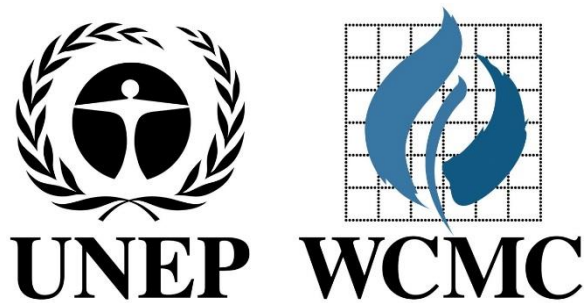


Enhancing the resilience of PAs and natural WH sites to the impacts of climate change (and other projects)

Elise Belle, Protected Areas Programme, UNEP-WCMC

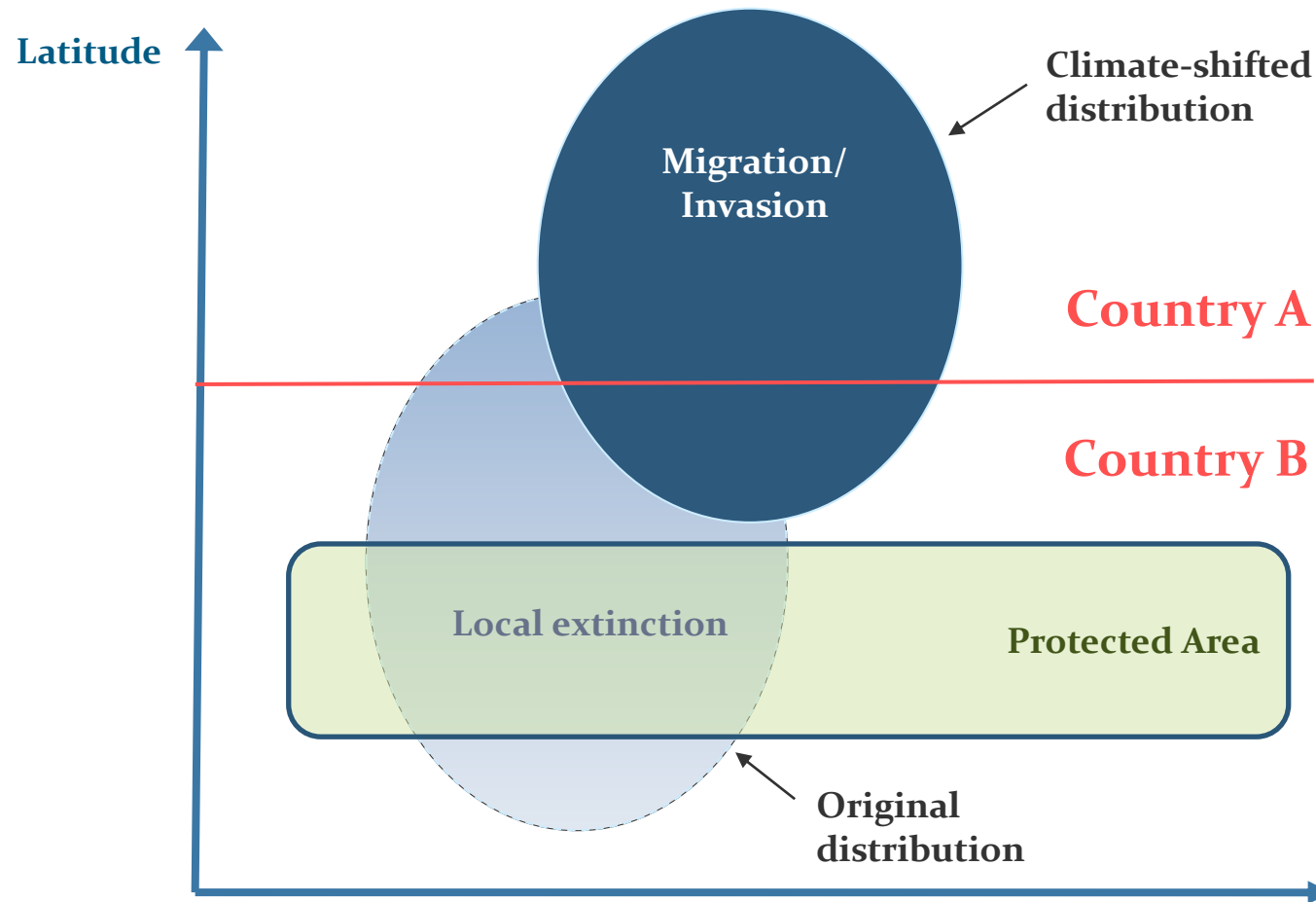




- **UNEP's specialist Biodiversity Assessment Centre**
- **Strategic objectives**
 - Provide the data and information that supports decision-making
 - Strengthen capacity for biodiversity decision-making



Protected Area Resilient to Climate Change (PARCC) project

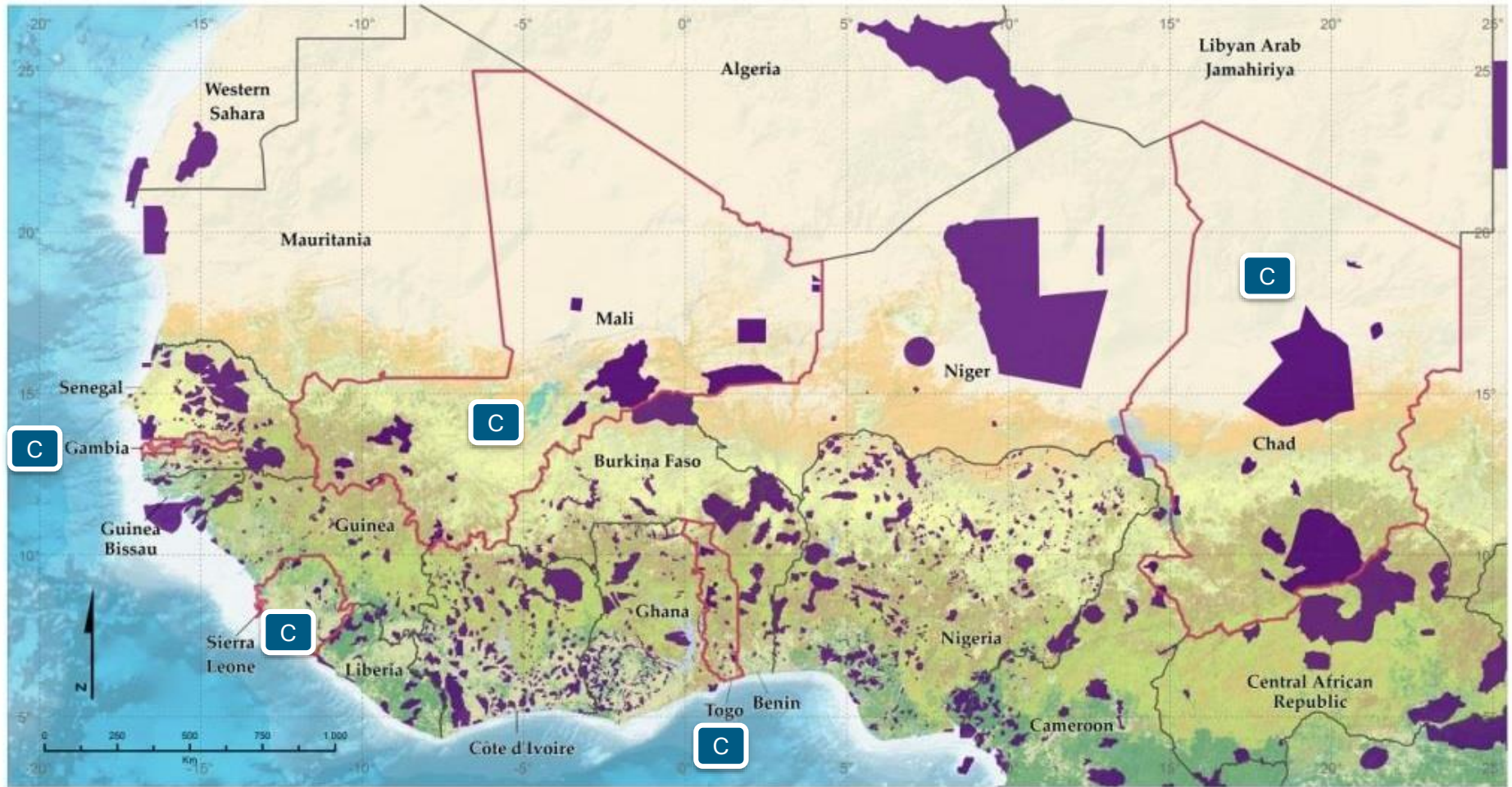


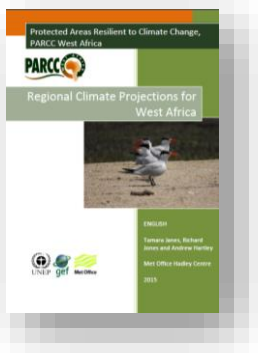
PARCC Project objectives

Help countries design **PROTECTED AREA SYSTEMS
RESILIENT TO CLIMATE CHANGE**, by:

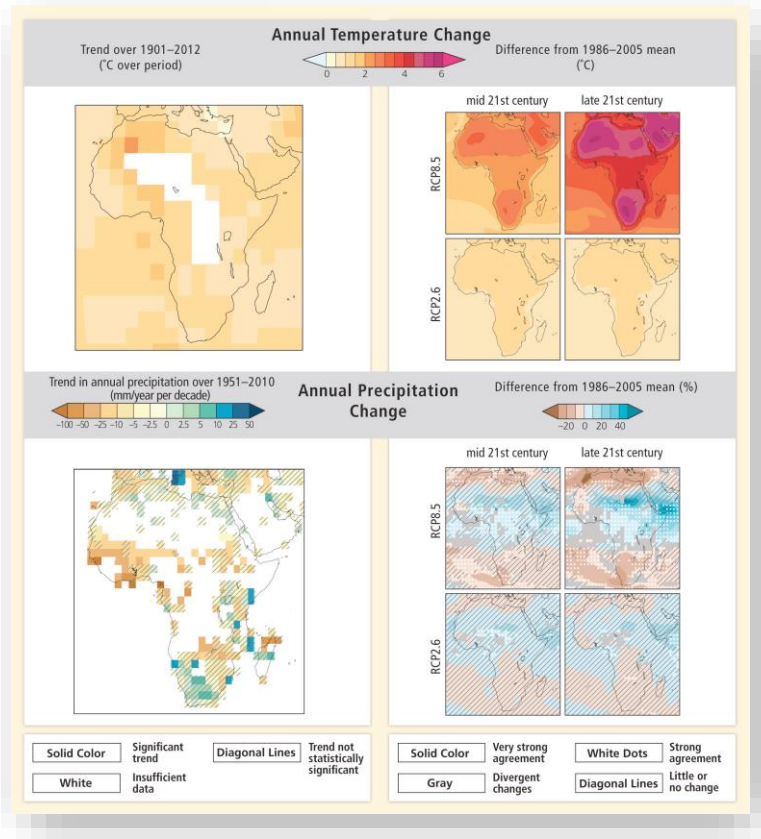
- ❖ Developing innovative tools for assessing the vulnerability of PAs to climate change
- ❖ Designing adaptation strategies to strengthen the resilience of PAs
- ❖ Building capacity in the region for applying the tools and implement the strategies

PARCC Project countries

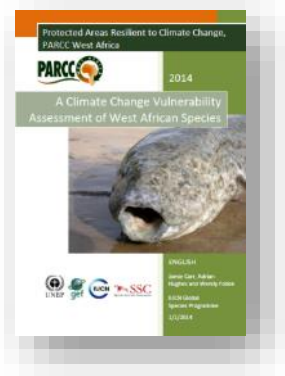




Regional climate projections *Met Office Hadley Centre*

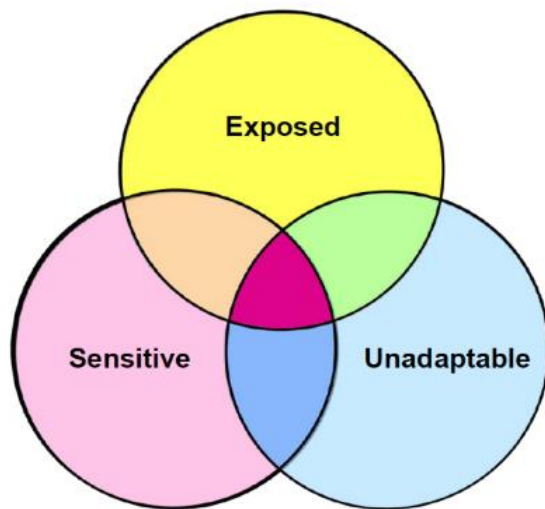


- 5 high resolution regional climate models
- A high level of confidence that **temperatures will increase** in the West Africa
- **Little consensus** on the direction and magnitude of potential changes **in rainfall**
- Projection of **changes in ecosystem services** under different scenarios of land use change (carbon storage, water provision and vegetation productivity)



Species vulnerability according to their biological traits

IUCN Global Species Programme



Vulnerability assessments of amphibians, birds, mammals, freshwater fish, and reptiles based on traits (TVAs):

- **Extinction risk** for all reptiles (317 species)
- **Vulnerability to climate change** of all reptiles, mammals (417 species) and freshwater fish (550 species)

Species vulnerability assessments for World Heritage sites

Yichuan Shi (IUCN and UNEP-WCMC)

Online prototype: Vulnerability to climate change of all globally assessed species of **amphibians, birds, and corals**, for all WH sites:

- Number of species with High/Low/Unknown:
 - *Exposure*
 - *Sensitivity* → **Species vulnerability to climate change**
 - *Adaptability*
- Trait (sensitivity and adaptability) and exposure detail

Prototype: Species vulnerability assessments for WH sites (1)

Natural World Heritage sites [Species](#) [Climate Change](#) [Vulnerability Analysis](#)

Search natural World Heritage site

Mount Huangshan



SPECIES CLIMATE CHANGE VULNERABILITY

Amphibian

FINAL SCORE

H: 8 L: 24

SENSITIVITY

H: 8 L: 17

LOW ADAPTABILITY

H: 10 L: 15

EXPOSURE

H: 9 L: 16

Bird

FINAL SCORE

H: 44 L: 162

SENSITIVITY

H: 84 L: 27 U: 95

LOW ADAPTABILITY

H: 86 L: 106 U: 14

EXPOSURE

H: 115 L: 24 U: 67

Coral

No data available

Prototype: Species vulnerability assessments for WH sites (2)

TRAITS AND EXPOSURE DETAIL

Amphibian

ADAPT A barriers

L: 25

ADAPT A dispersal distance

H: 7 L: 18

ADAPT C Slow Gen Turnover

H: 3 L: 9 U: 13

EXP AADRainfall

L: 25

EXP AADTemperature

L: 25

EXP MeanRainfall

L: 25

EXP MeanTemperature

H: 9 L: 16

EXP Sea Level

L: 25

SUSC A Habitats

H: 1 L: 24

SUSC A aquatic larvae

H: 4 L: 21

Bird

Dispersal barriers

H: 1 L: 197

Dispersal distance limited

H: 1 L: 195

EXP AADPrecip

L: 138 U: 67

EXP AADTemperature

L: 139 U: 67

EXP MeanPrecip

L: 139 U: 67

EXP MeanTemperature

H: 115 L: 24 U: 67

EXP Sea Inundation

L: 206

EffectivePopnSize

H: 1 L: 88 U: 106

ForestDependence

H: 1 L: 192

Gen Length

H: 71 L: 135

Coral

No data available

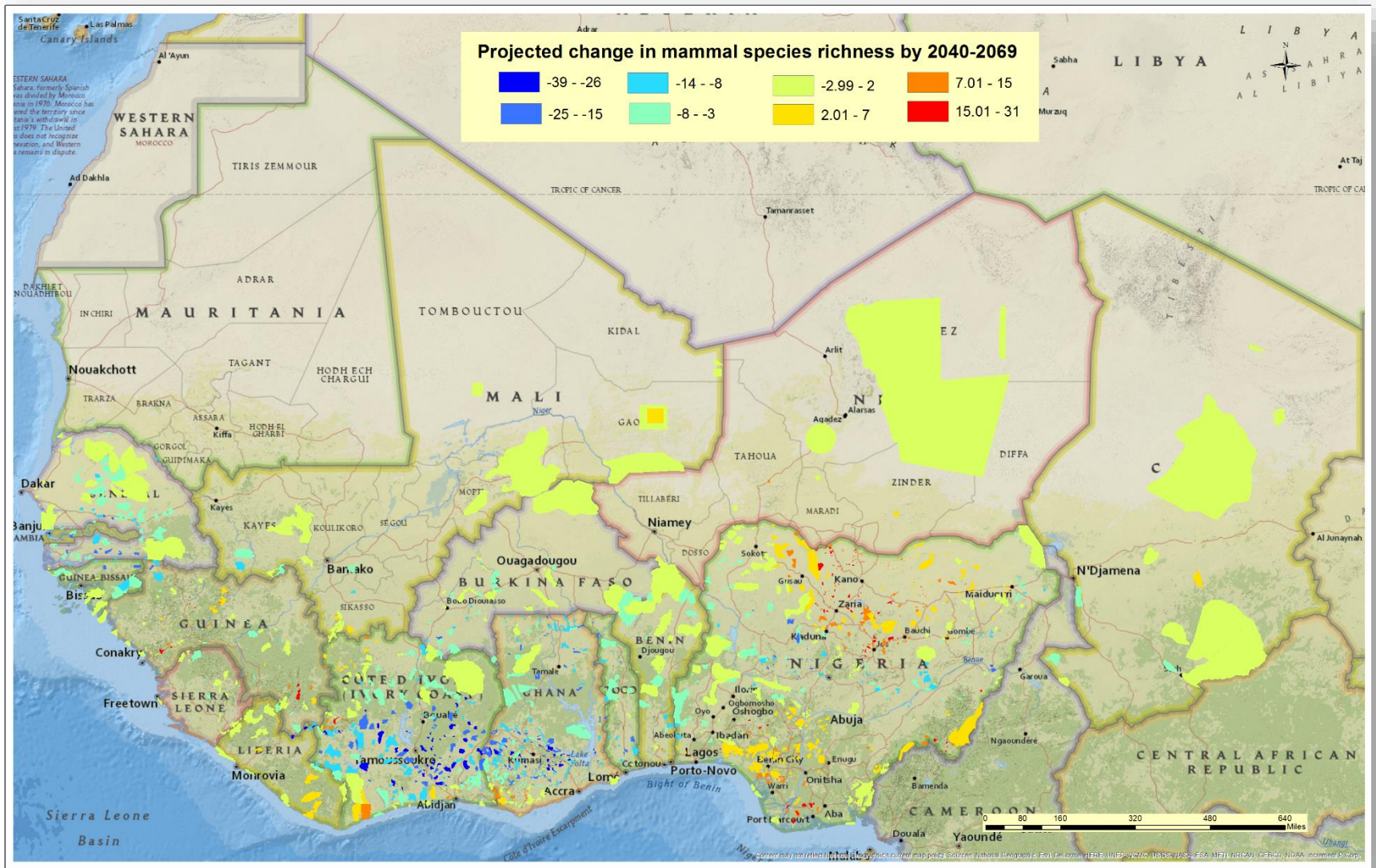


Future species distribution in the face of climate change

Durham University

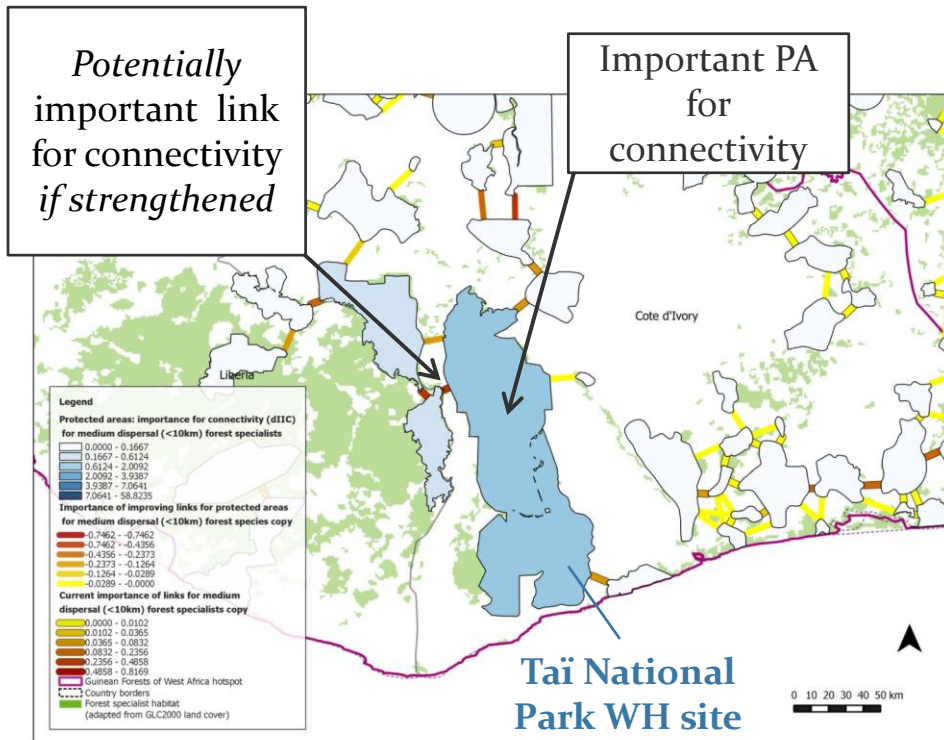
- Assessment of the potential impacts of climate change on PAs using Species Distribution Models (SDMs)
- PA network projected to decline in mean climate suitability for most species by 2060-2099
- Proportion of species projected as ‘highly likely’ to experience declining climate suitability:
 - 44% of amphibians
 - 52% of birds
 - 47% of mammals

Projected mammal species turnover by 2040-2069

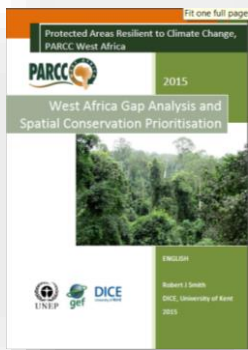


Assessment of the connectivity of the regional PA network

UNEP-WCMC Science Programme



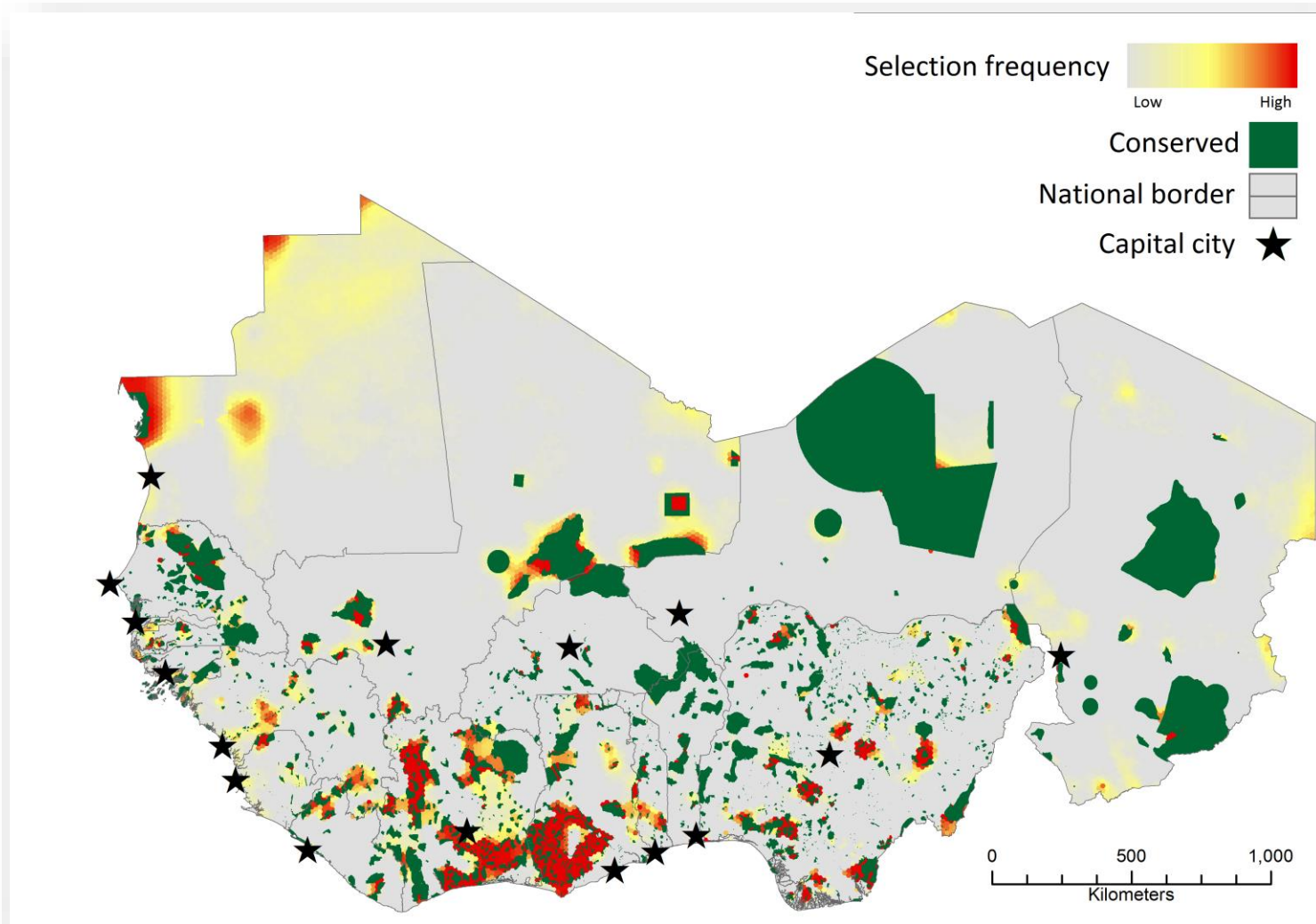
- A model of PA connectivity for a combination of:
 - **Species habitat preferences:** forest specialists, grassland specialists and generalists
 - **Species dispersal abilities:** short ($\leq 1\text{km}$), medium ($\leq 10\text{km}$), and long ($\leq 100\text{km}$)
- Most important PAs for connectivity and transboundary links



Identification of priority areas for biodiversity conservation *DICE University of Kent*

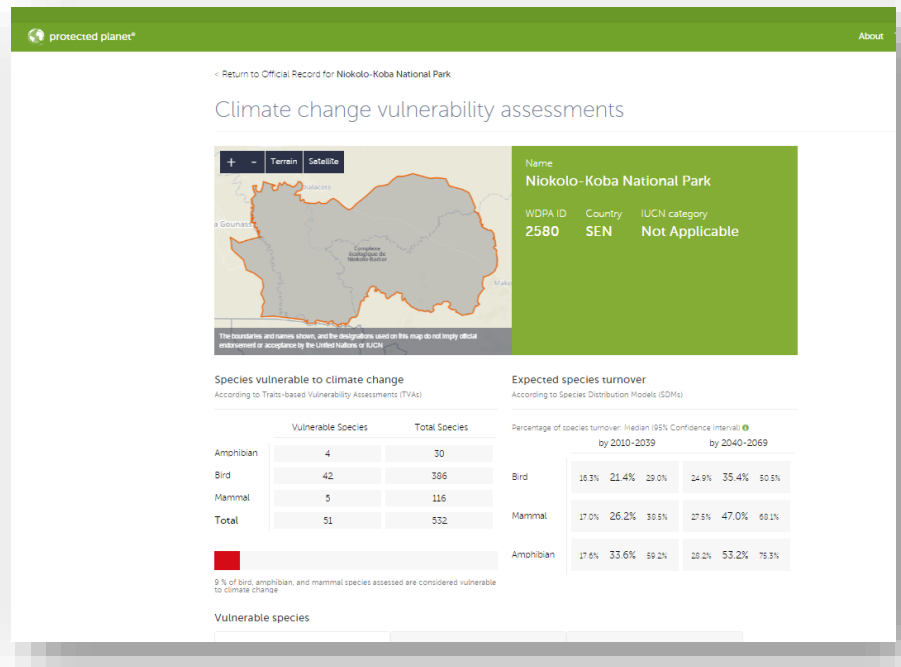
- **Systematic conservation planning**
- Gap analysis and spatial conservation prioritisation for West Africa:
 - Network of PAs & IBAs **meets conservation targets for >50% of ecoregions**, but does not conserve important ecoregions
 - Conservation targets met for majority of species, but **some features completely unprotected**, esp. threatened species
 - To meet all the conservation targets, **>20% of the West Africa region needs to be protected**

Identification of priority areas for the West Africa region



Other PARCC outputs

- **Adaptation strategies and policy recommendations** at the regional and national level and Guidelines for PA managers in the face of climate change
- Study of the links between PAs, climate change and communities
- Activities at transboundary pilot sites
- **Website with mapping links to vulnerability assessment per PA:**
<http://parcc.protectedplanet.net>



Applying PARCC methodologies to World Heritage and other UNESCO sites

- Regional climate models
- **Traits-based Vulnerability Assessments** (TVAs, presented earlier)
- **Species Distribution Models** (SDMs) (e.g., in China or East Asia)
- Integrating TVA and SDMs to **identify sites more likely to be vulnerable to climate change**
- Systematic conservation planning to identify other natural sites
→ Strategies, policy recommendations and management guidelines

Other work of UNEP-WCMC on the World Heritage Convention

Yichuan Shi and Elise Belle, Protected Areas Programme,
UNEP-WCMC and IUCN

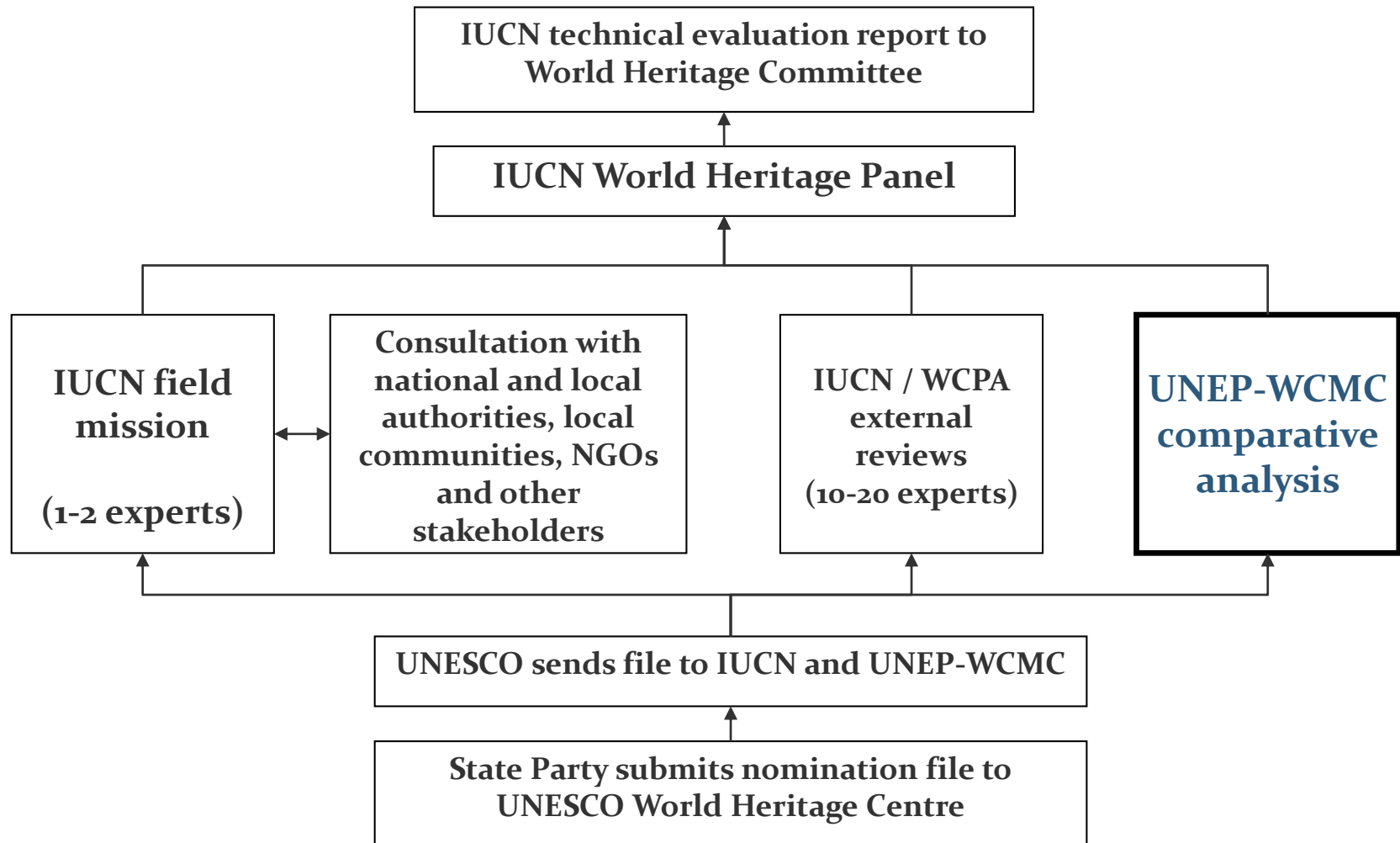


UNEP-WCMC's WORK WITH IUCN WHP

- Update and review how WH information is presented on the Protected Planet website (<http://protectedplanet.net>)
- Annual comparative analysis of sites nominated under biodiversity criteria (ix) and (x)
- **Online prototype for spatial comparative analysis**
- **Scoping study of land cover change within WH sites**
- Development of a web platform for WH datasheets



COMPARATIVE ANALYSIS



PROTOTYPE FOR ONLINE SPATIAL COMPARATIVE ANALYSIS

 Global Comparative Analysis Online

prototype version



Welcome to Global Comparative Analysis Online

Explore gaps and comparisons with biodiversity World Heritage sites

[Start →](#)

About

The spatial comparative analysis online prototype (the 'Prototype') is a proof-of-concept online web application that provides a first screening of comparable sites and identifies broad scale gaps, according to datasets of widely agreed global biogeographical classifications and biodiversity conservation priorities. The tool will enable an integrated routine to support an initial evaluation of the in-situ

Caveats

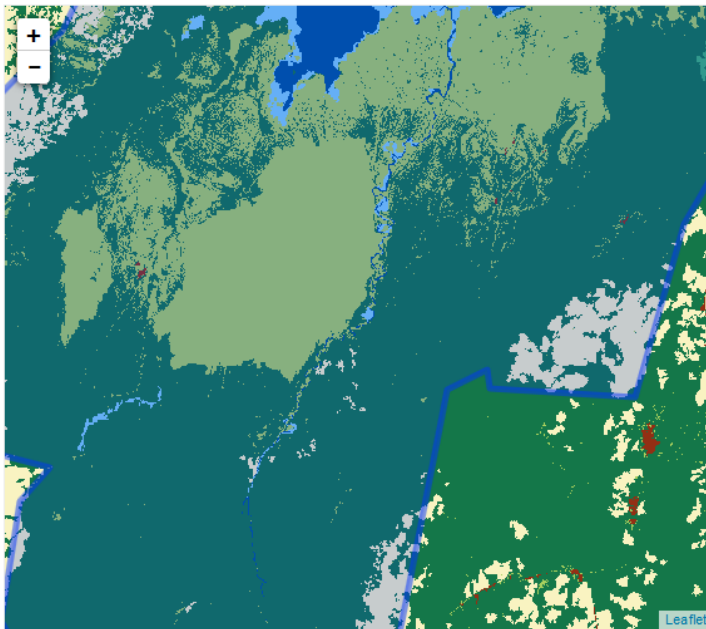
First and foremost, gaps identified in the same biogeographical regions, priorities and sites of biodiversity values by the Prototype, only indicate a spatially overlapping relationship based on the underlying sample datasets. While this can help to identify under-represented areas and guide the search of potential nominations, it does not include nor suggest the identification of Outstanding

SCOPING STUDY OF LAND COVER CHANGE IN WH SITES (1)

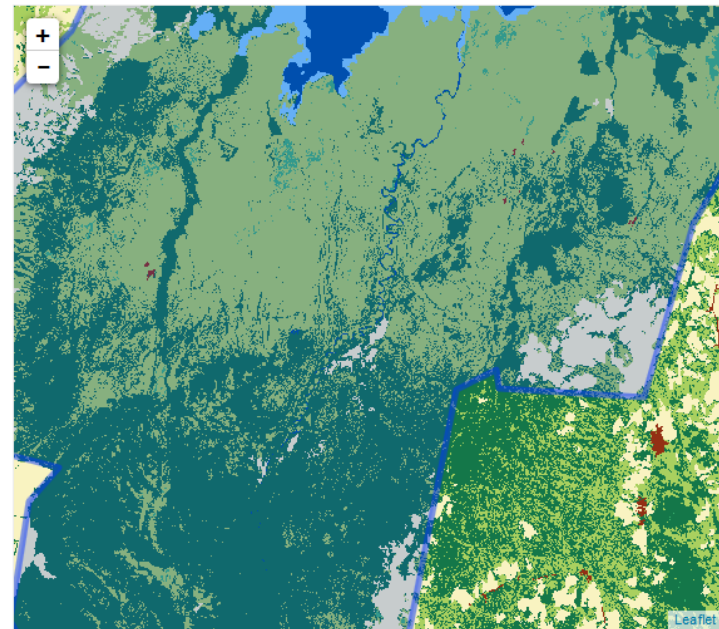
Landcover change in natural World Heritage sites

Virunga National Park Landcover Change 2000 - 2010

2000



2010



Cultivated land Forest Grasslands Shrublands Wetland Water bodies Tundra Artificial Surfaces Bareland Permanent snow and ice

IUCN World Heritage Programme

Data and map tiles from [GlobeLand30](#)

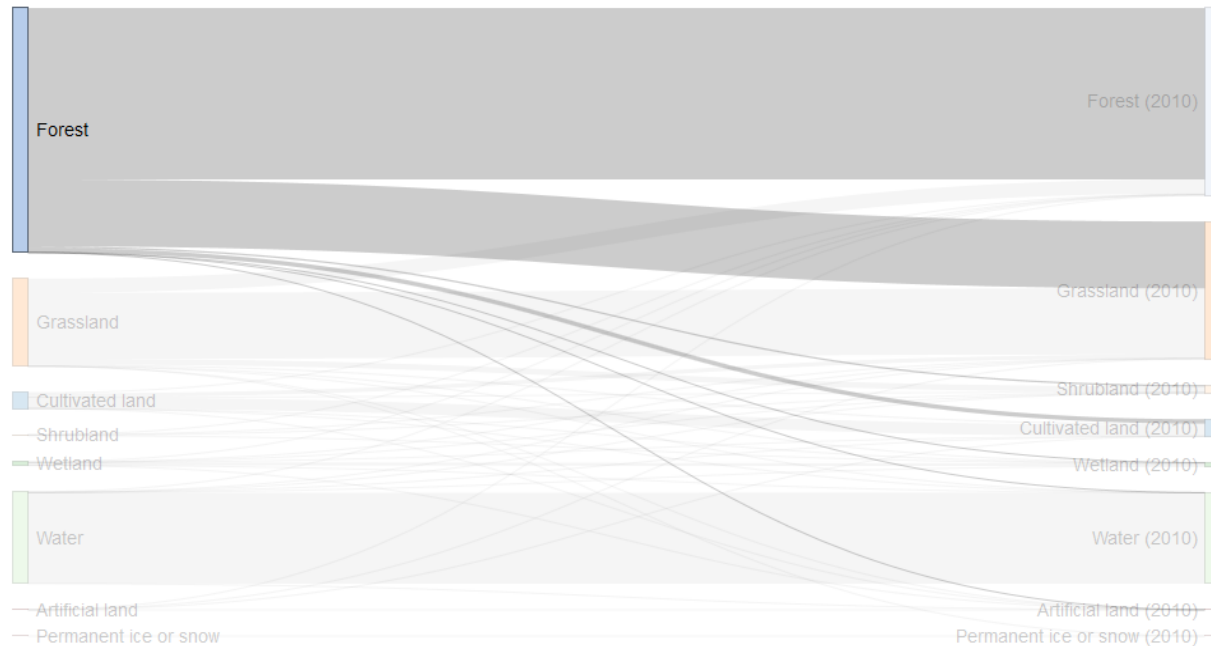
National Geomatics Centre of China

SCOPING STUDY OF LAND COVER CHANGE IN WH SITES (2)

Conversion matrix

The below graph illustrates landcover classes in the named World Heritage site and their change between 2000 and 2010 (Year 2000 on the left and Year 2010 on the right).

Tips: Hover to see the quantity and the conversion of each landcover class in square kilometers. Drag class labels to reposition landcover classes to aid visualisation



IUCN World Heritage Programme

Data and map tiles from [GlobeLand30](#)

National Geomatics Centre of China

ENHANCING MONITORING FOR NATURAL WH SITES IN CHINA

- China has a number of **natural WH sites** and some are facing significant threats
- Monitoring the management effectiveness from site studies is expensive
- **Remote sensing monitoring** based on land cover change: low cost and increasingly reliable
- Developed a **land cover change prototype** using a global dataset
- At site level, global data cannot capture every details and **validations of the land cover change** data are required
- Aim of the project: **Design an integrated tool to validate and analyse land cover change**

Talk to us if you are interested !



Thank you for your attention!

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Yichuan Shi: yichuan.shi@unep-wcmc.org

Protected Areas Programme
UNEP-WCMC