



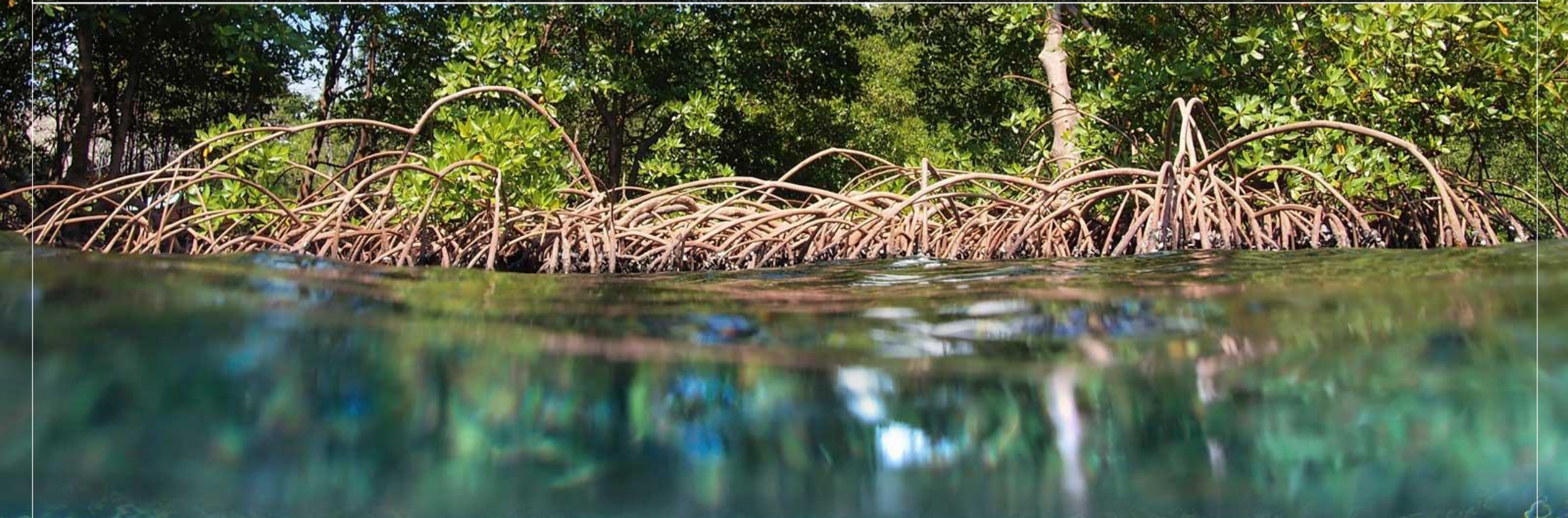
United Nations Environment  
World Conservation Monitoring Centre




# PROTEUS ANNUAL MEETING

20<sup>th</sup> – 22<sup>nd</sup> June 2018, David Attenborough Building, Cambridge, UK





## **HORIZON SCANNING: EMERGING ISSUES AND NEW DEVELOPMENTS**



**MAPPING BIODIVERSITY THREATS – APPLICATIONS FOR EXTRACTIVES**

Neil Burgess, Chief Scientist, UNEP-WCMC

# Focal areas

**What are the main threats to biodiversity?**

**How are we trying to map these various threats?**

**How are we thinking to make threat data (and solutions data) available?**

**Case study on oil, gas, coal, and protected areas and biodiversity**



**WHAT ARE THE MAIN  
THREATS TO  
BIODIVERSITY ?**

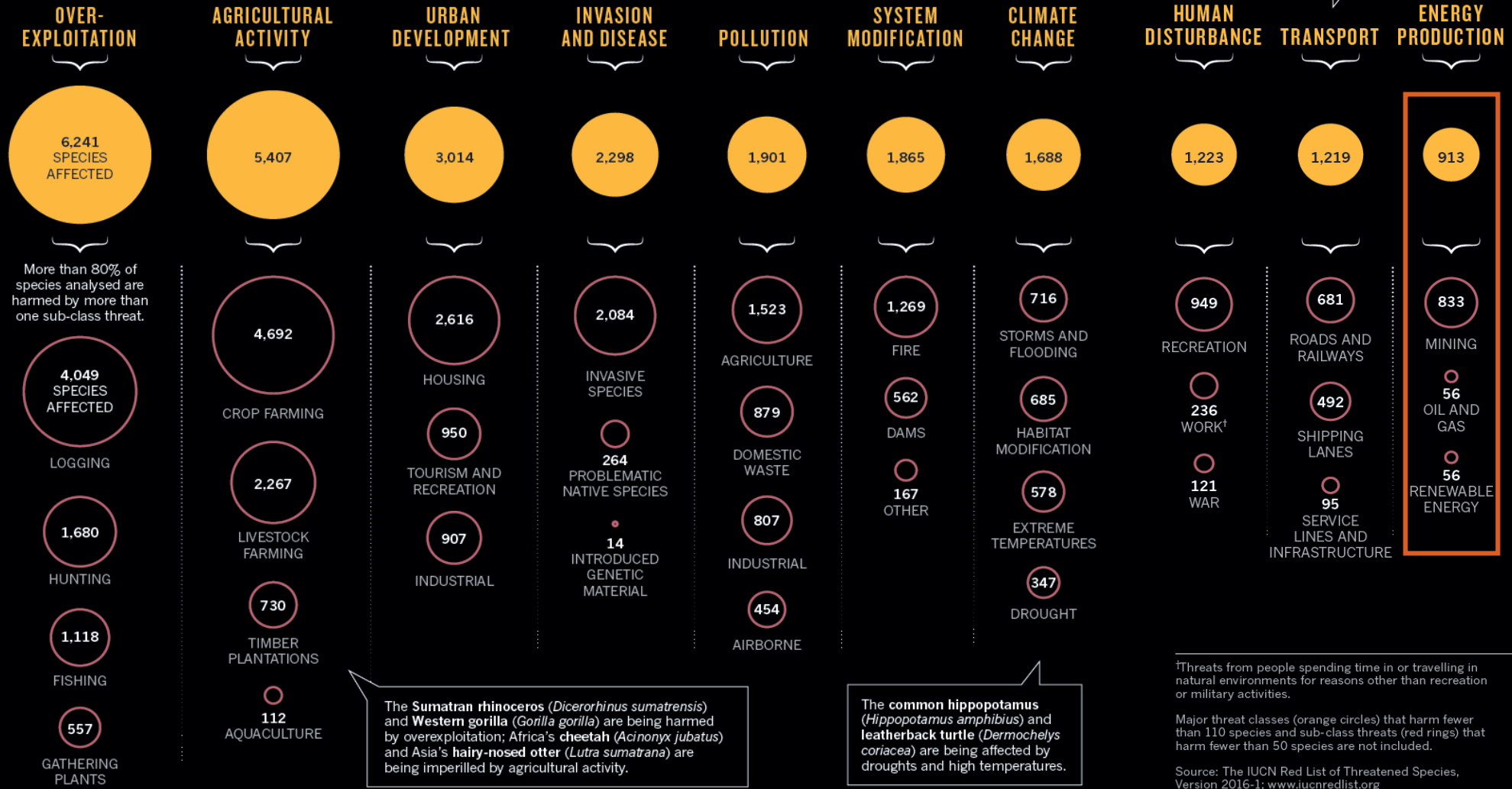
# Mapping threats to species on the IUCN Red List

[Link to paper](#)

## BIG KILLERS

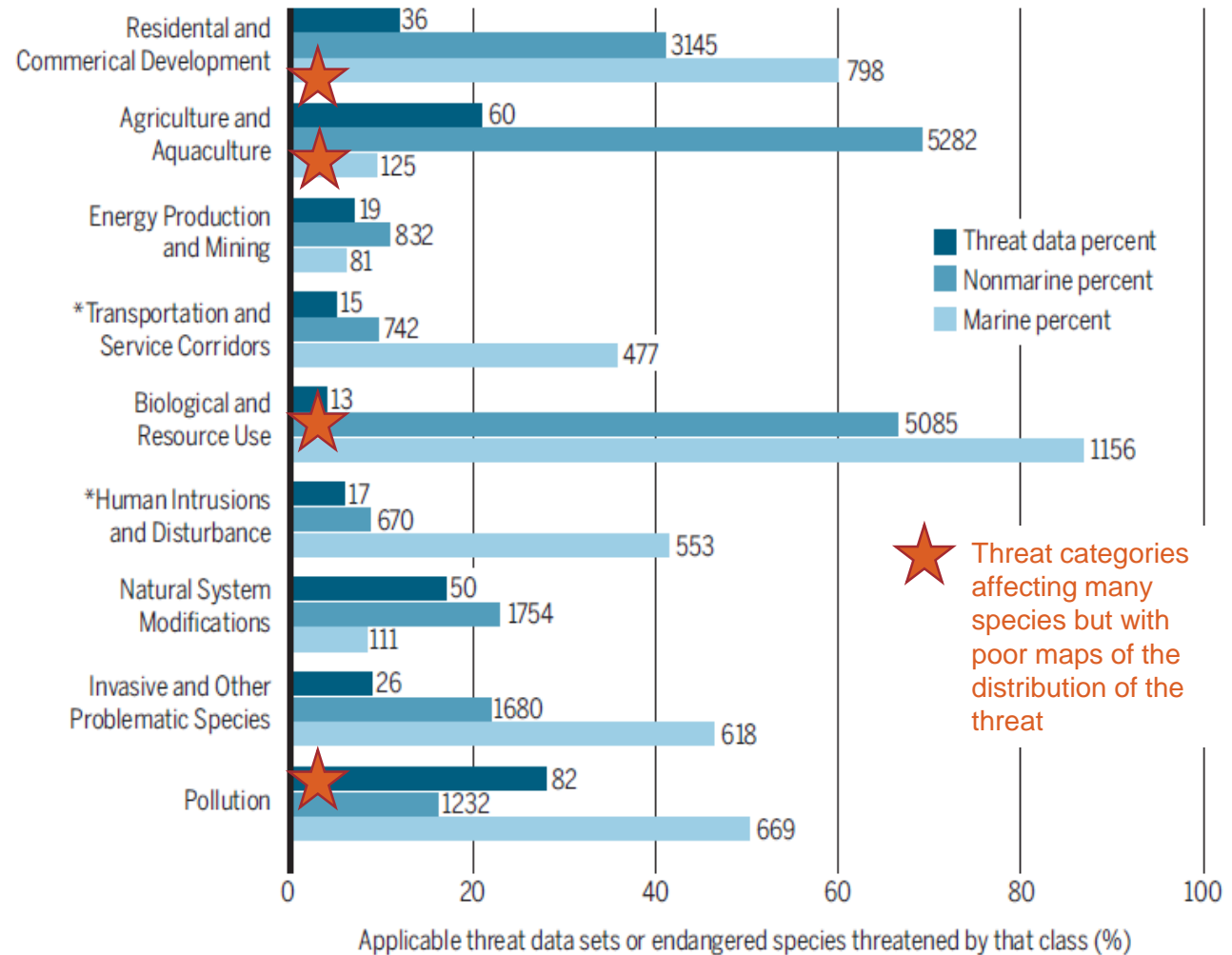
Overexploitation and agriculture are the most prevalent threats facing the 8,688 threatened or near-threatened species from comprehensively assessed species groups on the IUCN Red List.

The Spanish imperial eagle (*Aquila adalberti*) and giant panda (*Ailuropoda melanoleuca*) are being harmed by road building.



# How many of these threats can be mapped?

- Some threat classes affecting many species can be mapped using existing data. Others cannot.
- Particular problem in mapping 'biological resource use': logging, hunting, wildlife trade, fishing, etc.



[Link to paper](#)



# HOW TO MAP AND MEASURE MULTIPLE THREATS ?

# Collating mapped threat data

Humanitarian data e.g. refugee camps

Economic data

Human population data

Agriculture e.g. cropland, pasture and livestock data

Energy production & mining e.g. mining concessions in forests

Land cover and tree cover loss

Pollution e.g. nutrient application to crops

Infrastructure e.g. roads, airports, train stations and ferry terminals

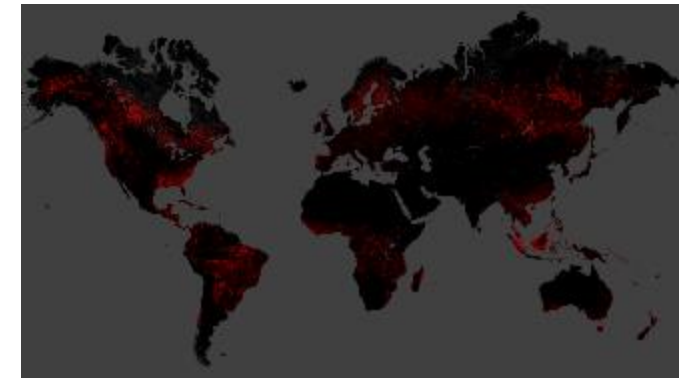
Urbanisation e.g. global map of travel time to cities (accessibility)

Military activity e.g. armed conflict location data

Irrigation and fire data



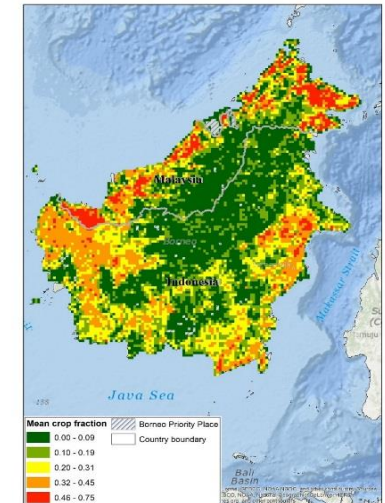
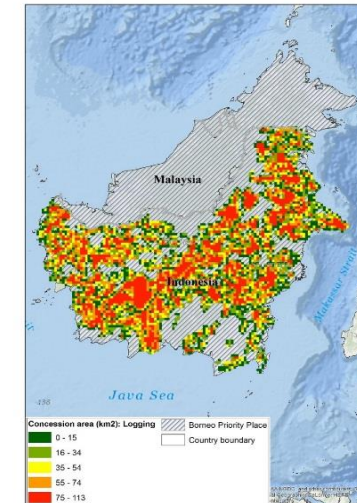
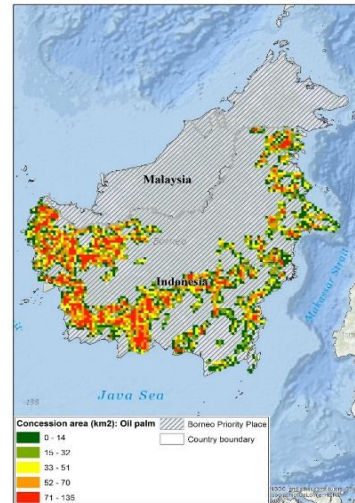
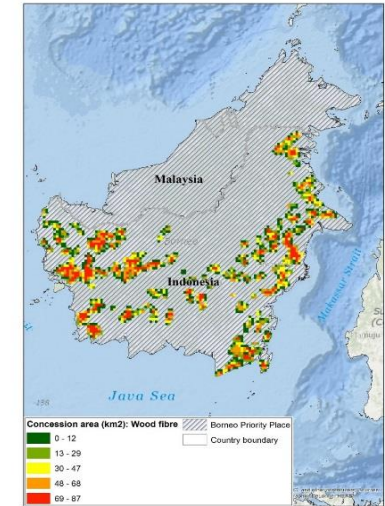
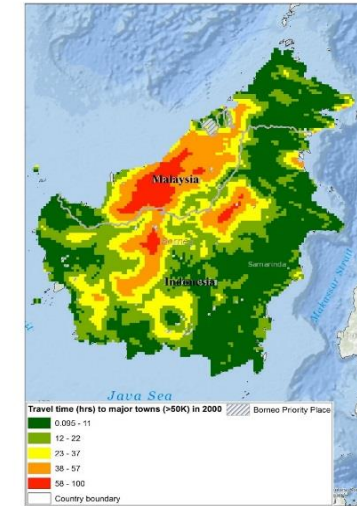
Human population density 2015 (CIESIN, 2016)



Forest cover loss 2000-2016 Hansen *et al*

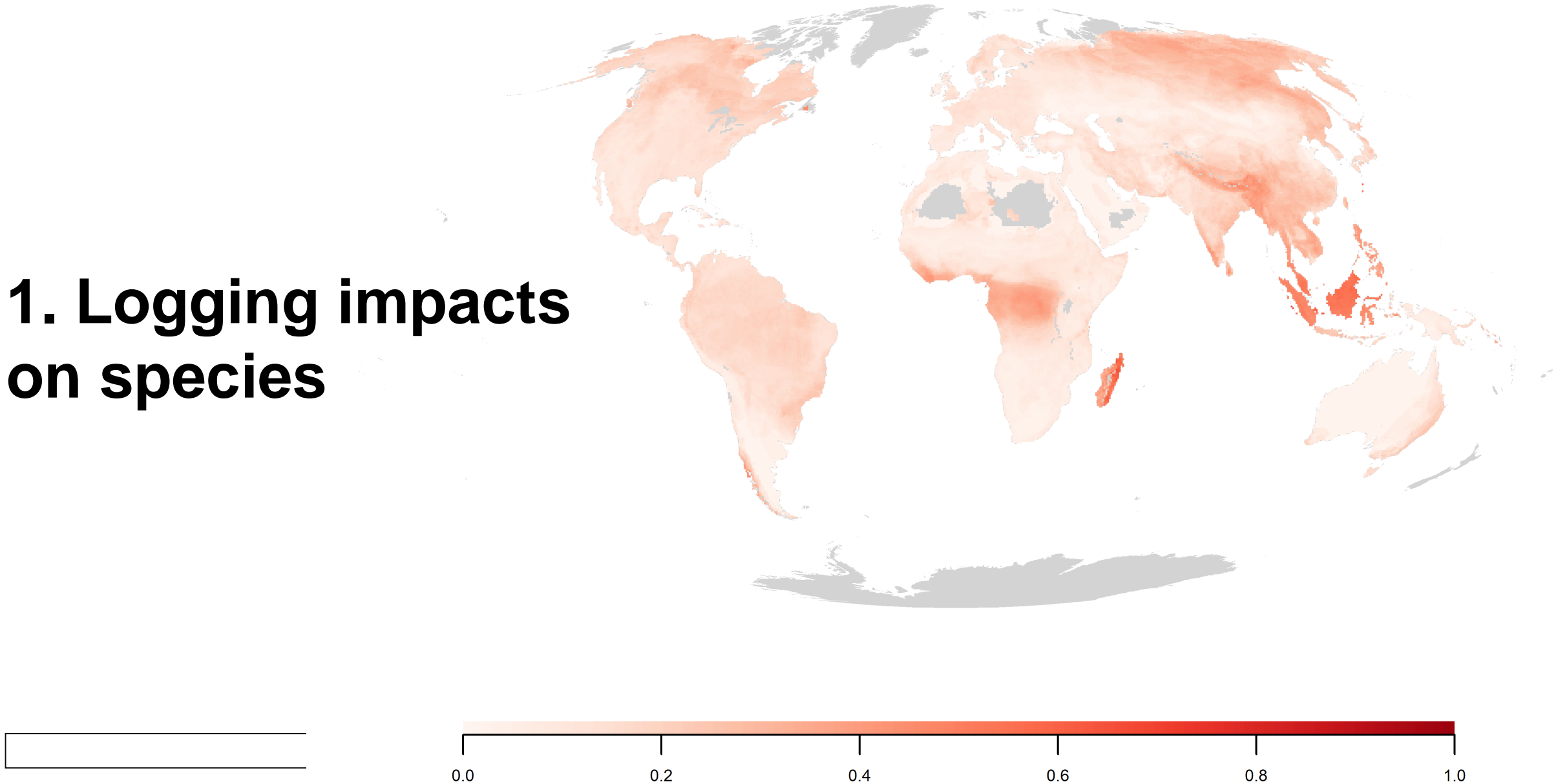
# What would maps of threats look like?

- Examples of standardised threat maps
- Borneo, WWF Priority Place
- Aiming to standardise these kinds of maps globally and provide threat data through GeoPortal system
- Luc Hoffmann Institute and Cambridge Conservation Initiative funding
- Hundreds of maps made for WWF Focal areas

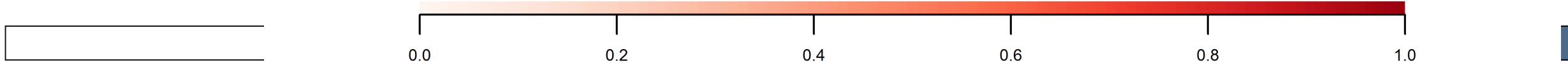
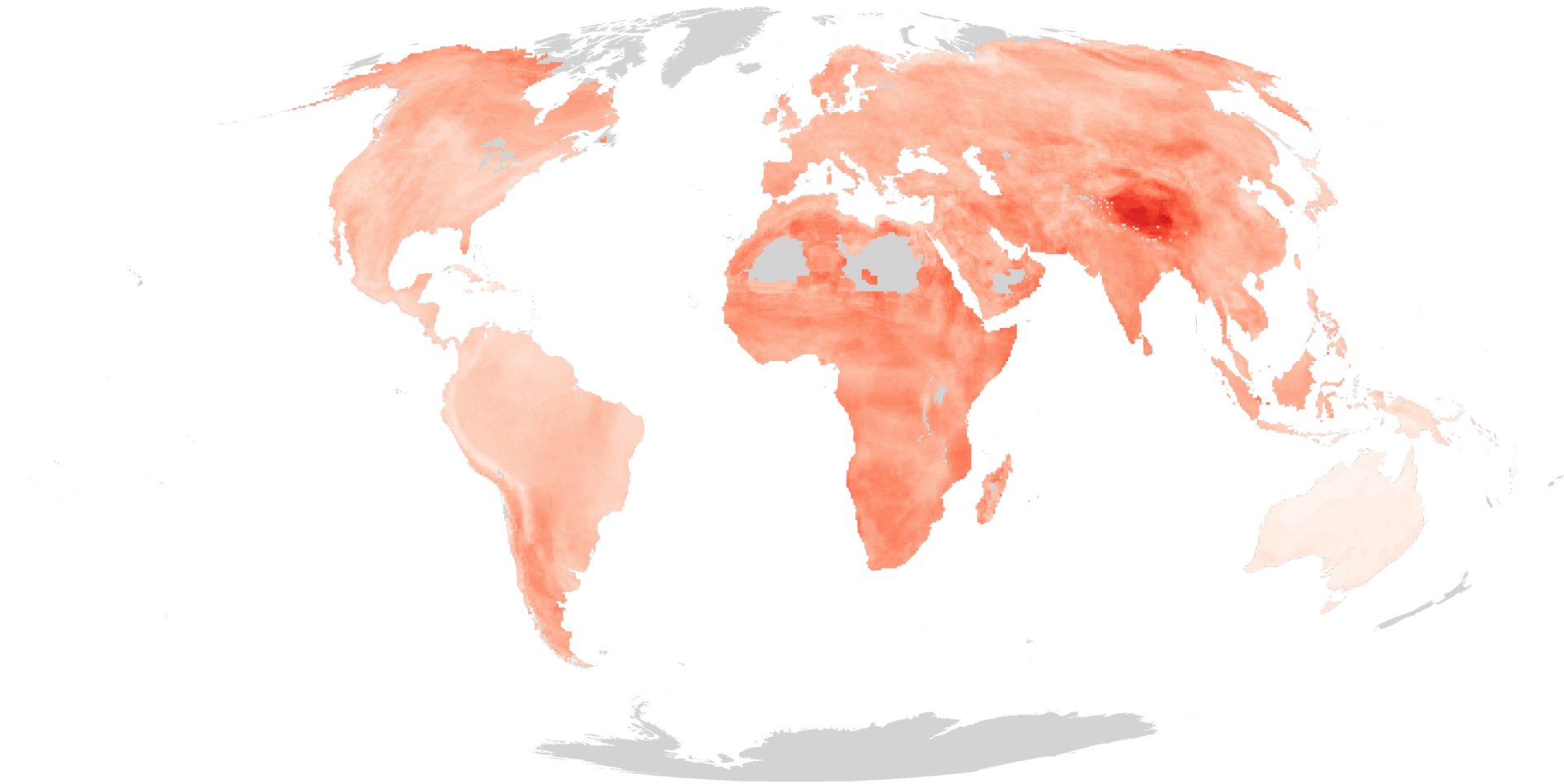


# Mapping distribution of threats to species in the IUCN red list

## 1. Logging impacts on species



# 2. Hunting impacts on species



# An ongoing survey on user needs for spatial data in Cumulative Impact Assessments

The survey so far suggests that threat data from a range of categories would be useful for CIAs

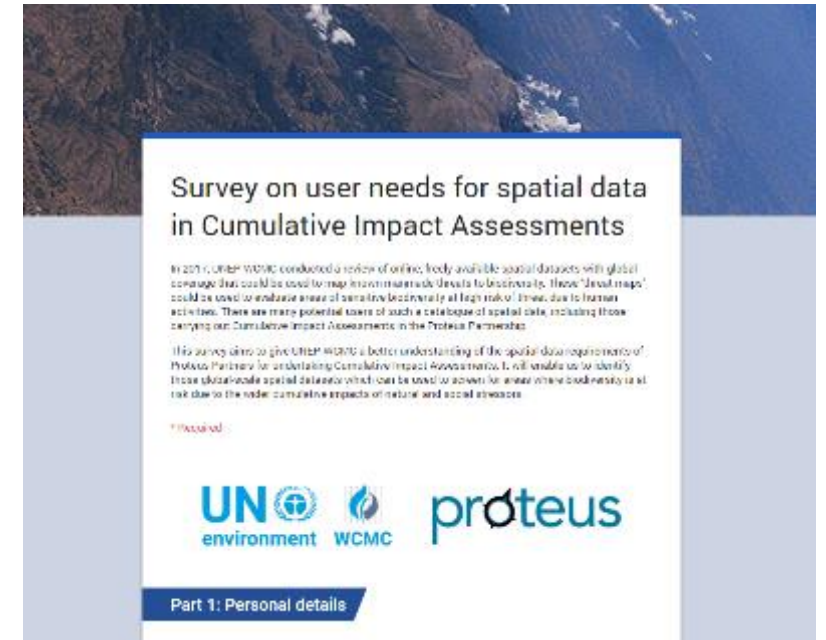
It indicates that a tool providing information on threats to biodiversity would be very useful for CIAs

Such a tool should be as location specific as possible, detailed and show trends over time

Threat data would also be useful for other environmental impact assessments

The survey is still open

<https://goo.gl/forms/3bqX7toMOQuJyaA72>





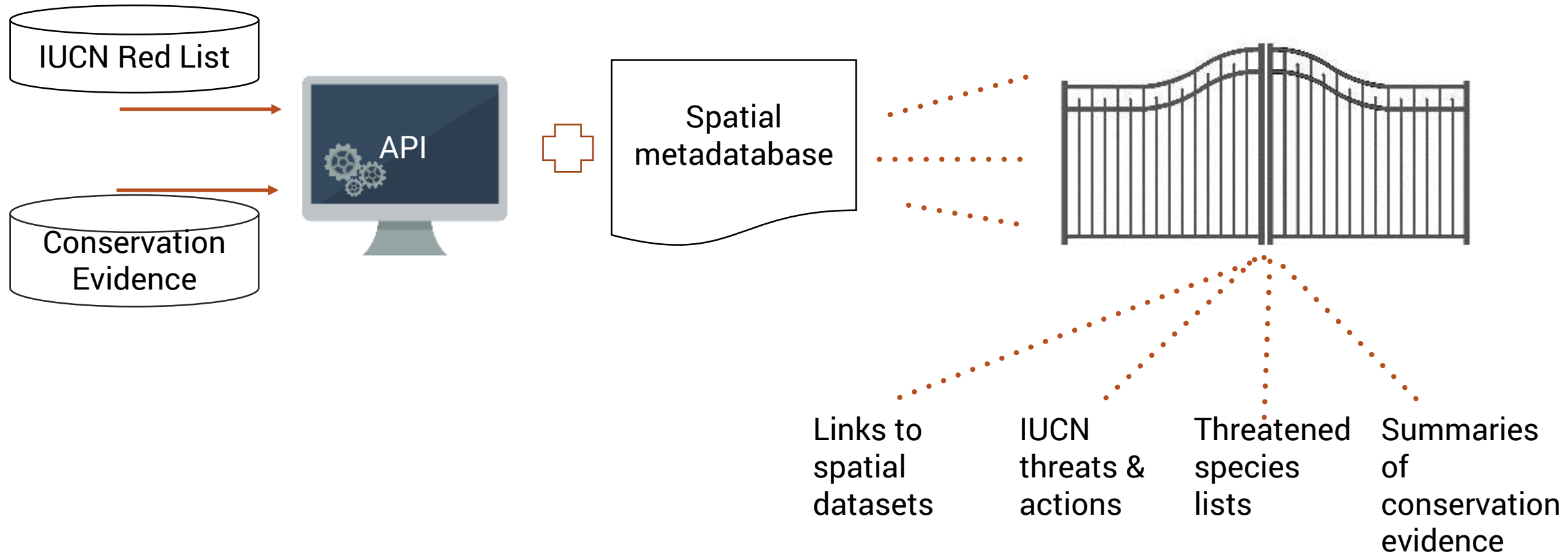
# **BUILDING A THREATS TO BIODIVERSITY INTEGRATION TOOL**

# Accessing information on threats, actions and evidence

## The problem of accessing information on threats to biodiversity

- **< 5% of 290 global, spatial datasets discovered** are usable for global threat mapping
- **there is no centralised database** of knowledge on threats to biodiversity akin to IBAT
- to summarize the scientific evidence of the impacts of the full range of threats on all species groups and habitats **would take approximately 90-125 people years**
- **An online portal, funded by the Cambridge Conservation Initiative,** is the first step to access the evidence base and unify disparate knowledge, leading to standardised threat assessments

# Conservation GATeWay - Global Assessment of Threats and Evidence



# Conservation Evidence provides a summary of evidence for what we know about conservation actions and if they work

The screenshot shows the homepage of the Conservation Evidence website. At the top, there is a search bar and a language selection dropdown. The main heading is "Conservation Evidence" with the tagline "Providing evidence to improve practice". Below this is a navigation menu with links for "Browse Evidence", "Journal", "About us", and "Resources". A large banner image shows ducks in water, with the text "Bird Conservation" and "Search our free summaries of scientific information to help make your conservation decisions more effective". Below the banner, there is a "Browse by category:" section with a grid of nine categories, each with an icon and a count of actions. A "See more" button is on the right side of the grid. At the bottom, there are three buttons: "Our mission", "The journal, Conservation Evidence", and "Conservation Evidence on Twitter".

Conservation Evidence  
Providing evidence to improve practice

Search [ ] Select Language [ ]

Tweet Share Browse Evidence Journal About us Resources

**Bird Conservation**  
Search our free summaries of scientific information to help make your conservation decisions more effective

Browse by category:

Amphibian Conservation 129 Actions	Bat Conservation 78 Actions	Bee Conservation 59 Actions
Bird Conservation 455 Actions	Control of Freshwater Invasive Species 161 Actions	Farmland Conservation 119 Actions
Forest Conservation 122 Actions	Management of Captive Animals 96 Actions	Mediterranean Farmland 75 Actions

See more [ ]

Our mission The journal, *Conservation Evidence* Conservation Evidence on Twitter

What is this?

Step 1 (of 4) Please choose a habitat

1. Forest

Step 2 (of 4) Please choose a threat classification

3. Energy production & mining

Step 3 (of 4) Please choose a country

Cameroon

Step 4 (of 4) Please choose an action classification

Please select

- 1. Land/water protection
- 2. Land/water management
- 3. Species management
- 4. Education & awareness
- 5. Law & policy
- 6. Livelihood, economic & other incentives



### Gain a deeper insight into threats to biodiversity

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### Spread the word

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### About the work

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Read more

# Results

Habitat 1. Forest Threat 3. Energy production Country Cameroon Action 3. Species management

Results have been collected from the below sources (showing 31 items in total)

Sort

Conservation Evidence (6) Red List species (1) Threat metadata (24)

Gorilla gorilla (Western Gorilla)

CR

Read more

This species is Critically Endangered

Sort

## About the work

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Read more

## About

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# Status of Conservation GATEway

- **Prototype under development having gone through user testing**
- **High fidelity designs approved by project team**
- **Planned for development by UNEP-WCMC Informatics in Autumn 2018**
- **Initial funds to launch concept and build basic site, more needed to develop it and expand potential use cases, e.g. to business users**



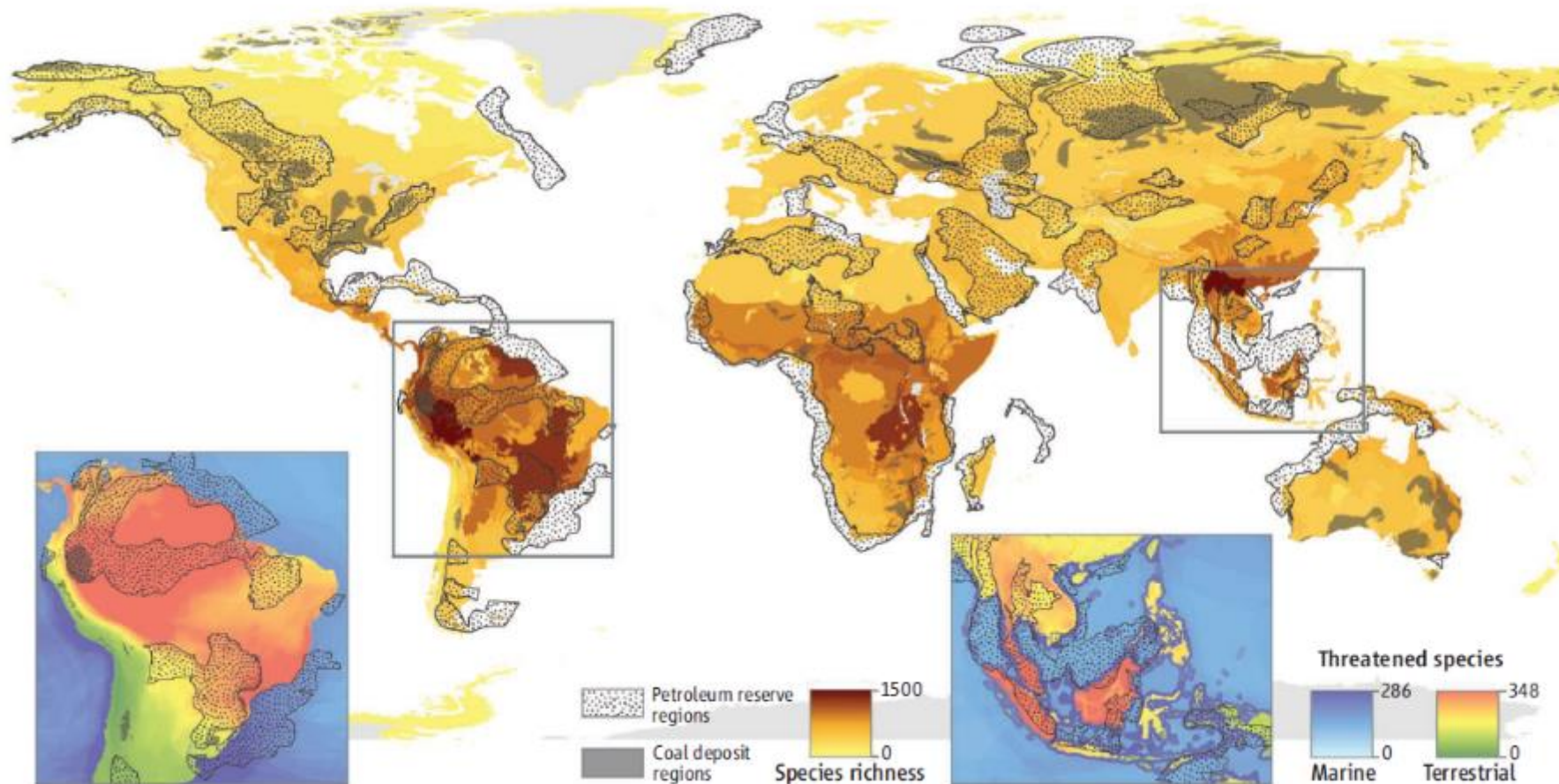
**OVERLAY BETWEEN OIL,  
GAS AND COAL AND  
BIODIVERSITY FEATURES**

## CONSERVATION

# Biodiversity Risks from Fossil Fuel Extraction

The overlapping of biodiverse areas and fossil fuel reserves indicates high-risk regions.

N. Butt,<sup>1\*</sup> H. L. Beyer,<sup>1</sup> J. R. Bennett,<sup>1</sup> D. Biggs,<sup>1</sup> R. Maggini,<sup>1</sup> M. Mills,<sup>2</sup> A. R. Renwick,<sup>1</sup>  
L. M. Seabrook,<sup>1,2</sup> H. P. Possingham<sup>1</sup>



# Aims

## *Past and Present*

How is exploitation distributed spatially?

What is the relationship between this exploitation and biodiversity?



## *Future*

How is the likely future exploitation distributed spatially?

How does the relationship between exploitation and biodiversity for this likely future compare to the past and present?

Are there any conservation implications?

Can we identify locations of particular concern?

# Data



1. Wells, pipelines and refineries
2. Oil and Gas fields

**S&P Global**

Coal mining locations

Note: this analysis was completed in 2014-2015, but took some years to get published.

There are now many more protected areas in the WDPA, many more species mapped in the Red List and updated data in the IHS and S&P Global databases.



Distributions of protected areas



Species distribution maps for 37,583 terrestrial, freshwater and marine species

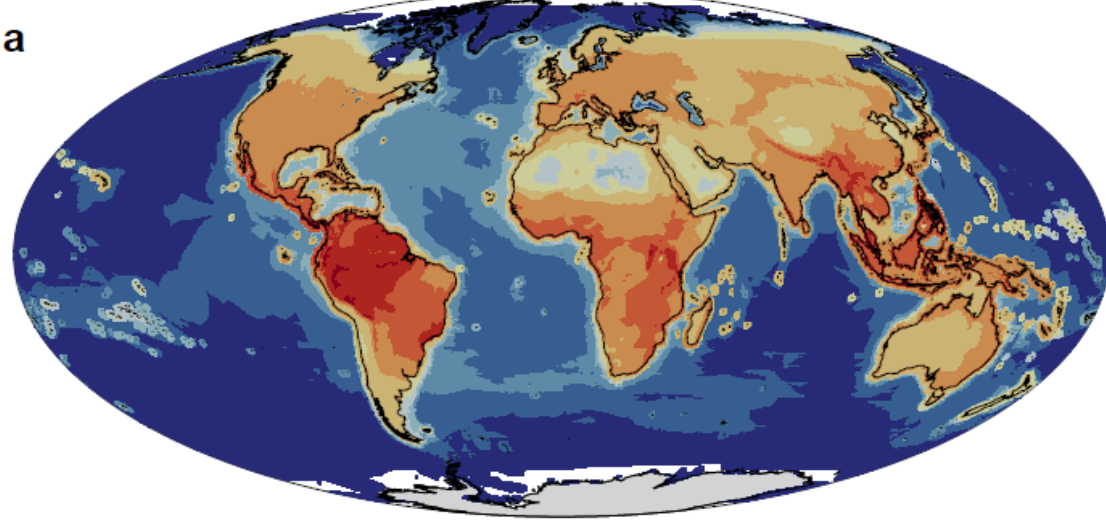
# Biodiversity data

## All IUCN red list

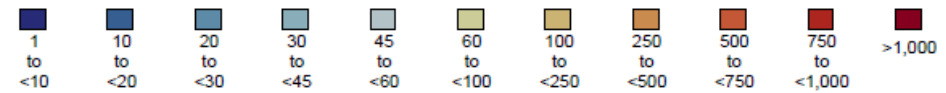
**Species richness** is number of species in a 50x50 grid (overlapping range maps)

**Range rarity** is a calculation of the inverse range size per grid for each species, with sums for all these scores added up. Represents endemism value

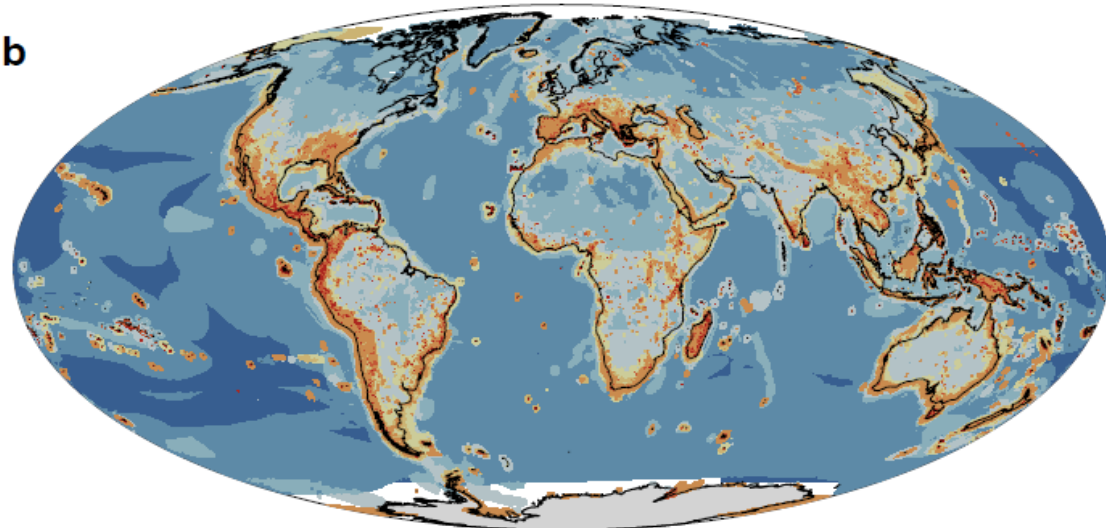
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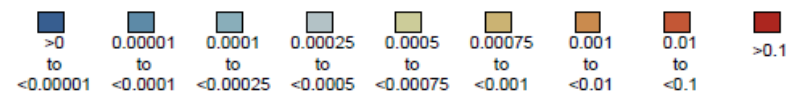
Assessed species richness



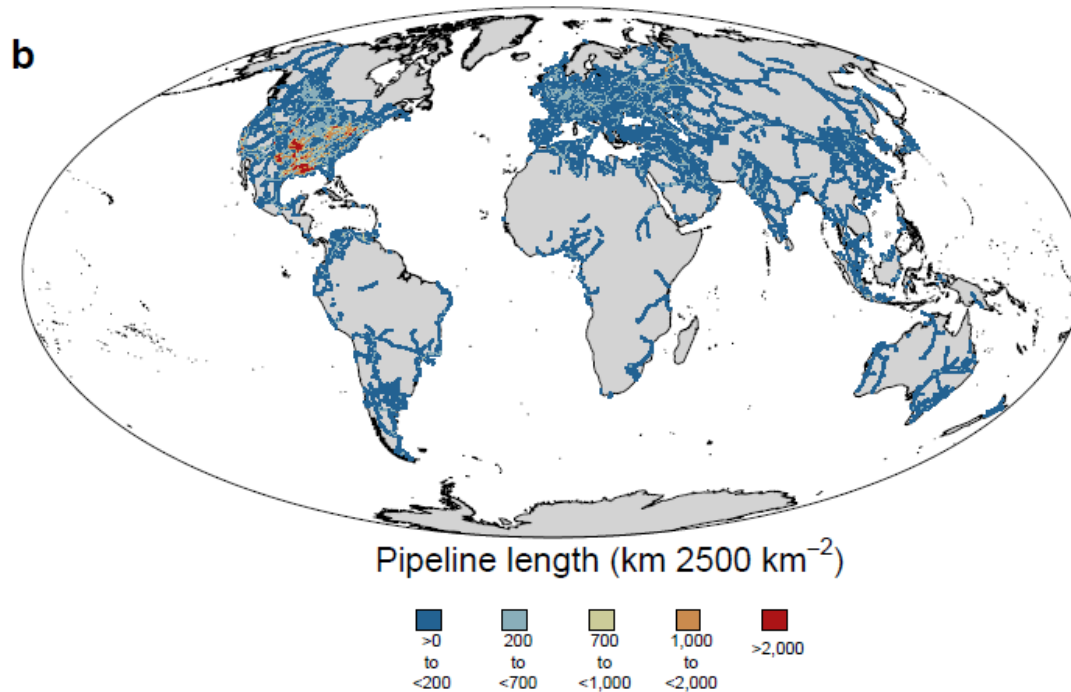
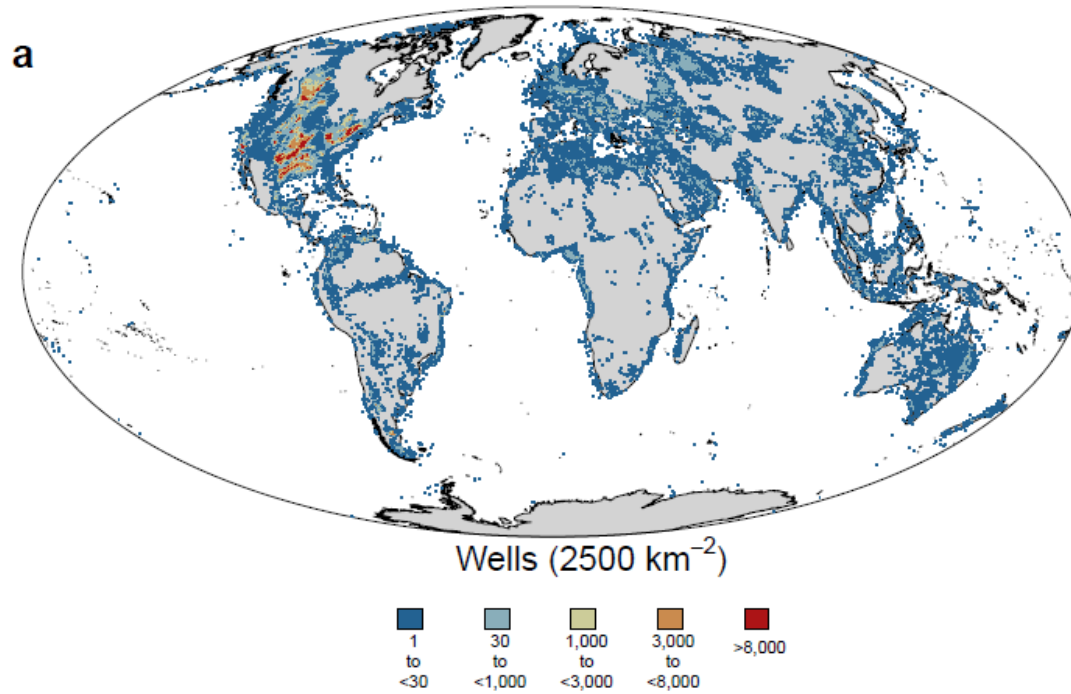
b



Assessed range rarity

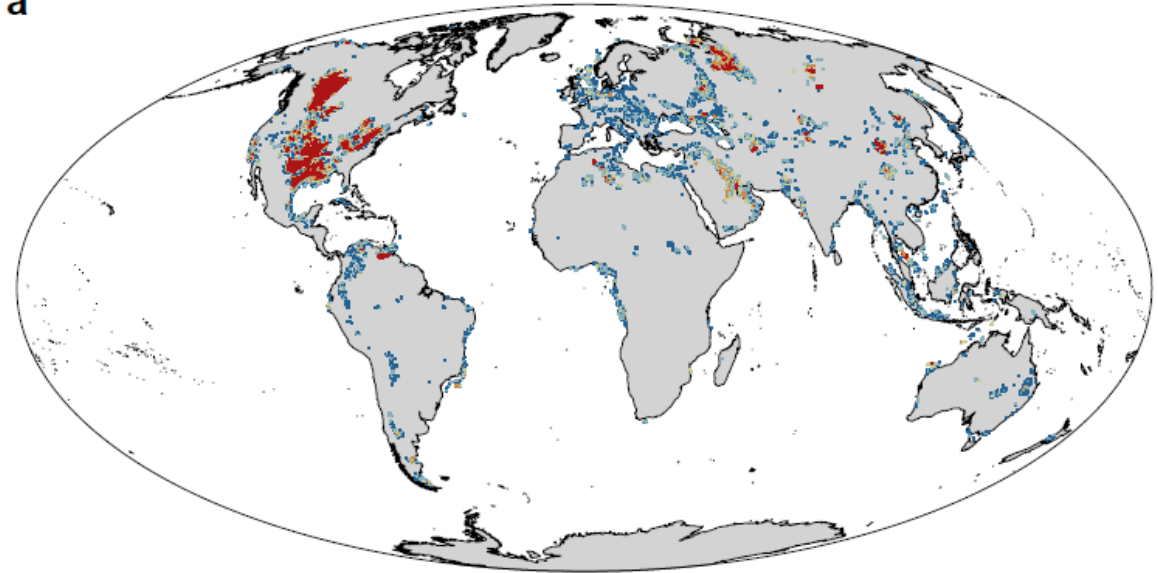


# Global density of oil and gas wells (a) and pipeline length (b) at 50 km × 50 km resolution

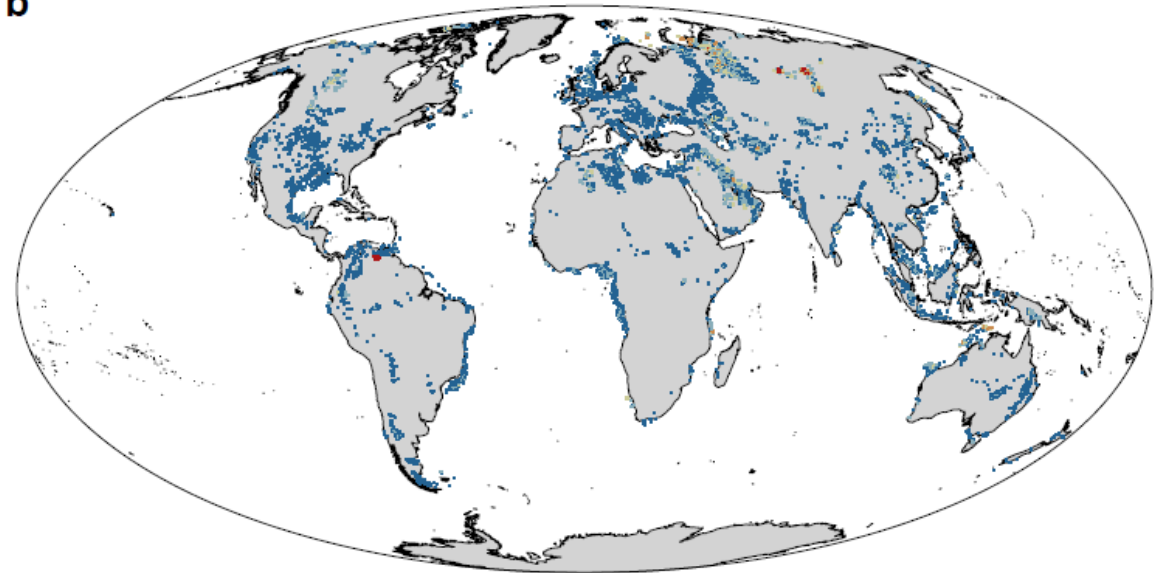


Global density of exploited (a) and near-future oil and gas fields (b) at 50 km × 50 km resolution

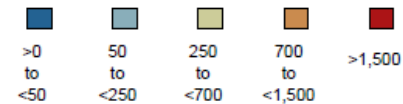
a



b



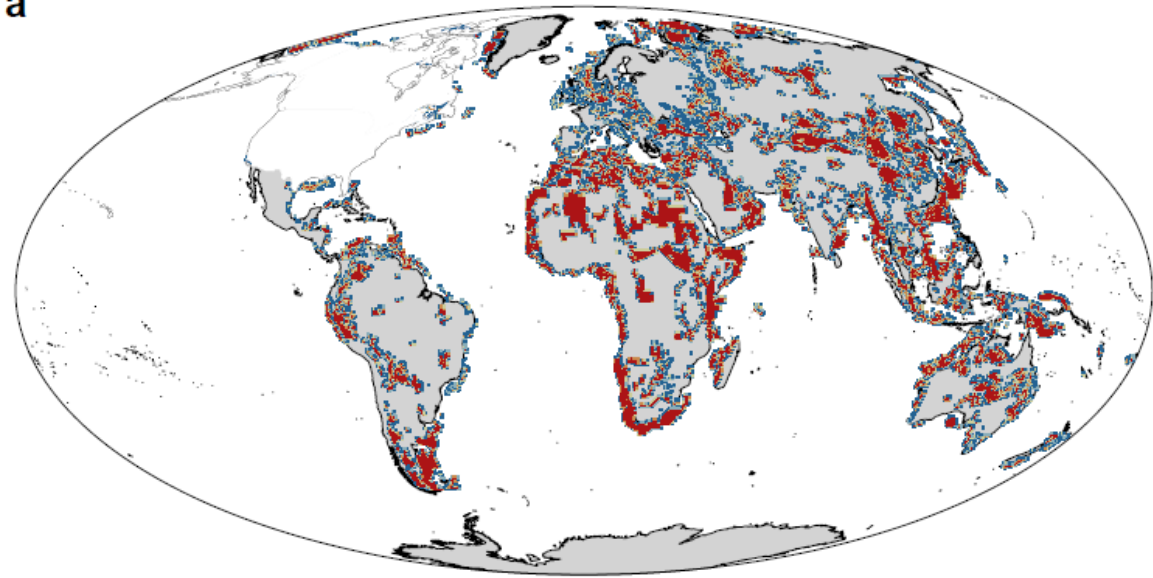
Fields ( $\text{km}^2$  2500  $\text{km}^{-2}$ )



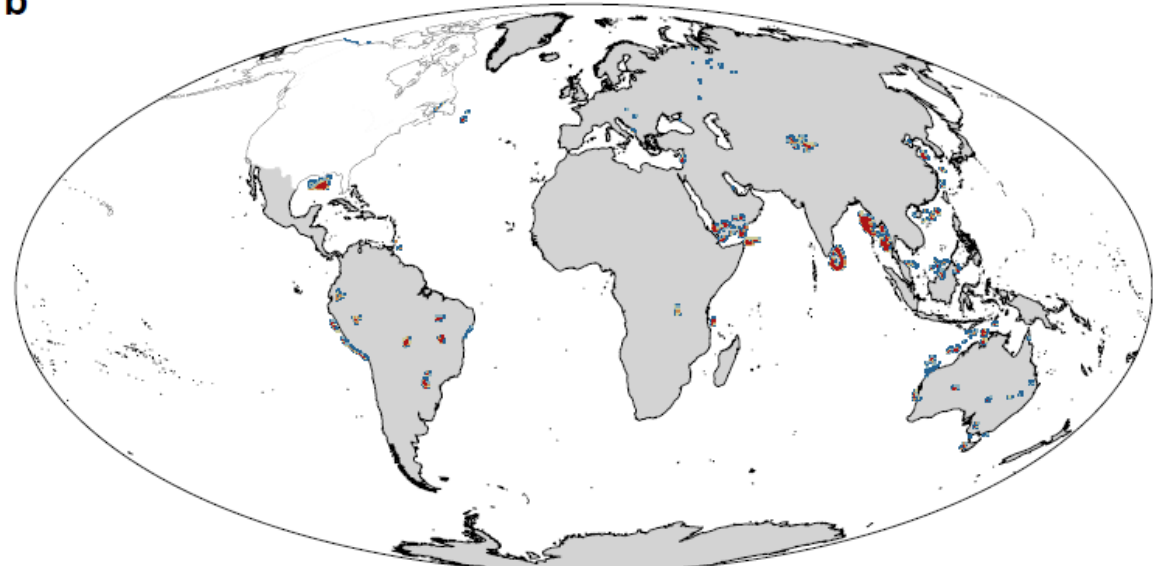
Global density of licensed (a) and future-exploration oil and gas contract blocks (b) at 50 km × 50 km resolution

Data for USA and Canada not available

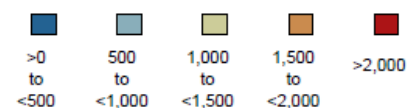
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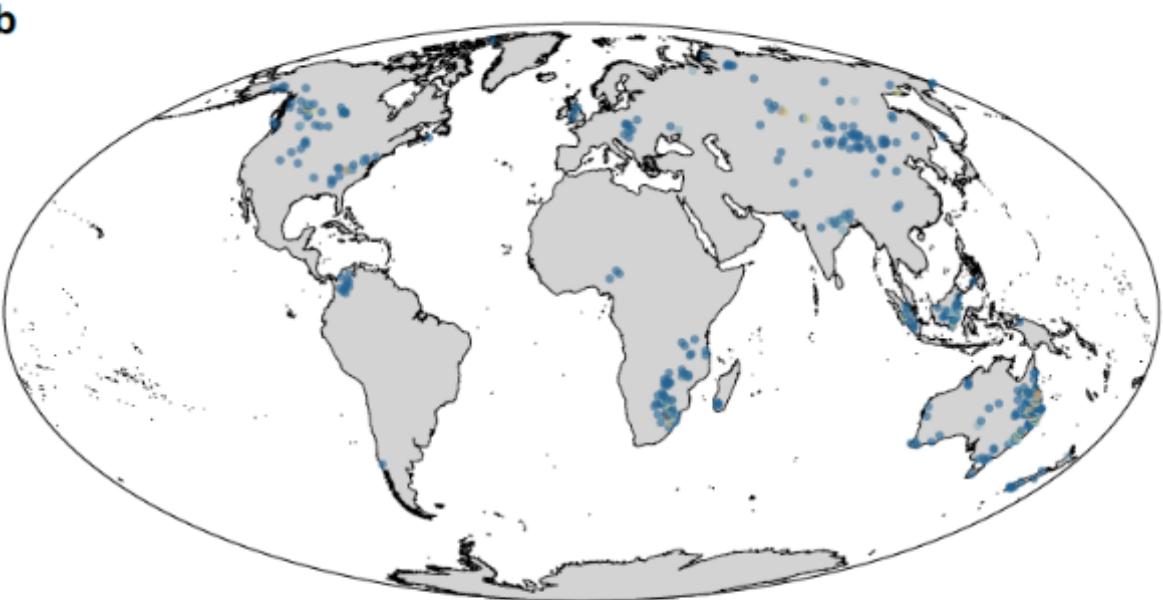
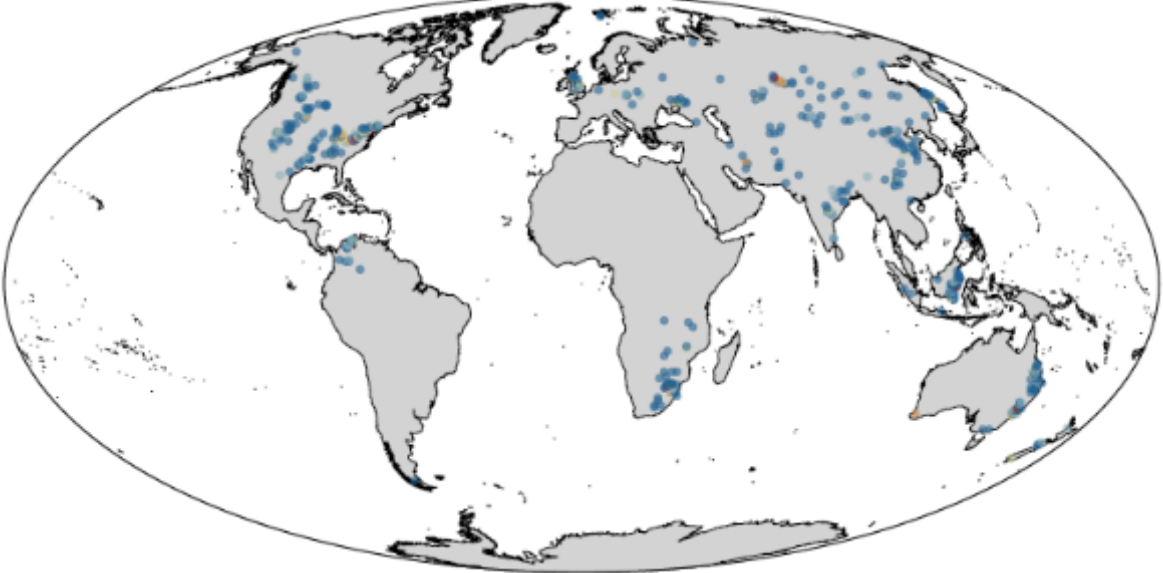
b



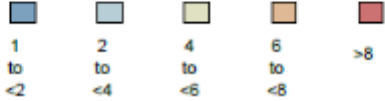
Blocks ( $\text{km}^2$  2500  $\text{km}^{-2}$ )



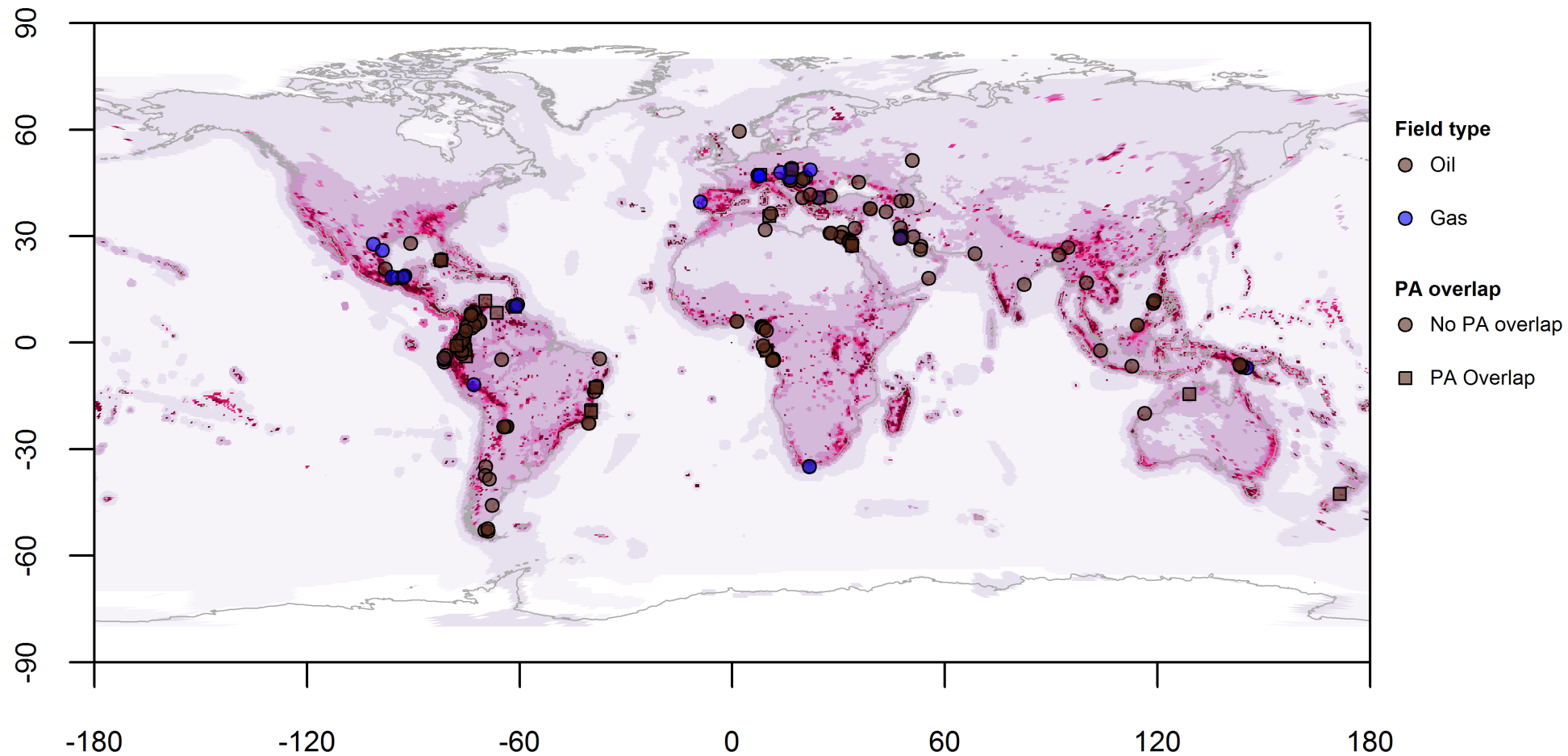
Global density of active (a) and exploratory coal mines (b) at 50 km × 50 km resolution



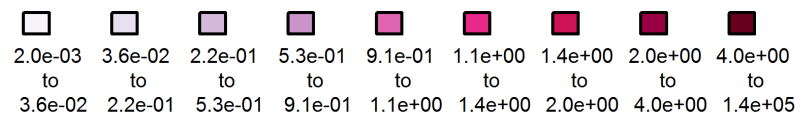
Mines (2500 km<sup>-2</sup>)



# Overlap analysis

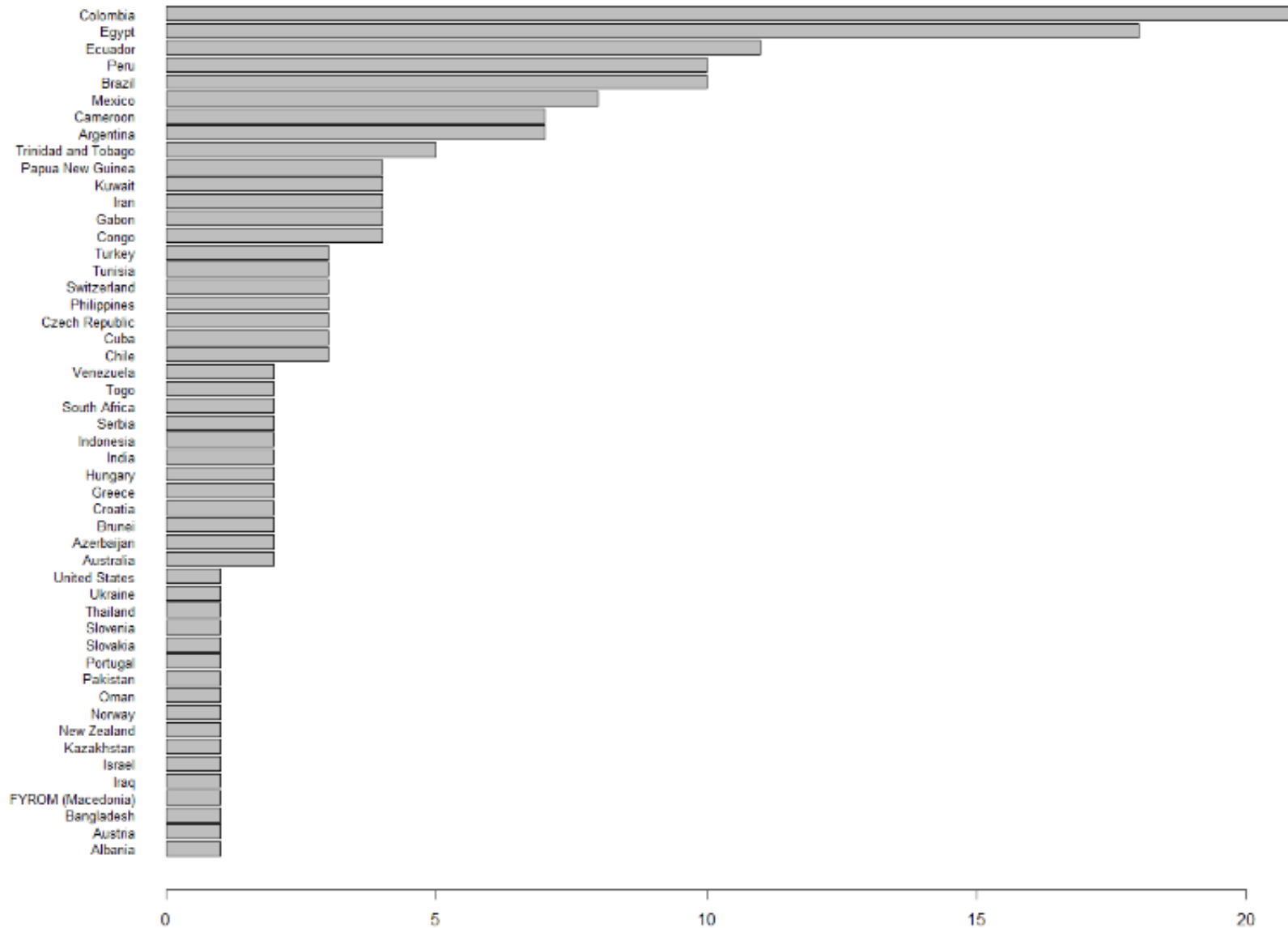


Geometric mean species richness and range rarity



Dots show areas of critical overlap between protected areas, range rarity and oil and gas fields

# Country overlap



Number of high risk fields

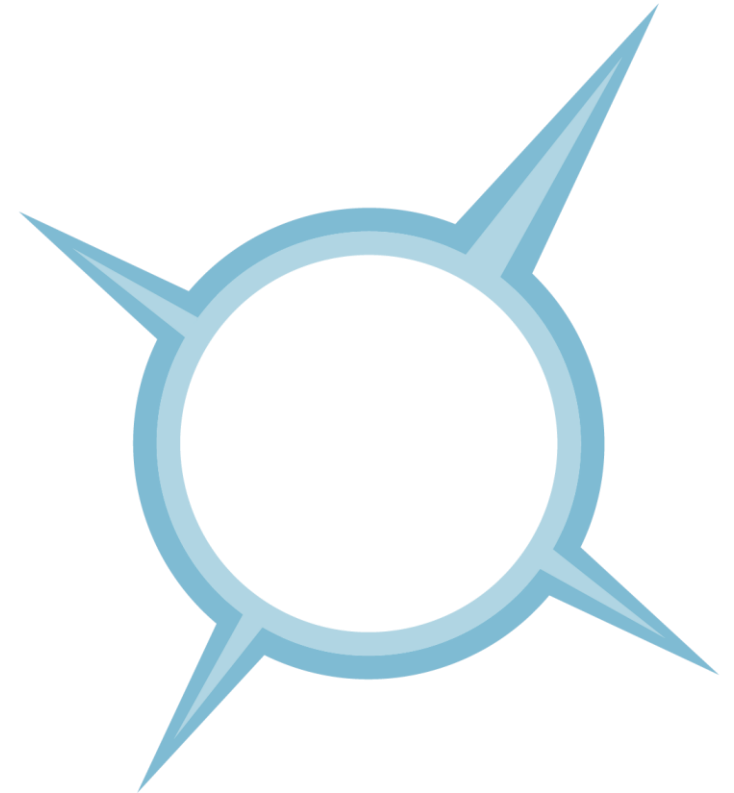
# Summary

- **UNEP-WCMC has various strands of ongoing work on mapping threats and pressures**
- **We have a portal in progression to hold these kinds of data**
- **This portal links from spatial and non-spatial threats data to species data (IUCN Red List) to knowledge on how to solve the threats (Conservation Evidence)**
- **Potential relevance to Proteus and IBAT to be explored**



**THANK YOU**

# Questions?





United Nations Environment  
World Conservation Monitoring Centre



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