation Agriculture

REDD+

REDD+

= Reducing Emissions from Deforestation and forest Degradation

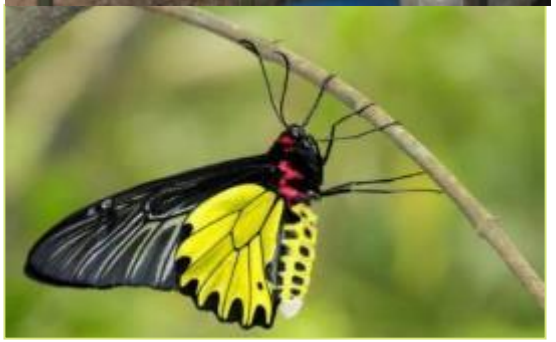
+

Conservation of forest carbon stocks
Sustainable management of forest
Enhancement of forest carbon stocks

Examples of REDD+ benefits

Well-planned and implemented REDD+ actions could lead to benefits such as:

- Enhanced ecosystem services provision (e.g. control of soil erosion, water quality, pollination of crops, recreation & tourism, NTFPs…)
- Improved biodiversity conservation
- Improved local livelihoods for communities
- Clarified tenure and improved governance of natural resources



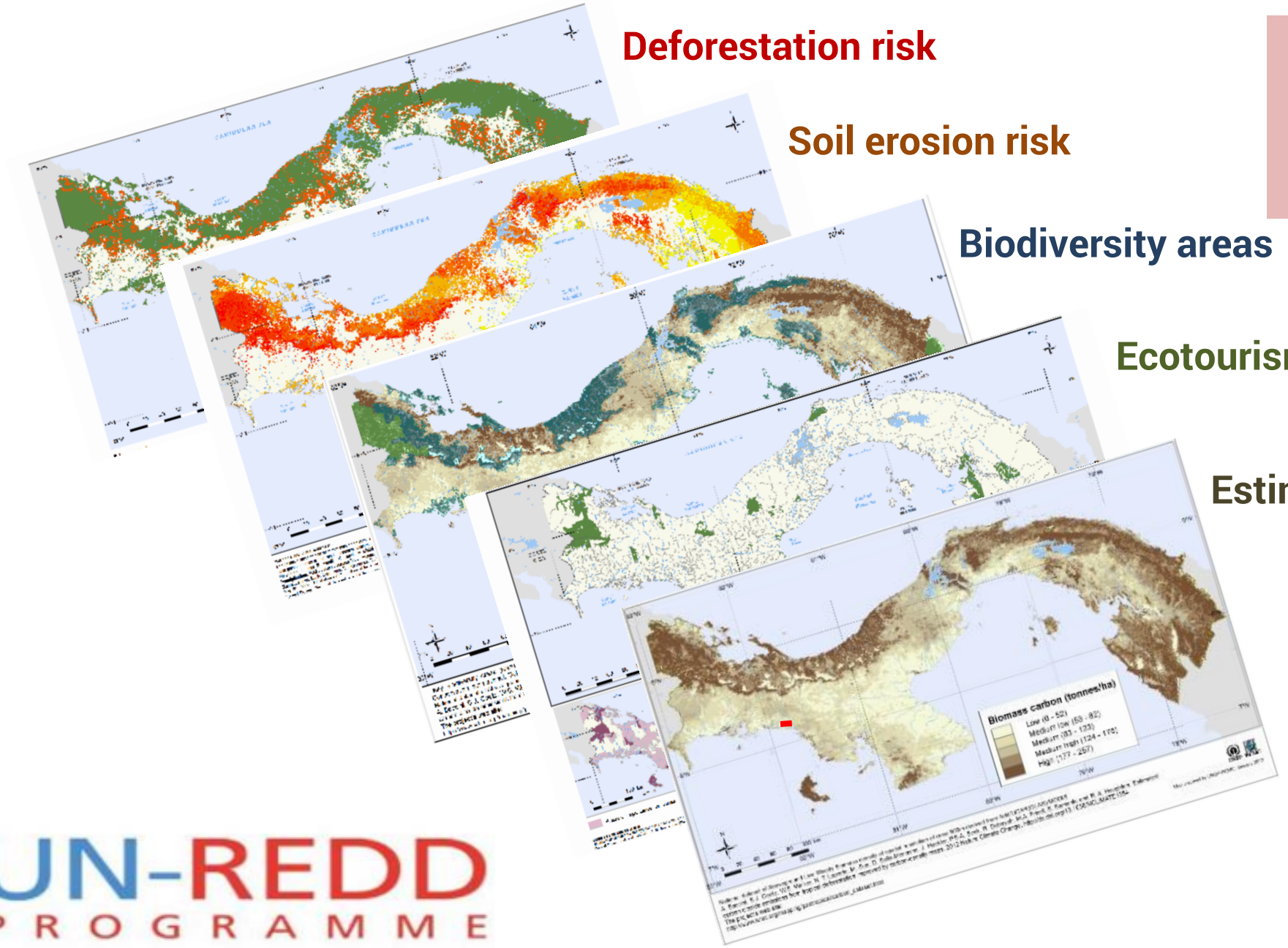
UN-REDD PROGRAMME

Food and Agriculture Organization of the United Nations

UNDP

UNEP

For example: using spatial layers to identify priority areas for REDD+ multiple benefits in Panama



UN-REDD PROGRAMME

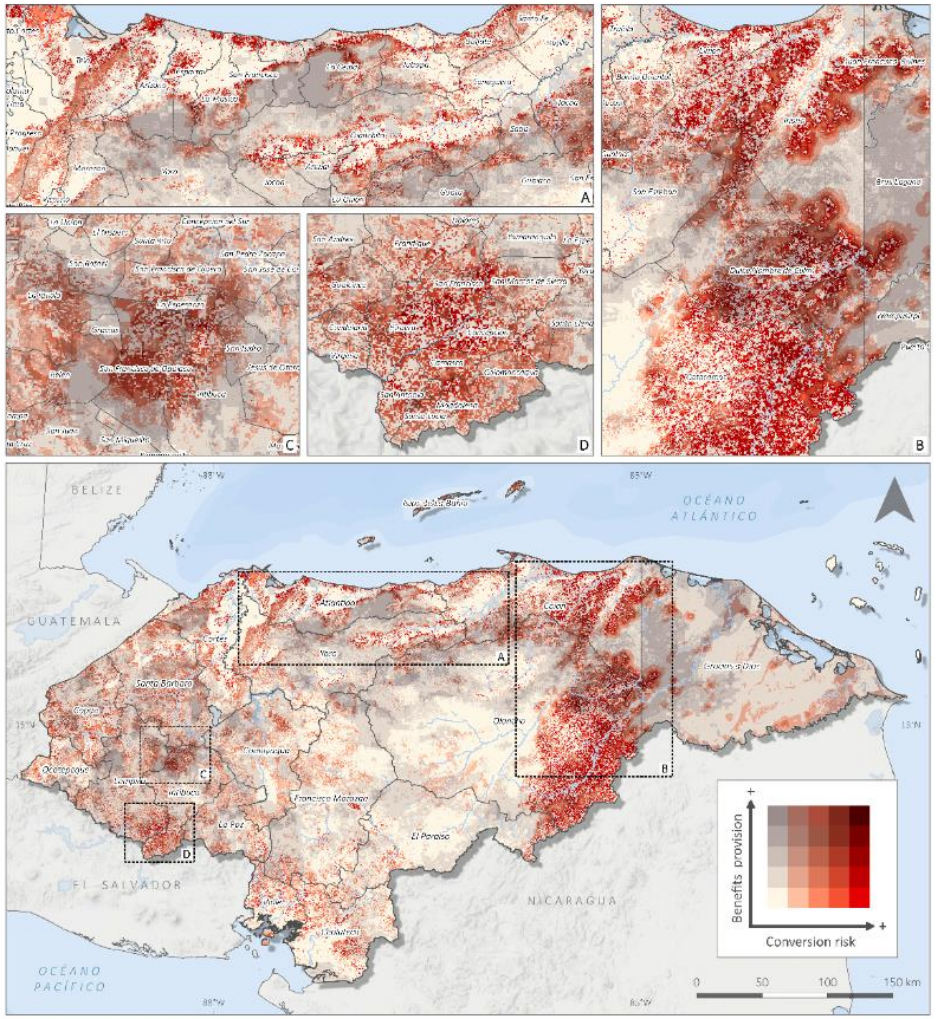
Food and Agriculture Organization of the United Nations

UNDP

UNEP

REDD+

Evaluating potential benefits of particular types of action in different locations



In which areas of Honduras can action to reduce conversion pressure on forests bring the greatest social and environmental benefits?

UN-REDD PROGRAMME

Food and Agriculture Organization of the United Nations

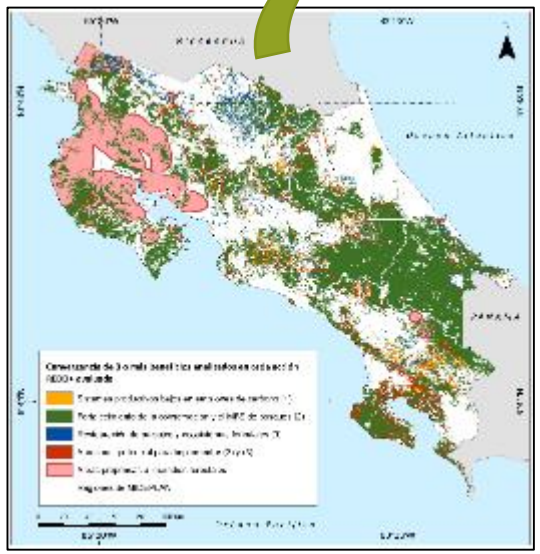
UNDP

UNEP

Support to Implementation Plan for REDD+ Costa Rica

Analysis of social & environmental benefits

- Promotion of low-emission production systems
- Strengthening of fire control programmes
- Incentives for conservation and sustainable forest management
- Restoration of landscapes and forest ecosystems



UN-REDD PROGRAMME

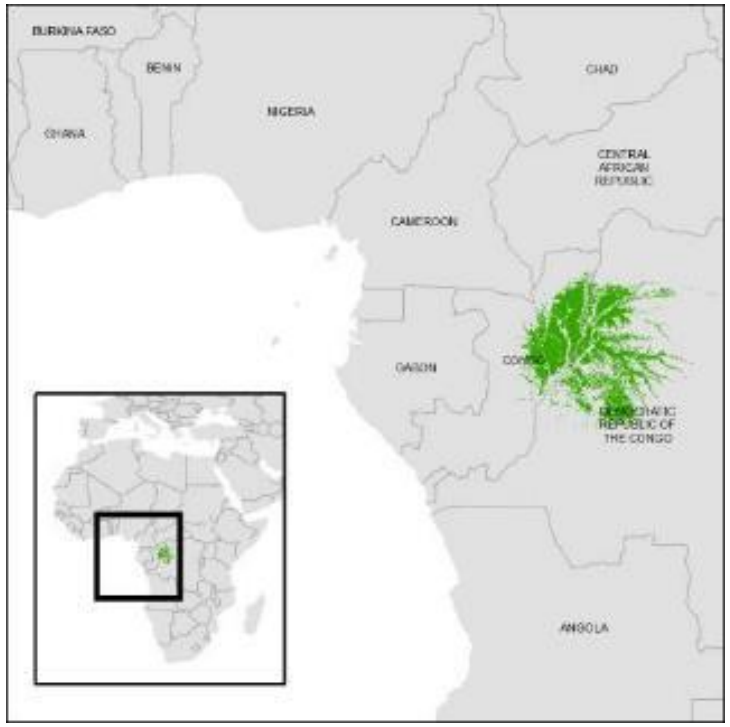
Food and Agriculture Organization of the United Nations

UNDP

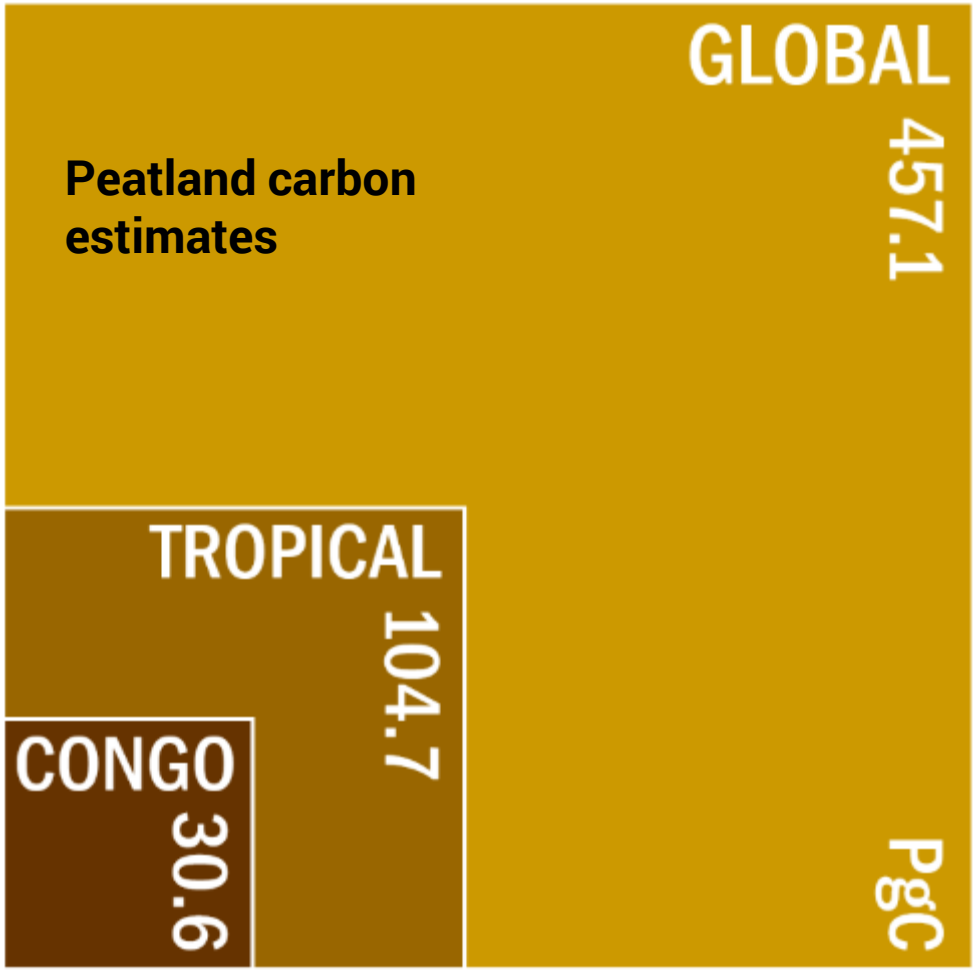
UNEP

Peatland management

Central Congo basin peatlands



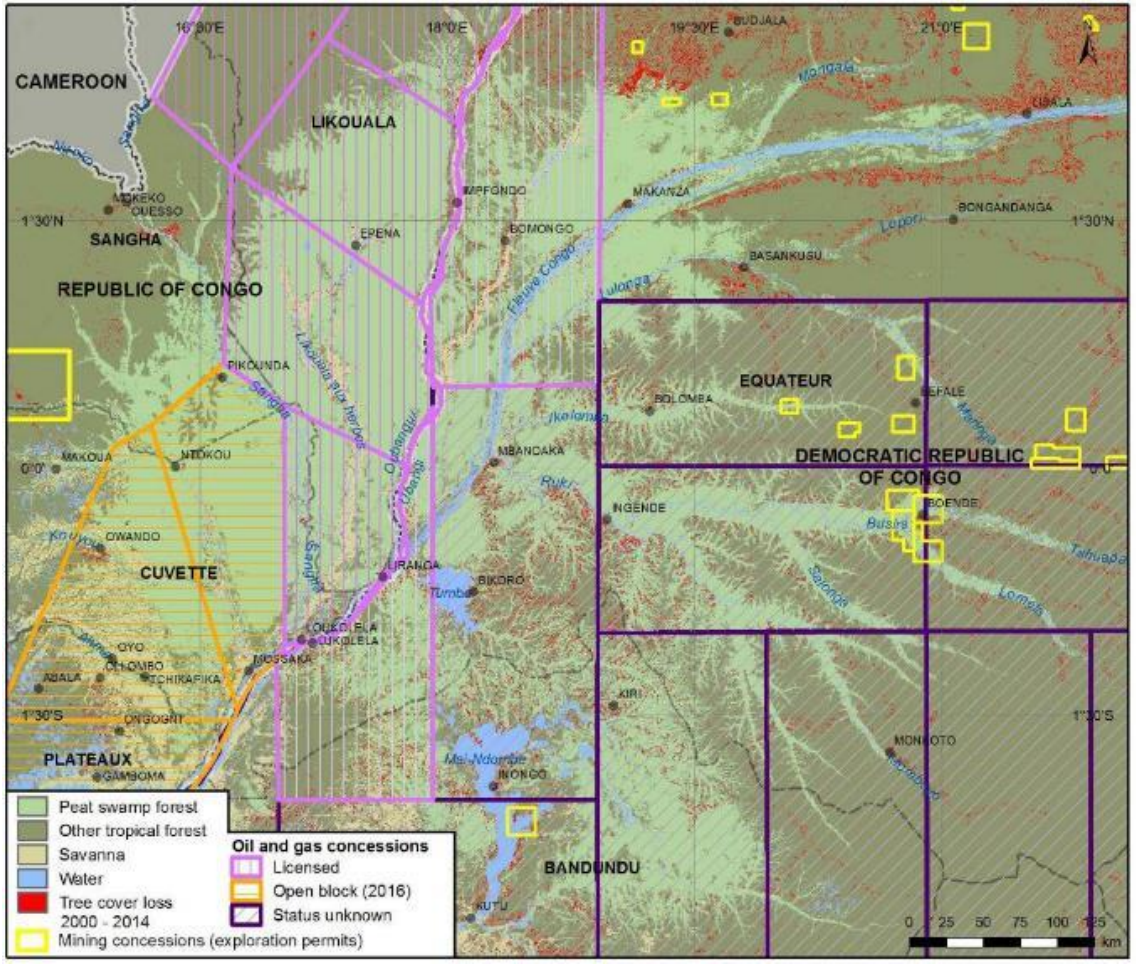
DARGIE ET AL. 2017



Peatland management

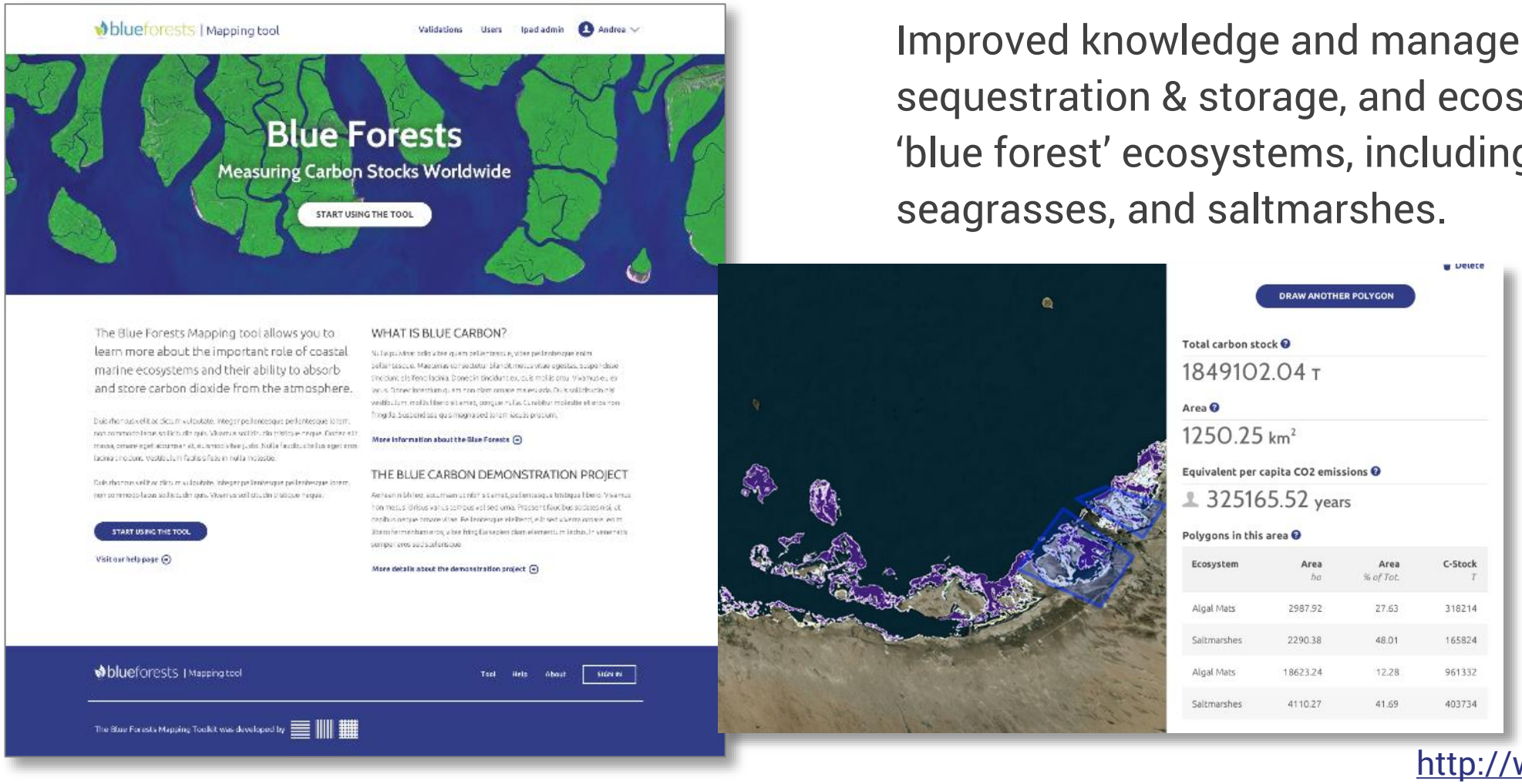
Wildlife value

Pressures



Sources: Dargie *et al*. 2017; IUCN 2017; Hansen et al. 2013; Openoil Repository; Min. des Hydrocarbons (Congo); Global Forest Watch

Management and restoration of other ecosystems



Improved knowledge and management of carbon sequestration & storage, and ecosystem services in ‘blue forest’ ecosystems, including mangroves, seagrasses, and saltmarshes.

blueforests

gef

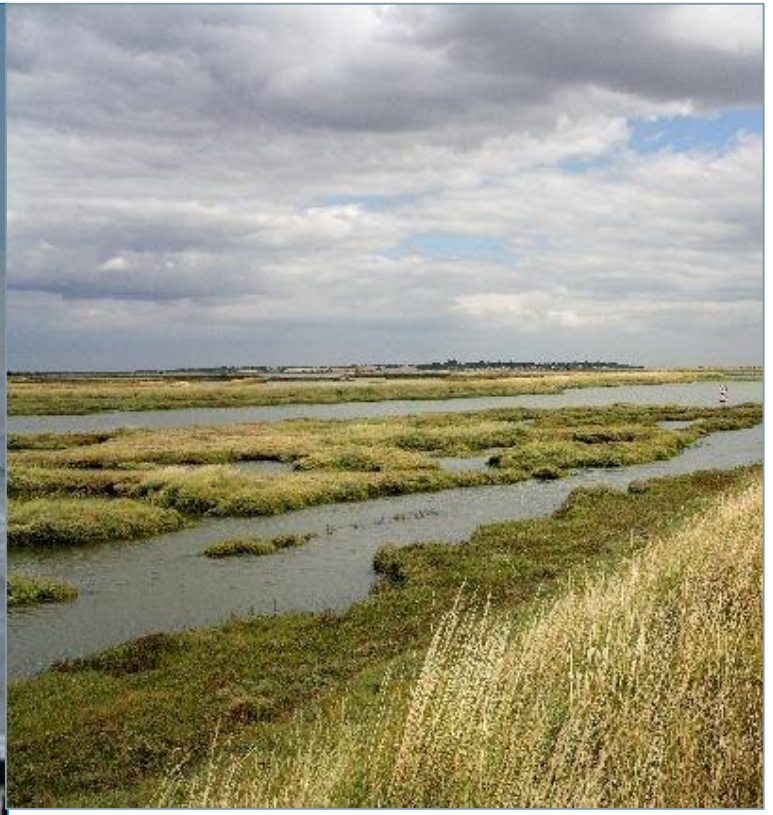
http://www.gefblueforests.com

HUMAN RESPONSES TO CLIMATE CHANGE - ADAPTATION

Ecosystem Based Adaptation (EBA)

Engineered (hard) vs ecosystem – based approaches

© AP Bradbury

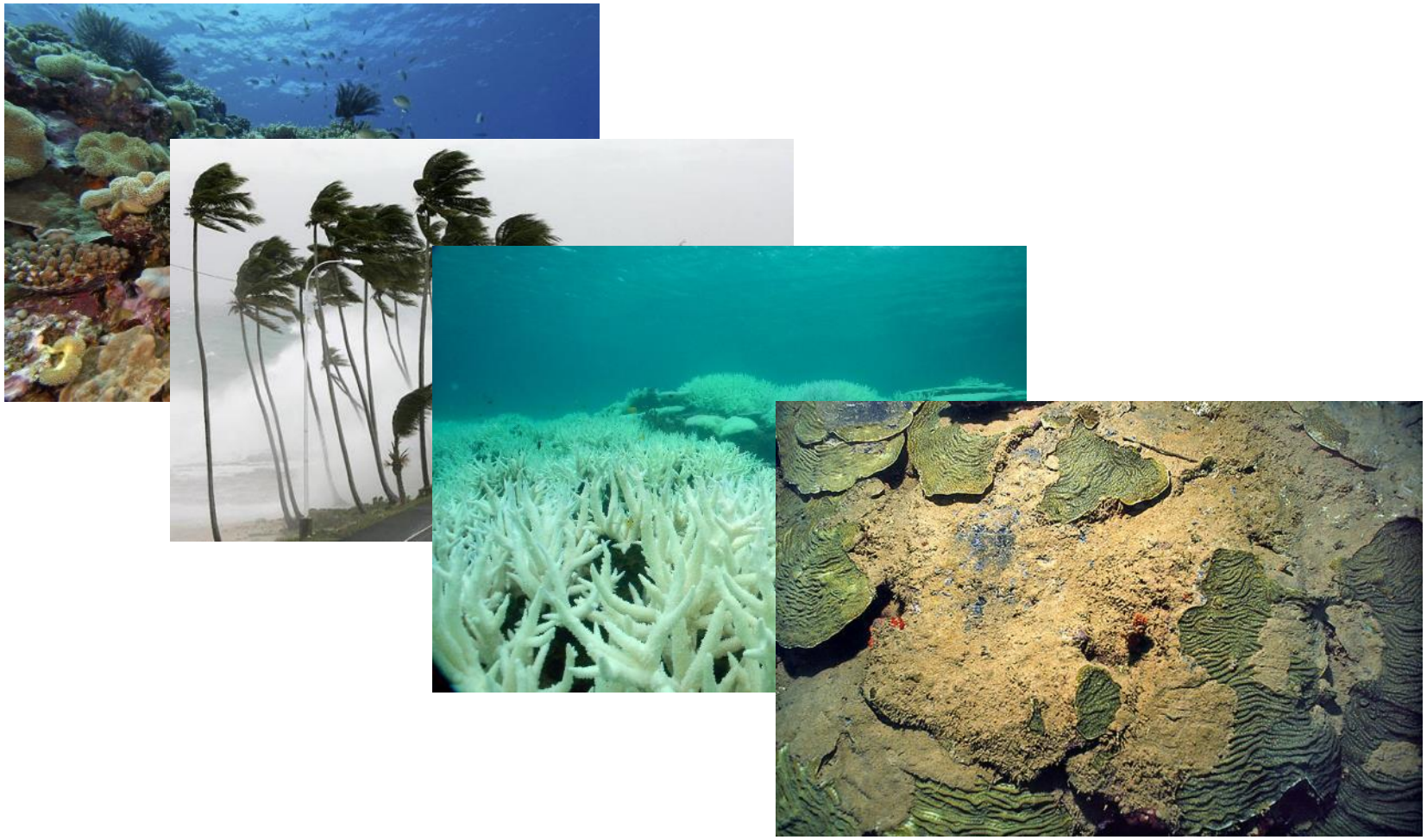


© Matthew Barker

Ecosystem Based Adaptation (EBA)

Engineered (hard) vs ecosystem – based approaches

EBA effectiveness is contingent on the impacts of other pressures



Nature-Based Solutions to Climate Risks

WHAT ARE NATURE-BASED SOLUTIONS?

- Harnessing, using and learning from nature to build resilience and deliver co-benefits
- Potentially cost efficient and effective alternative or complementary approach to built solutions for countries, communities and companies

EXAMPLES

- Restoring mangroves instead of, or in addition to, building seawalls
- Manging upland forests instead of, or in addition to, building retaining walls
- Using wetlands instead of, or in addition to, building new waste water treatment infrastructure

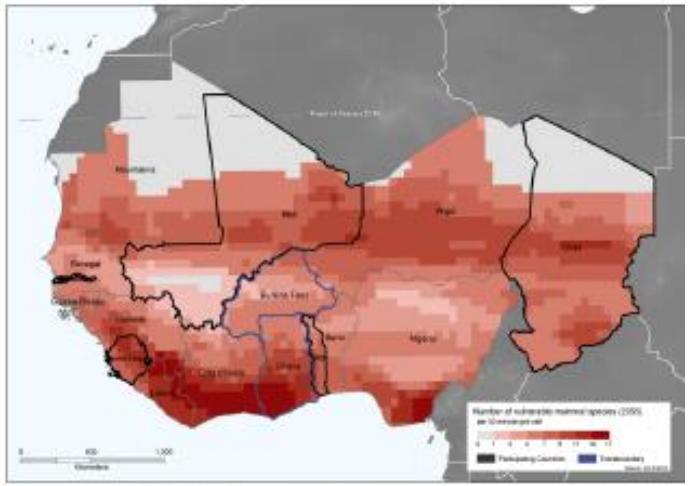
PRIVATE SECTOR USE

- Increasing risk to assets and operations due to a changing climate
- Provide one option to help build private sector resillience while delivering co-benefits
- Do not appear to be part of standard approaches considered by companies

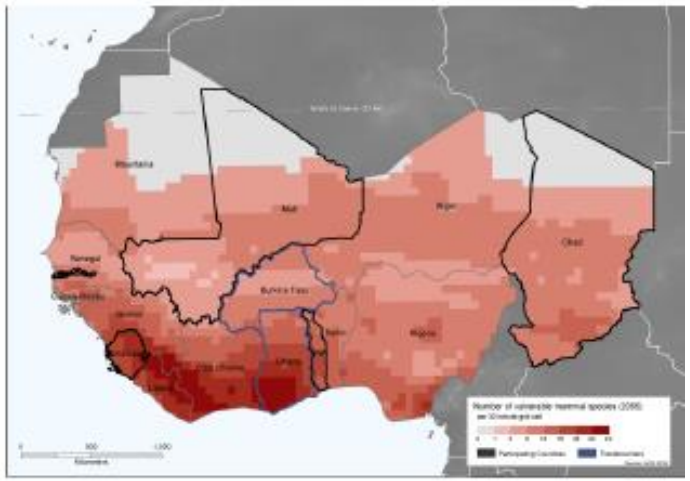
Options for action: Adjustment of protected areas and management

West Africa: Distribution of climate vulnerable mammals

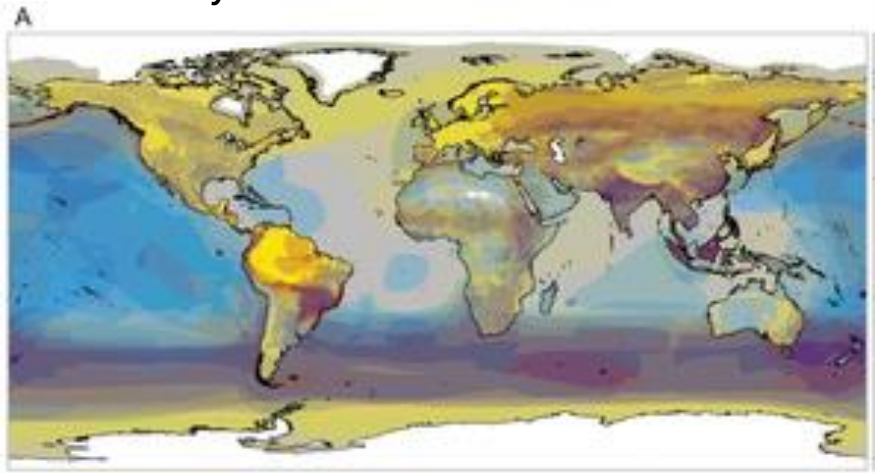
By 2040-2069

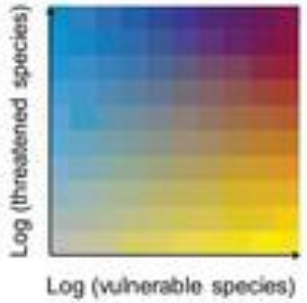


By 2070-2099



Concentrations of species that are both climate change vulnerable **and** threatened by **non-climate stressors**.





Foden WB, Butchart SHM, Stuart SN, Vié JC, Akçakaya HR, et al. (2013). PLOS ONE

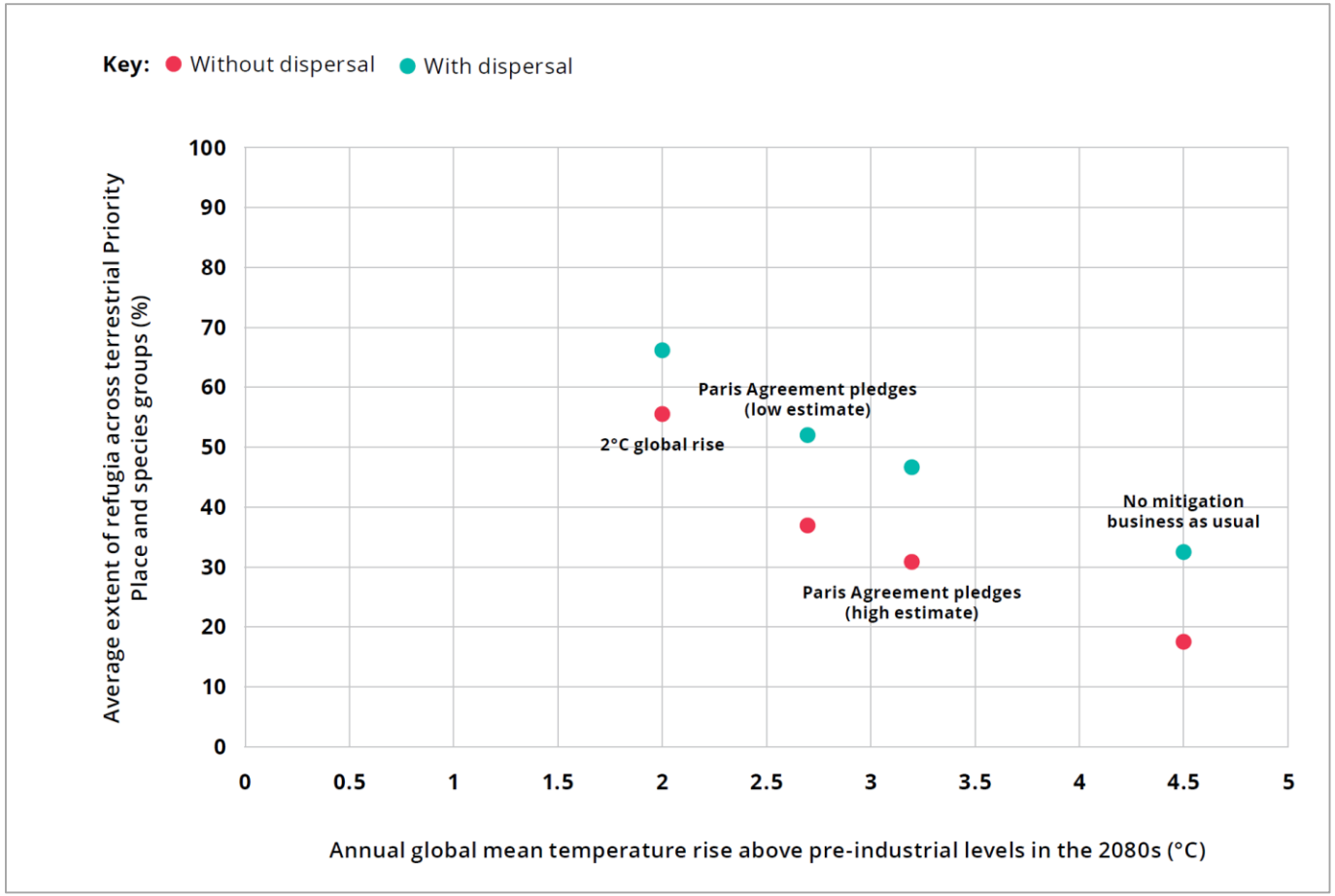
Protected Areas Resilient to Climate Change

Options for action

Identify and conserve climate refugia

Facilitate dispersal

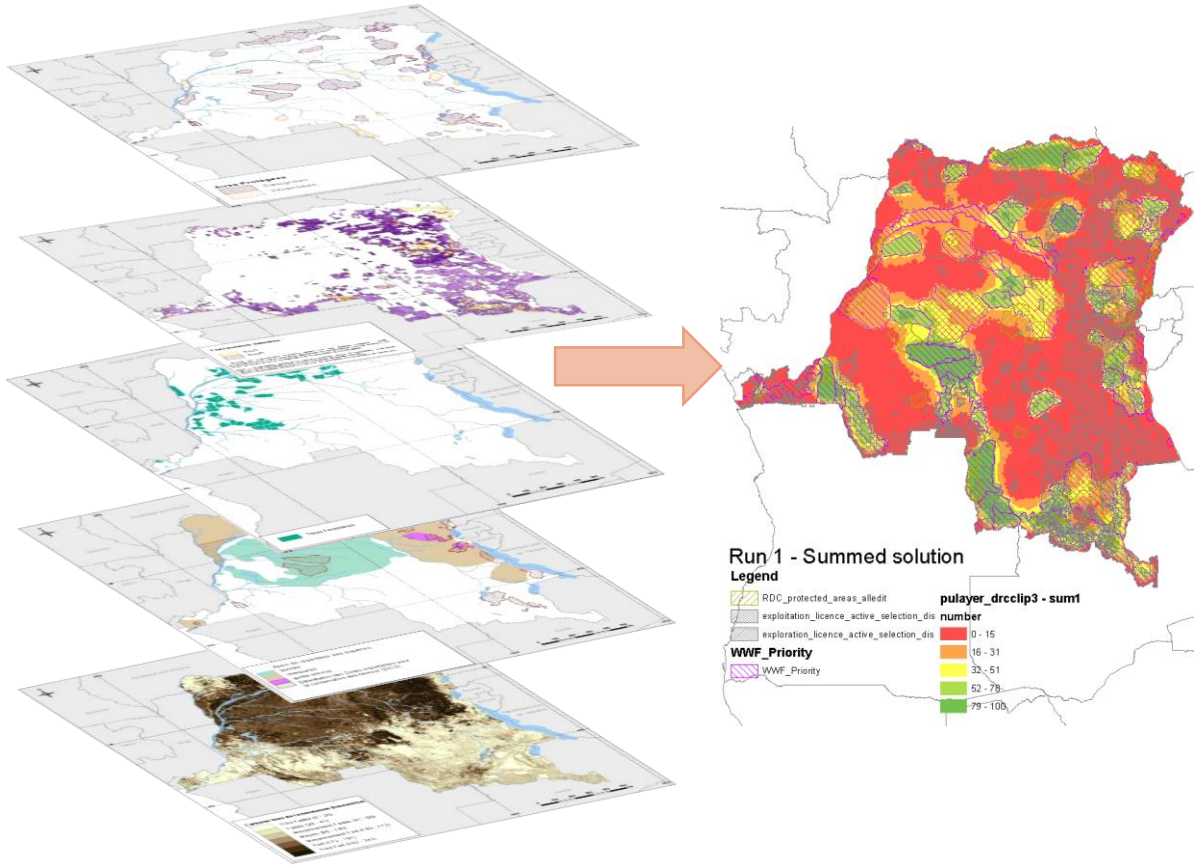
Contribute to achieving climate change mitigation objectives

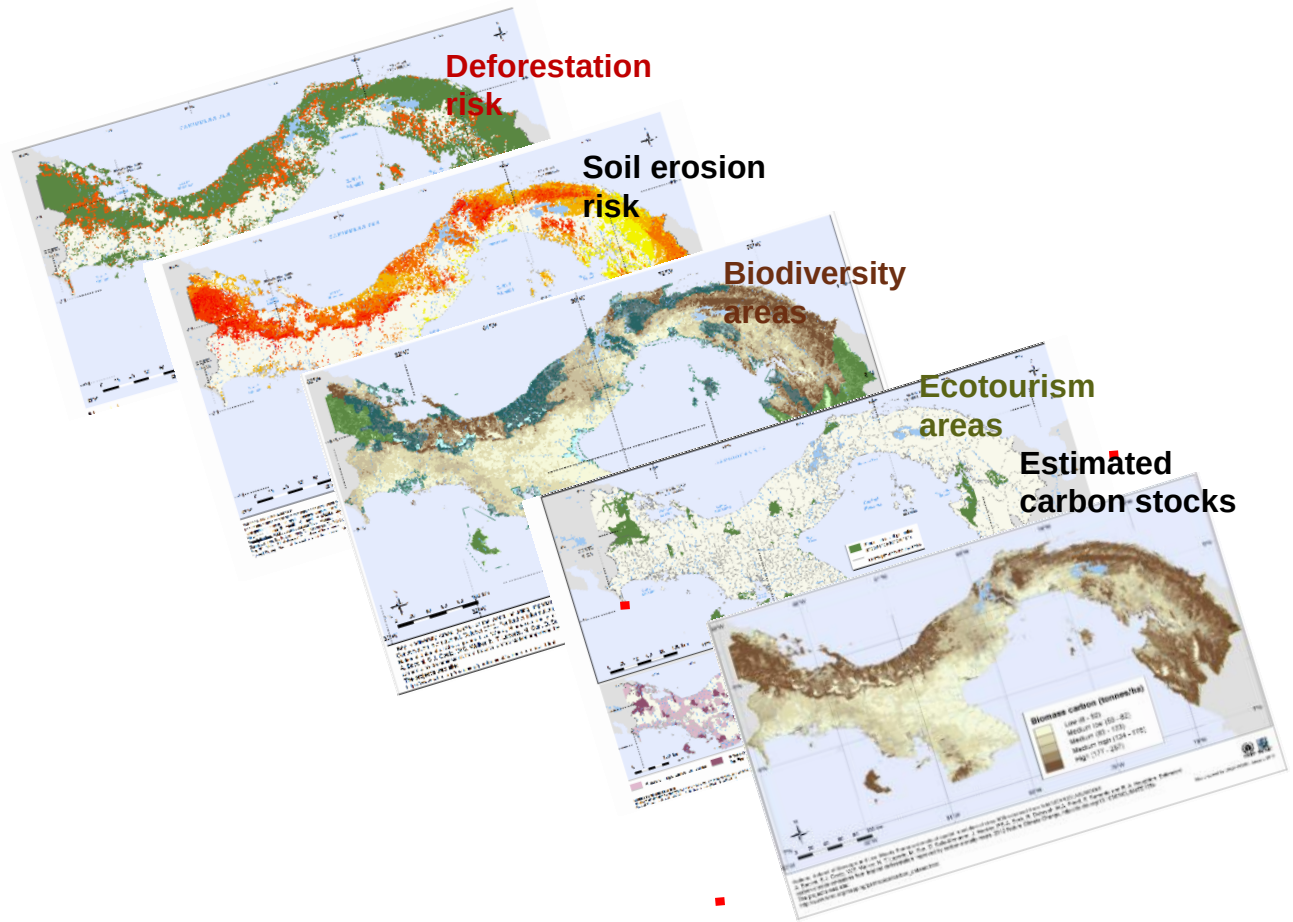


Average persistence of climate refugia - areas where 75% of the total number of species presently found in a given taxon in a given "Priority Place" will still be found under a changed climate

Warren at al. 2018, *Climatic Change*

Options for action: Planning & management for multiple benefits





CHALLENGES AND WAYS FORWARD

Challenges, ways forward and implications for business

Embrace uncertainty

- Make better use of the range of models and results available and take account of other pressures

Improvements to Environmental Impact Assessments

- EIA and measures to mitigate impacts need to account for climate change (how important will current ‘project’ impacts on biodiversity be under future climate?)

No regrets options can be opportunities for conservation

- Understand, highlight, and where possible maximise adaptation and/or mitigation value of conservation action

Increased awareness and reduced climate impacts of operations

DISCUSSION

Discussion

To what extent do your current efforts to assess and mitigate biodiversity impacts take account of climate change?

What would be the implications of doing so?

Do you use ecosystem-based approaches to reducing climate risk?

What would be needed to make them more attractive to you?

UN Environment
World Conservation Monitoring Centre

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Valerie Kapos

Head of Programme, Climate Change & Biodiversity

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