# Climate change and bird conservation in the Albertine Rift - from science to policy action

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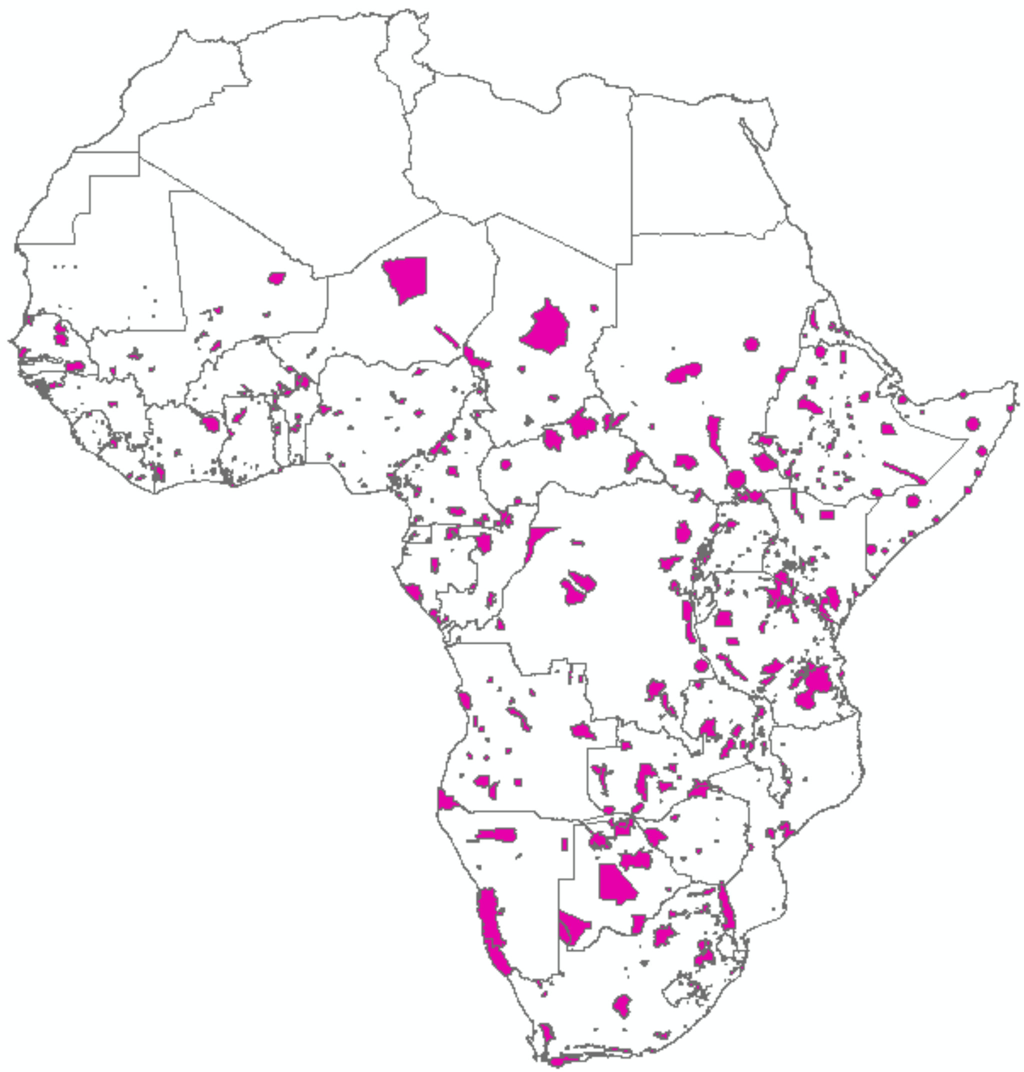
# Overarching Project Goals

1) Understand potential climate change impacts across sub-Saharan African IBA network
2) Explore regional scale impacts (Albertine Rift)
3) Develop Adaptive Management Framework – regional AND "local"
4) Disseminate information & outreach
5) Identify capacity needs and policy options

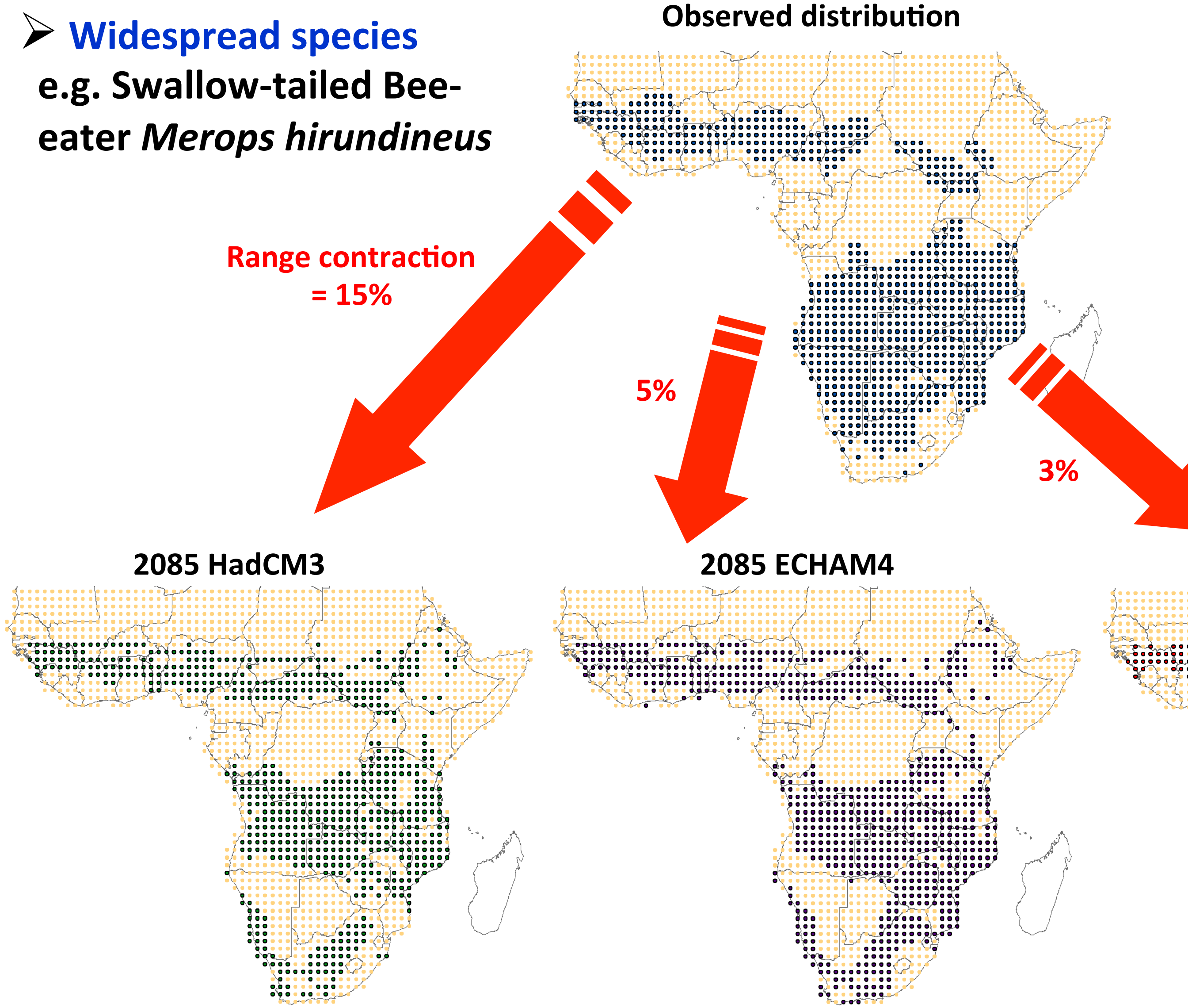
# Africa's Important Bird Area (IBA) network

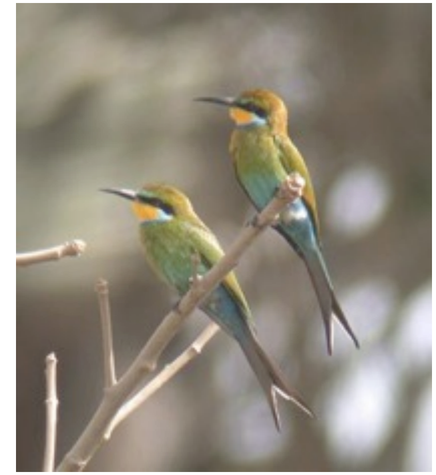
- ~1,230 IBAs across Africa and associated islands
- 881 in sub-Saharan Africa (below $20^0$ North) excluding islands
- Selected based on the presence of:
- 1) species of global conservation concern
- 2) assemblages of restricted-range species
- 3) assemblages of biome-restricted species
- 4) concentrations of congregatory species



# Species distribution modeling (SDM)

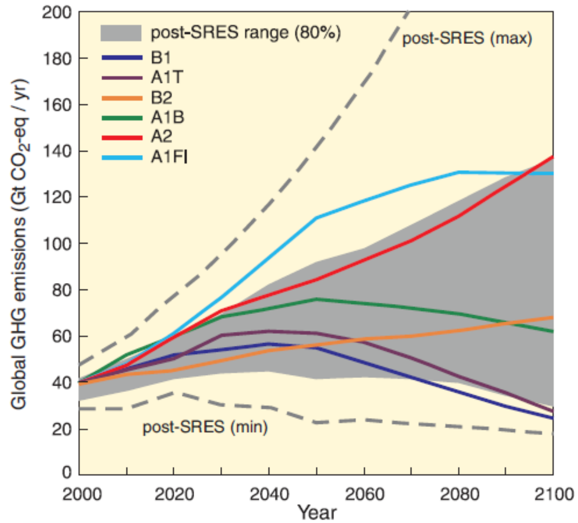
➢ **Widespread species**
e.g. Swallow-tailed Bee-eater *Merops hirundineus*



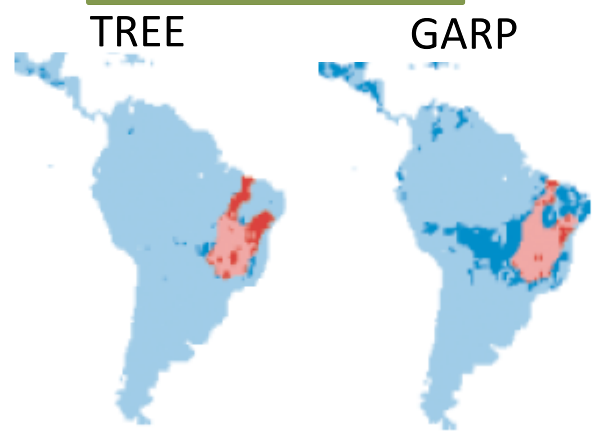



# Uncertainty

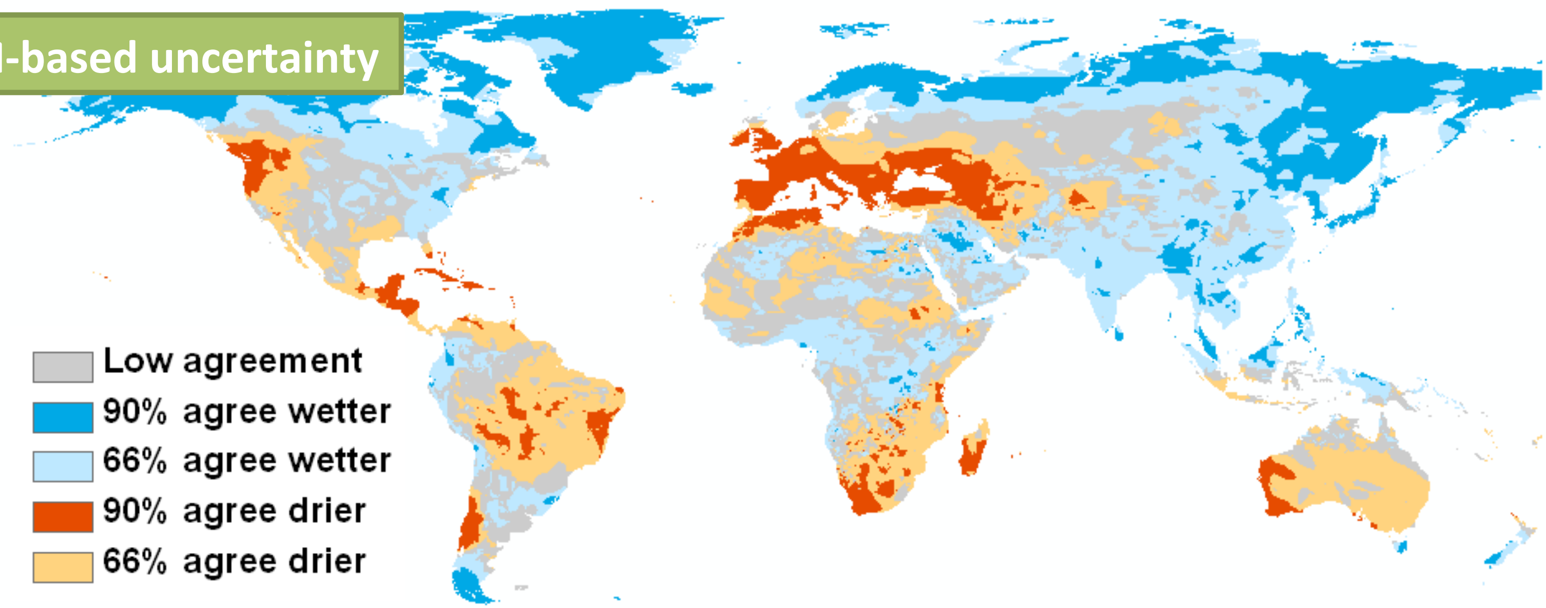
## Emissions scenario uncertainty




## BEM uncertainty



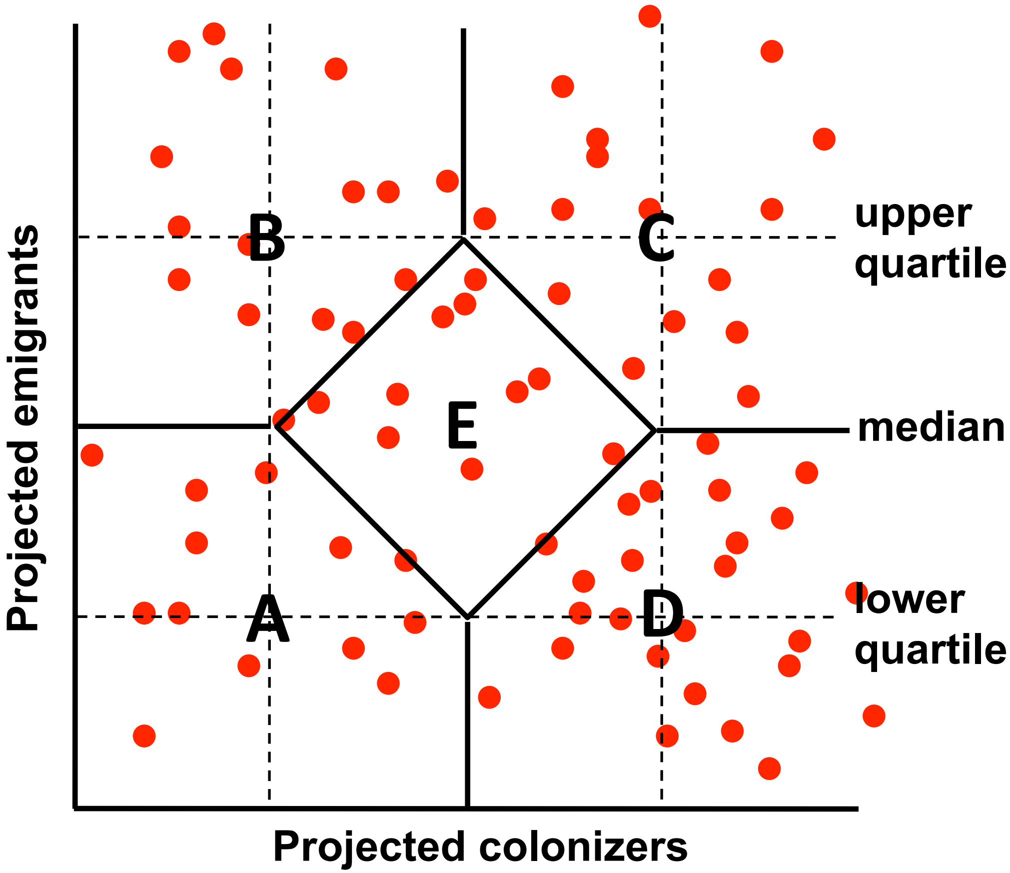

## GCM-based uncertainty




**Model agreement in direction of change in precipitation across 16 GCMs – 2080s, A1b**

# Targeting adaptation actions – IBA categorization

- Categorise each IBA based on projected proportions of colonizers, emigrants and persistent species




| | Emigrants | Colonizers | Persistent |
|---|---|---|---|
| A | Low | Low | High |
| B | High | Low | Low |
| C | High | High | Low |
| D | Low | High | High |
| E | Mid | Mid | Mid |

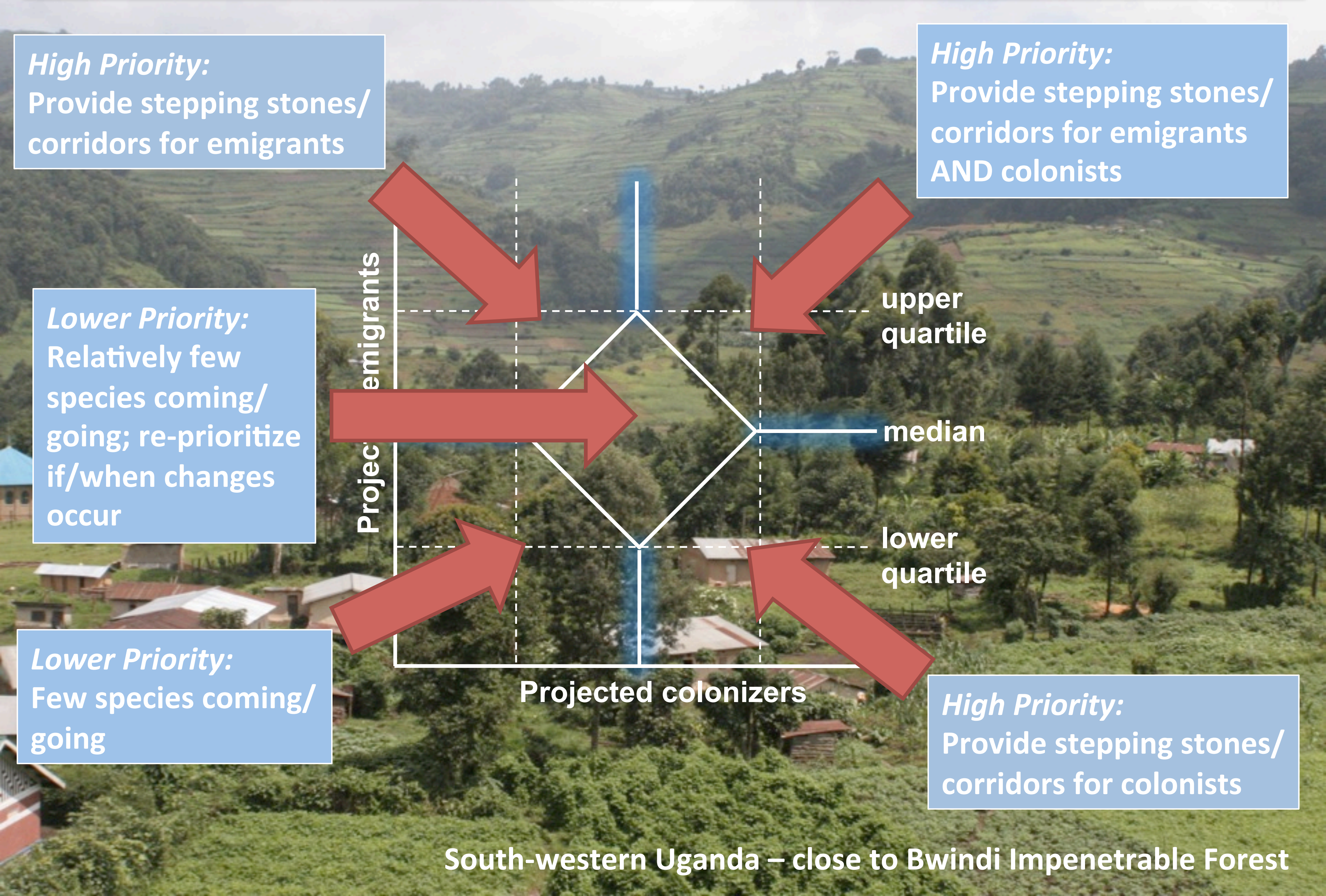
Source: Hole et al. (2011) *Conservation Biology*

# Category contingent management actions

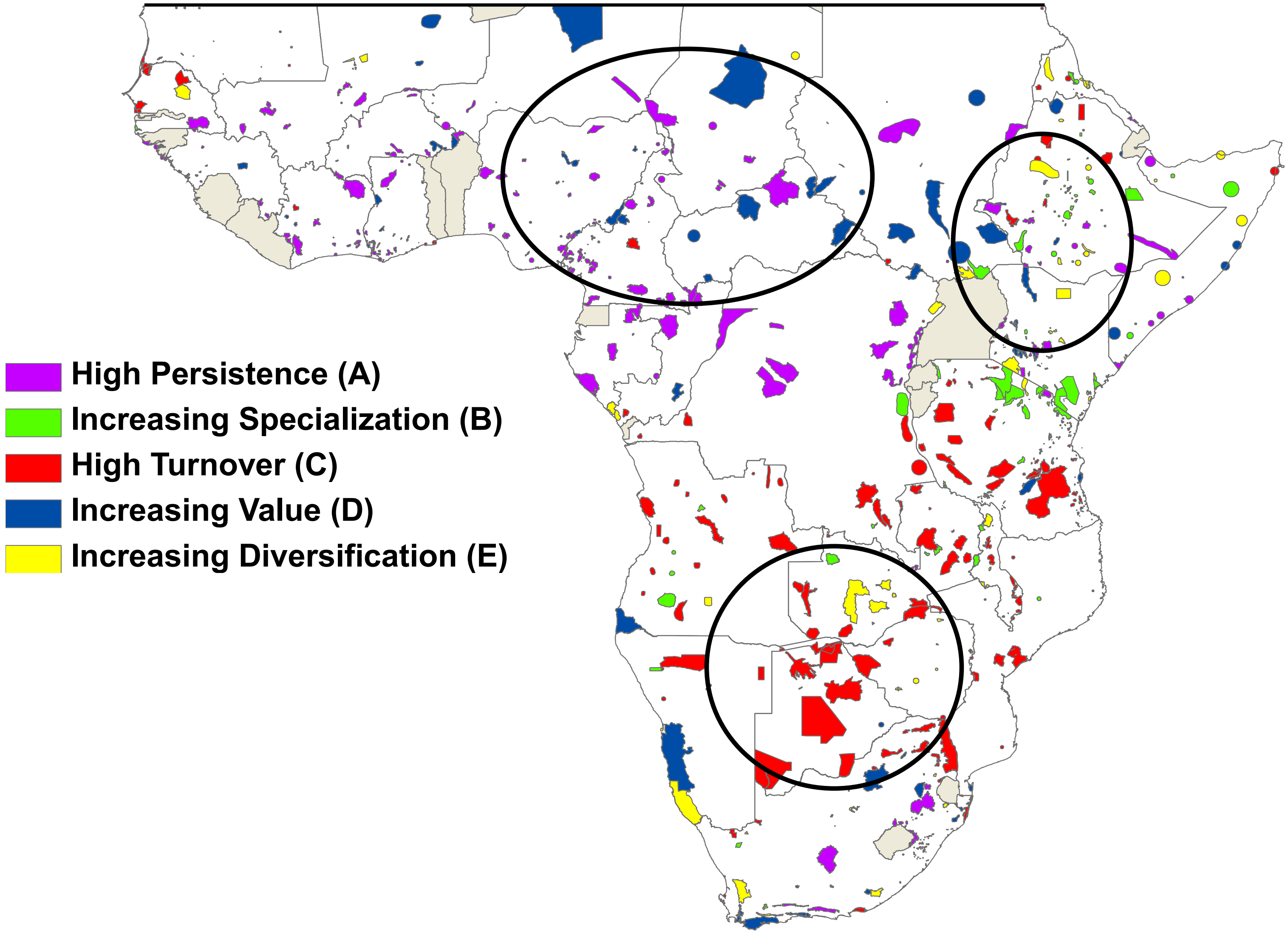
From Table 1, Hole et al (2011) Conservation Biology

| CCAS category | Proportion of priority species | | | Site-management goal[a] | Example category-contingent management actions[b] | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | emigrating | colonizing | persisting | | habitat restoration and creation | disturbance-regime management (e.g., fire, flood, grazing) | translocation | increase site extent | matrix management for landscape permeability |
| High persistence | low | low | high | resilience: maintain viable populations of persistent species | desirable: focus on restoration from current and/or historical perspective to maximize habitats for persistent species; consider using genotypes better adapted to projected future climate | desirable: manage disturbance regimes within natural range of variability; allow passive shifts where unavoidable | low priority (because change in climatic suitability is neither driving much emigration nor encouraging much colonization) | desirable: identify and incorporate refugial areas (e.g., highland valleys), areas of physiographic diversity and/or abiotic gradients to maximize resilience of persistent species | low priority: (because change in climatic suitability is neither driving much emigration nor encouraging much colonization) |

# Management actions – Matrix management

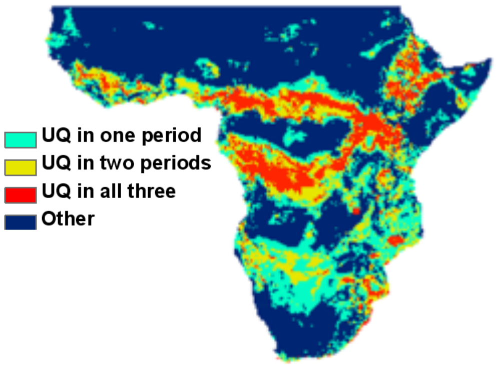


# Targeting adaptation actions – IBA categorization




Source: Hole et al. (2011) *Conservation Biology*

# Filling gaps in the network

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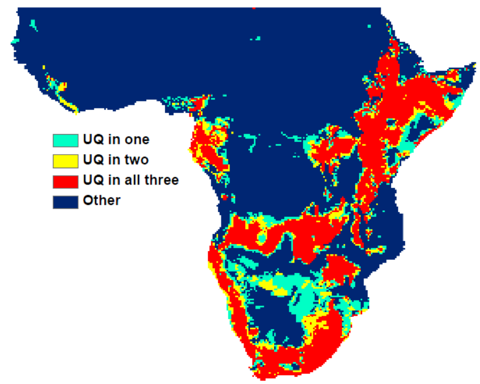


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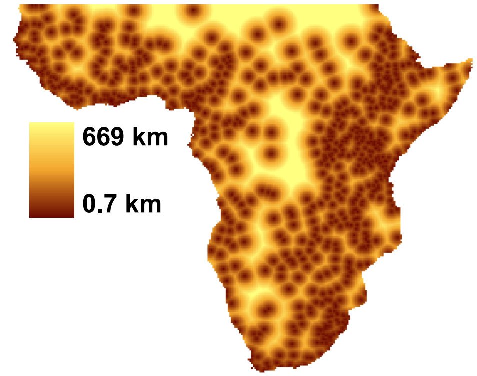
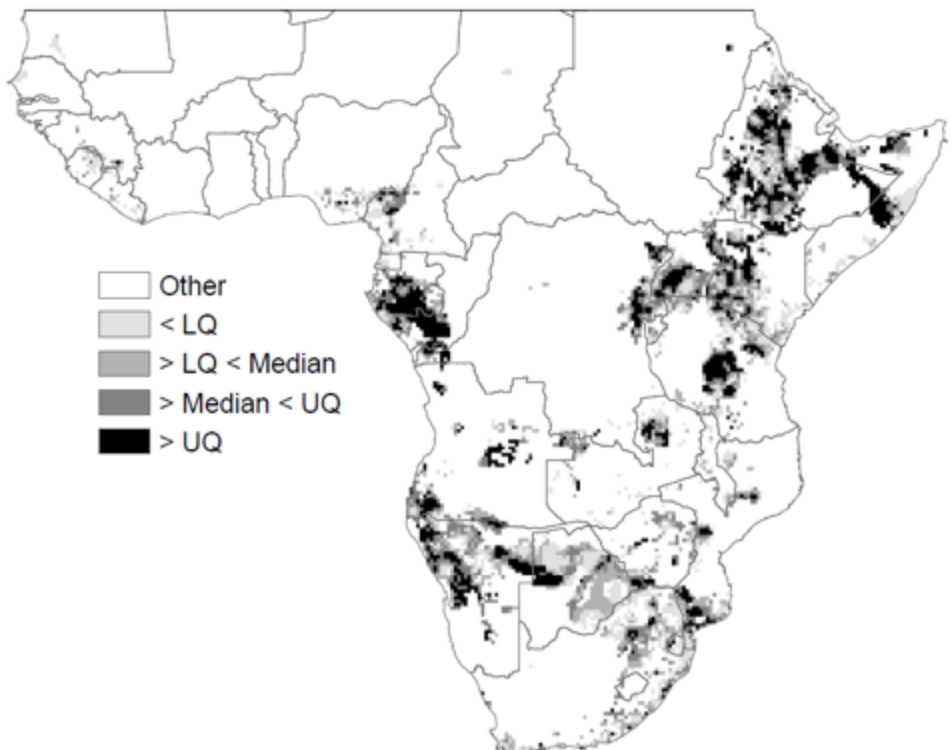


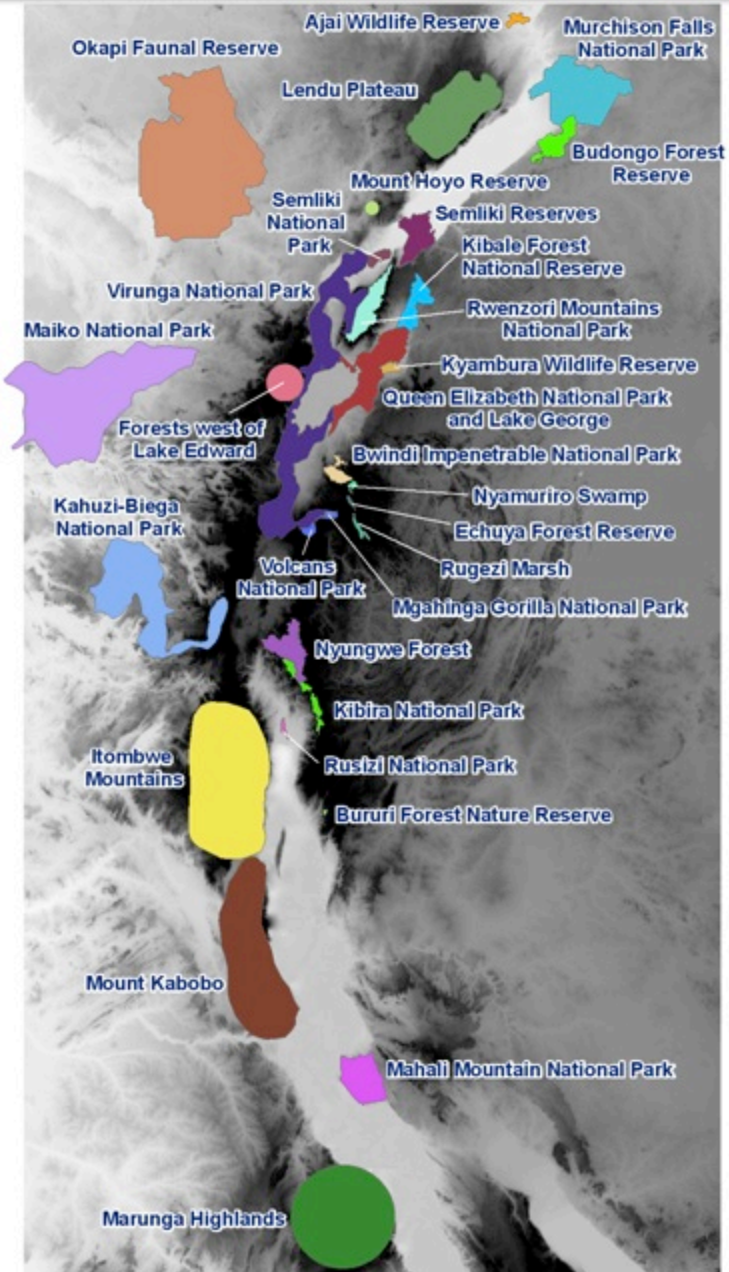




Source: Hole et al. (2011) *Conservation Biology*

# Pros and Cons

- Evaluates impacts across the entire network and entire set of species of interest
- Based on modeled shifts across large number of species – reduced risk of skew
- Tries to balance taking a narrowly focused action that proves to be inappropriate and bet-hedging that fails to focus limited resources effectively
- Broad range of caveats associated with SDMs
- Management for adaptation needs to focus on more than conservation priority species – site-specific focus needed for keystone species/other ecological/abiotic processes – preserve site integrity
- Only broad generalizations, not detailed prescriptions

# IBAs of the Albertine Rift

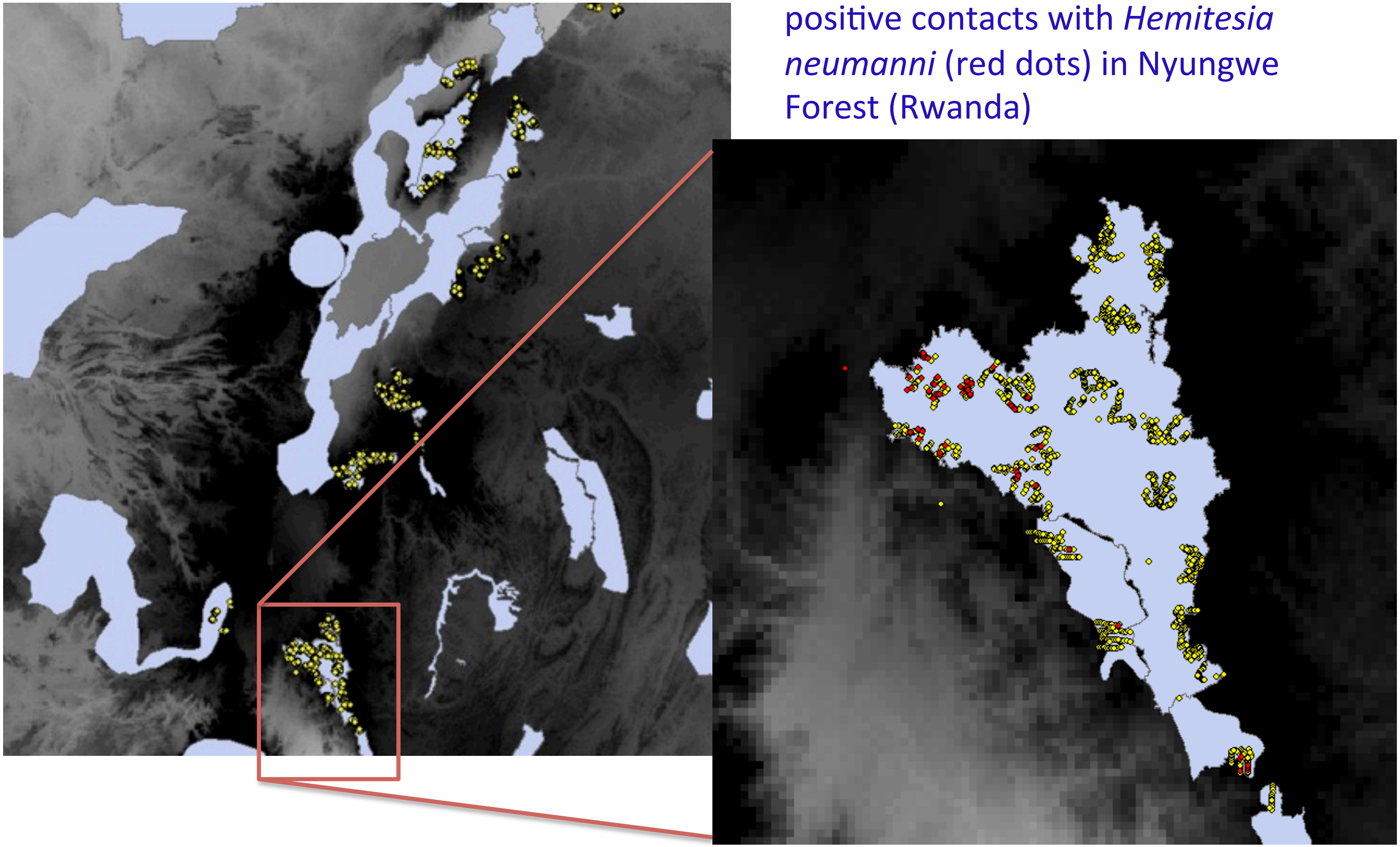



- 33 species are recognized as Albertine Rift EBA species.
- Together, these species flag-up 22 IBAs (a further 9 IBAs are also located within the region).

# Fine-scale modeling in the Albertine Rift

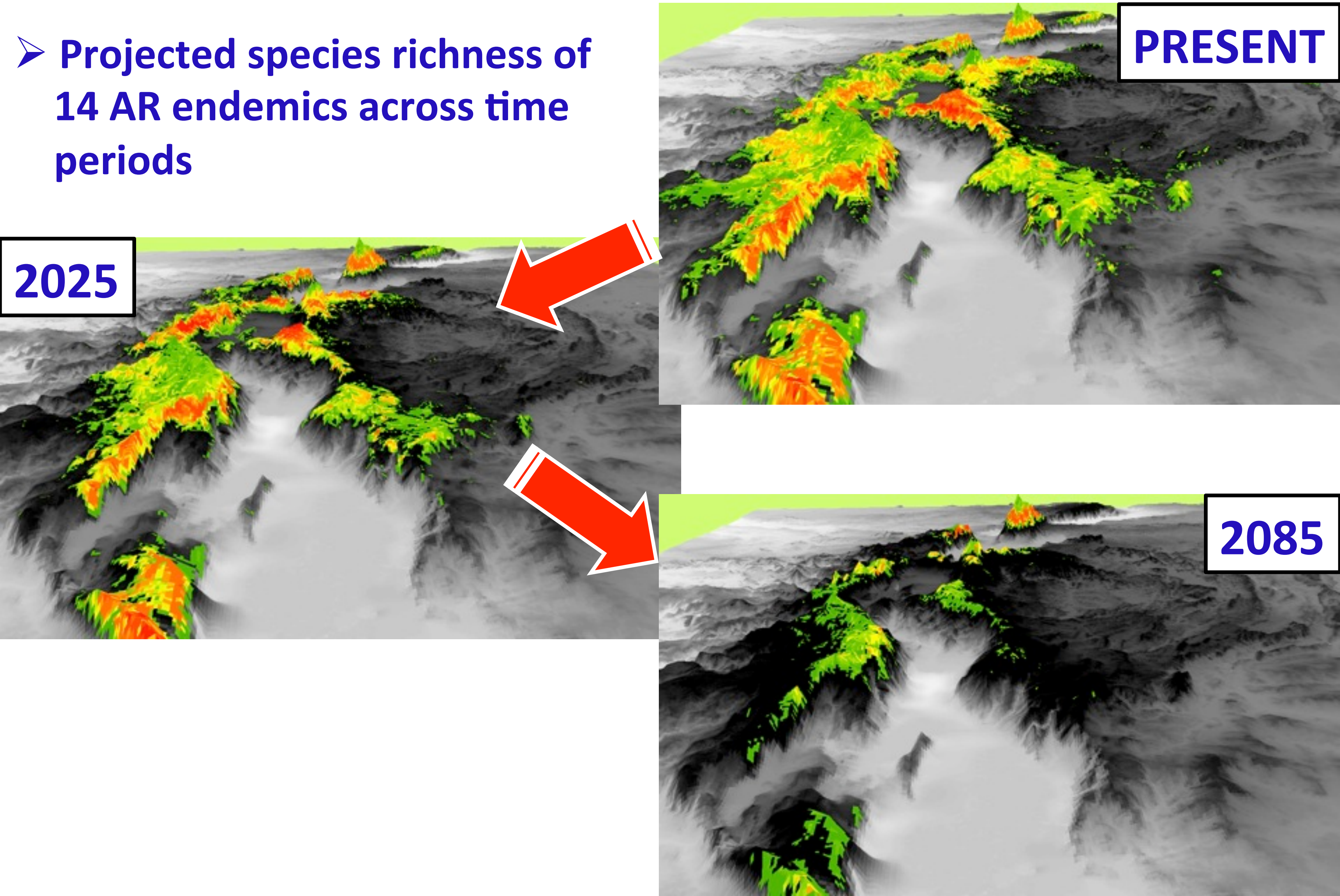
- WCS point survey localities in the northern Albertine Rift (yellow dots)

- Survey localities (yellow dots) and positive contacts with *Hemitesia neumanni* (red dots) in Nyungwe Forest (Rwanda)



# Projected species richness

- Projected species richness of 14 AR endemics across time periods



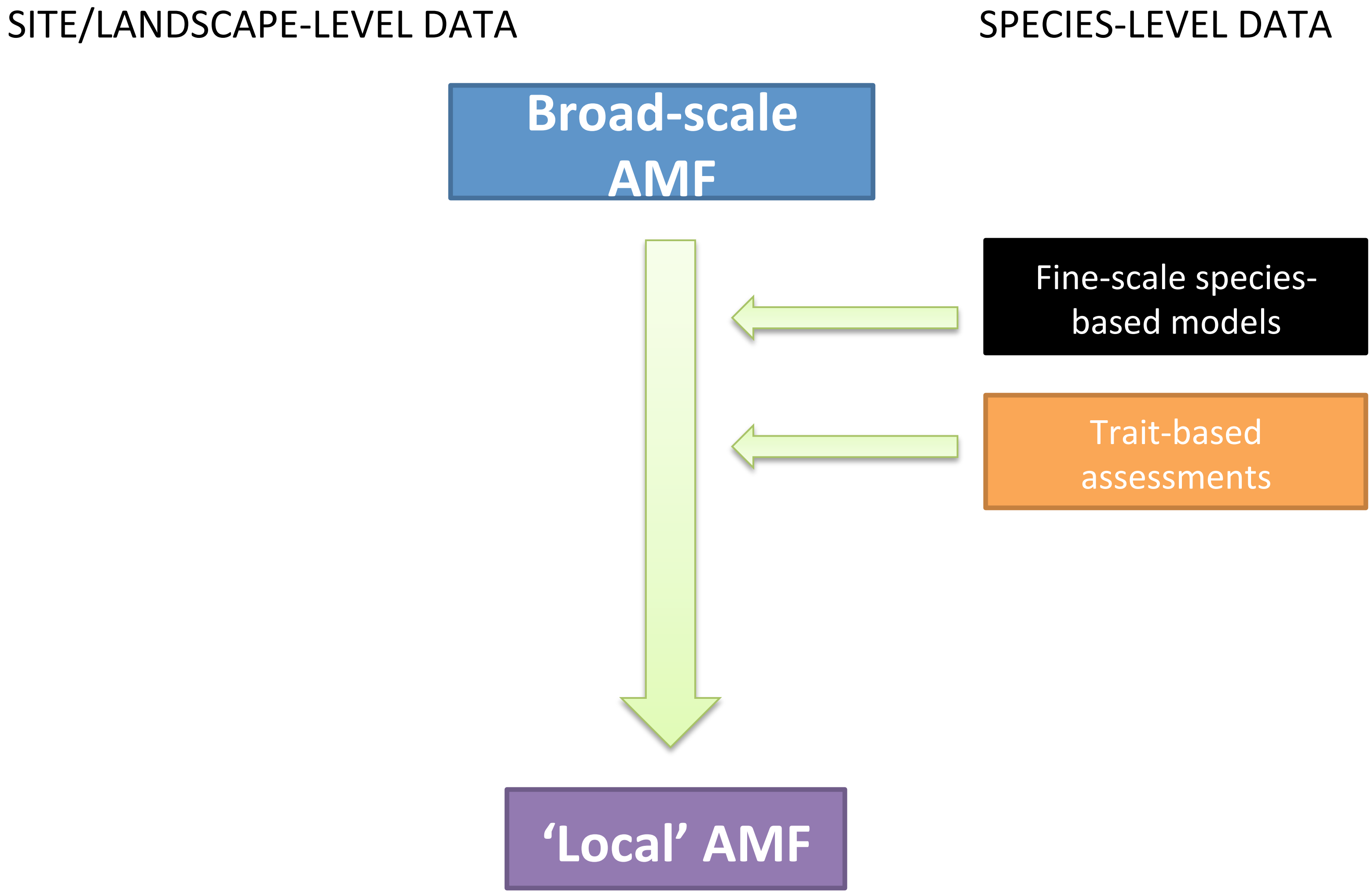
# Pros and Cons

- Provides a resolution that is largely consistent with conservation planning needs
- Allows us to evaluate potential connectivity needs (least-cost path modeling)
- Provides testable hypotheses (e.g. lowland biotic attrition)
- Also subject to the broad range of caveats associated with SDMs
- Sufficiently good quality data for modeling only available for a small proportion of species
- Resolution can mask uncertainty

# Developing the AMF – making it "local"

➢ So how do we deal with the uncertainties from the broad-scale modeling AND make the AMF LOCAL?!

1. Don't look at individual species projections – look at ***species groups*** (lowland forest, savanna, etc)
2. What ***direction*** are the majority of species coming from?
3. What trends are evident for ***keystone*** species groups (e.g. seed dispersers)?

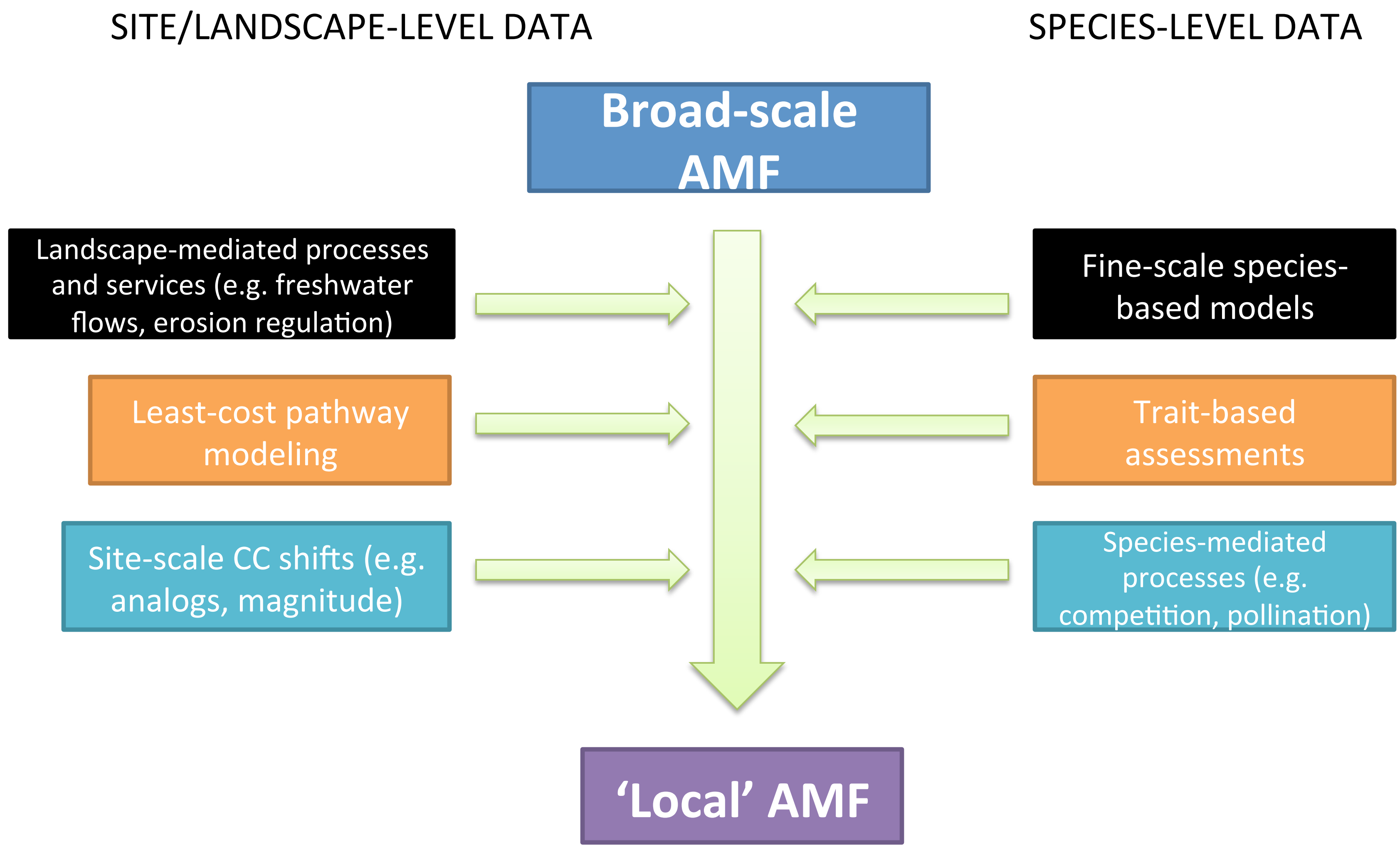

SITE/LANDSCAPE-LEVEL DATA
SPECIES-LEVEL DATA
Broad-scale AMF
Fine-scale species-based models
Trait-based assessments
'Local' AMF

# Trait-based analyses

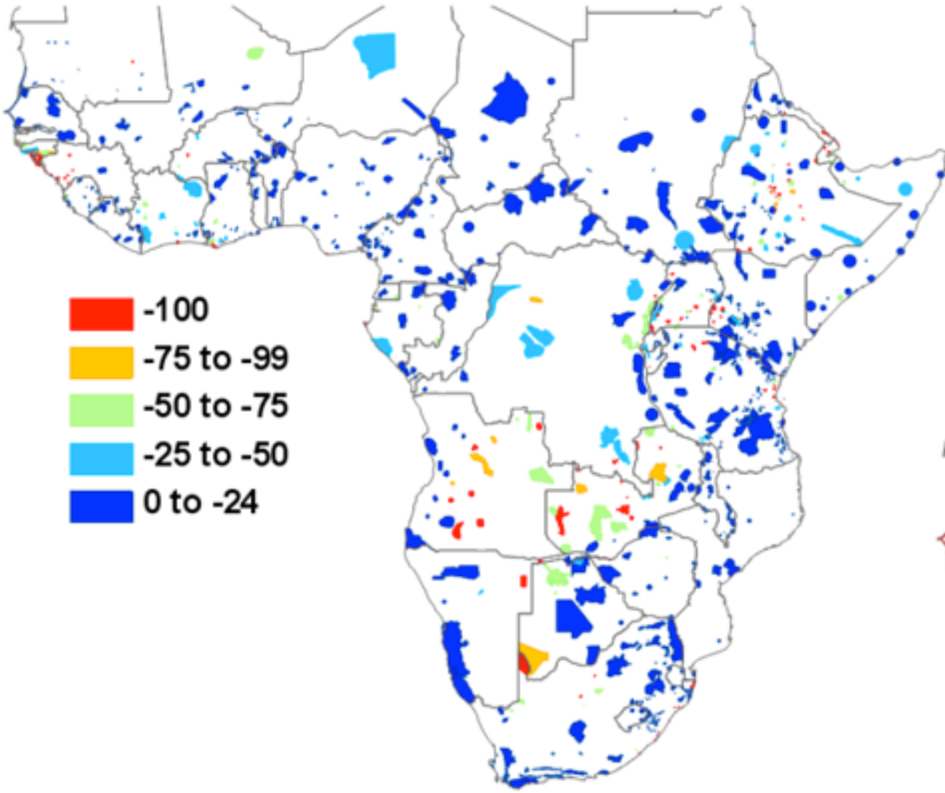
| Trait Group | Biological Trait | No. of species qualifying | | |
|---|---|---|---|---|
| | | Birds | Amphibians | Corals |
| **A. Specialized habitat and/or microhabitat requirements** | Altitudinal range narrow and at high elevation | 224 | | |
| | Restricted to habitats susceptible to climate change | 820 | 757 | 15 |
| | High degree of habitat specialization | 693 | | 28 |
| | Dependence on a particular microhabitat | 438 | 889 | |
| | **Contribution of trait group** | **46%** | **42%** | **5%** |
| **B. Narrow environmental tolerances or thresholds that are likely to be exceeded due to climate change at any stage in the life cycle** | Global temperature tolerances likely to be exceeded | | | 61 |
| | Larvae particularly susceptible to heat stress | | | 108 |
| | Sensitive to increased sedimentation | | | 143 |
| | Vulnerable to physical damage from storms and cyclones | | | 183 |
| | **Contribution of trait group** | **0%** | **0%** | **68%** |
| **C. Dependence on specific environmental triggers or cues that are likely to be disrupted by climate change** | Environmental trigger/cue disruption observed or likely | 316 | 315 | |
| | **Contribution of trait group** | **9%** | **10%** | **0%** |
| **D. Dependence on interspecific interactions which are likely to be disrupted by climate change** | Dependent on very few prey or host species | 27 | | |
| | Dependent on an interspecific interaction that is likely to be impacted by climate change | 44 | | |
| | Susceptible to chytridiomycosis and/or enigmatic decline | | 1,034 | |
| | Susceptible to breakdown of coral-zooxanthellae interaction | | | 144 |
| | **Contribution of trait group** | **2%** | **32%** | **25%** |
| **E. Poor ability or limited opportunity to disperse to or colonize a new or more suitable range** | Low maximum dispersal distances | 1,500 | | 73 |
| | Geographic barriers limit dispersal opportunity | 709 | 744 | 117 |
| | Limited opportunity to establish at new locations | 769 | 602 | 55 |
| | Low genetic diversity or known genetic bottleneck | 63 | | |
| | **Contribution of trait group** | **69%** | **40%** | **40%** |
| **Number of climate change susceptible species** | | **3,438** | **3,217** | **566** |
| **Number of species assessed** | | **9,856** | **6,222** | **799** |
| **Climate change susceptible species (%)** | | **35%** | **52%** | **71%** |

***Table 1.*** *A summary of the trait groups, biological traits and numbers of bird, amphibian and warm-water reef-building coral species that qualify as having the trait in question. Trait group summary rows (grey) show the relative contribution of each trait group to the total number of climate change susceptible species for each taxonomic group. The sum of these values is >100% because many qualifying species have multiple traits. Detailed descriptions of trait groups are given in the Box.*

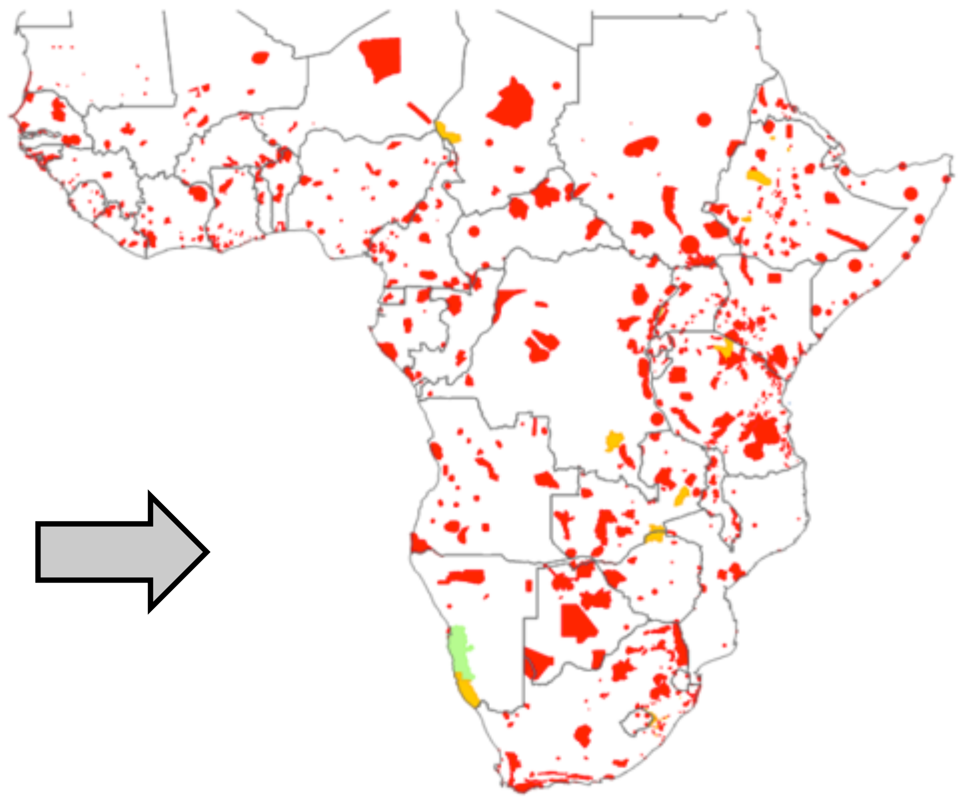
(Source: IUCN/Foden et al, 08)


SITE/LANDSCAPE-LEVEL DATA
SPECIES-LEVEL DATA
Broad-scale AMF
Landscape-mediated processes and services (e.g. freshwater flows, erosion regulation)
Least-cost pathway modeling
Site-scale CC shifts (e.g. analogs, magnitude)
Fine-scale species-based models
Trait-based assessments
Species-mediated processes (e.g. competition, pollination)
'Local' AMF

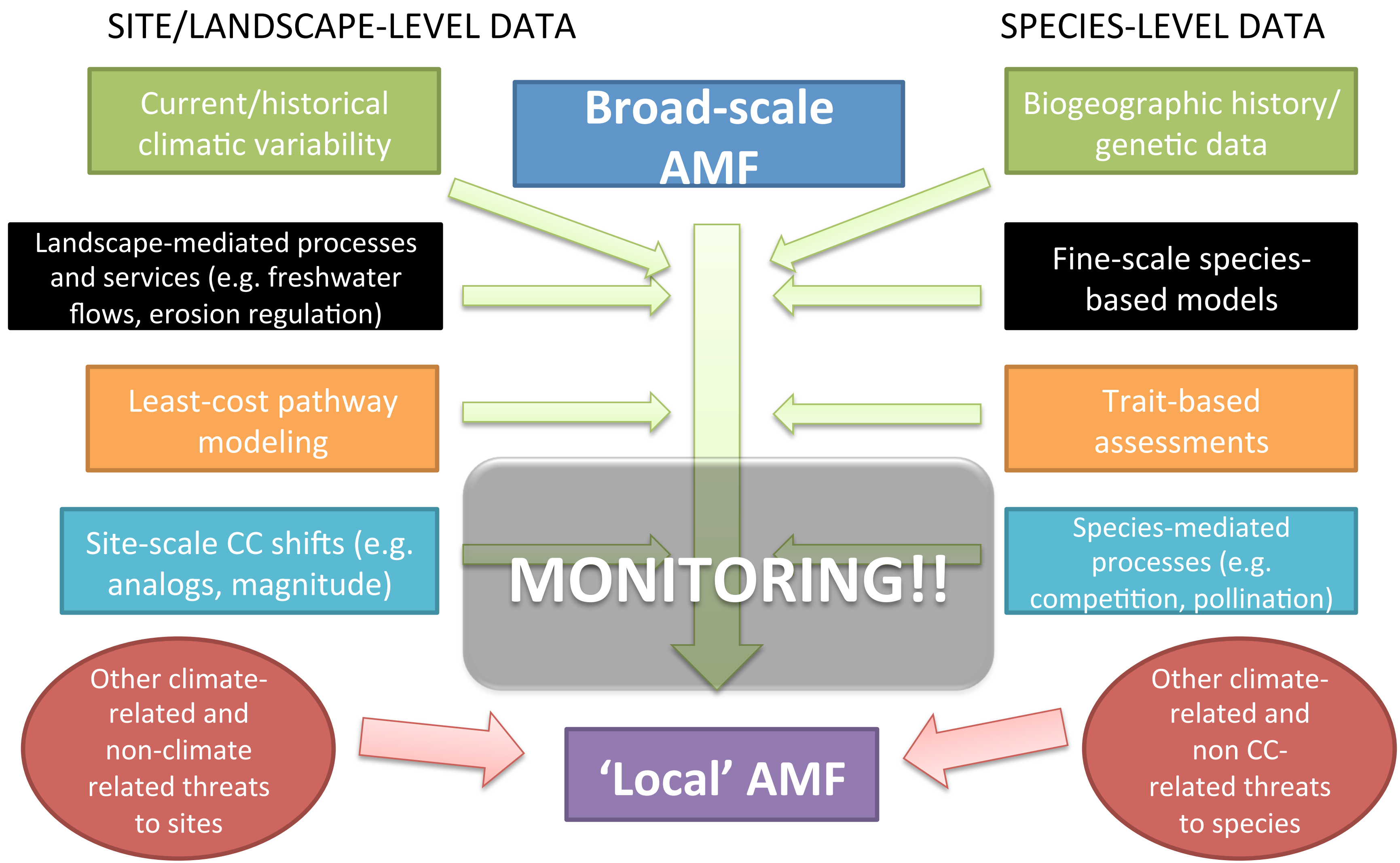
# Mapping simple shifts in climate




What the Sub-Saharan IBA network might look like to a "climatically **insensitive**" species by 2085 (extra-wide limits)



What the Sub-Saharan IBA network might look like to a "climatically **sensitive**" species by 2085 (narrow limits)



SITE/LANDSCAPE-LEVEL DATA
SPECIES-LEVEL DATA
Current/historical climatic variability
Broad-scale AMF
Biogeographic history/ genetic data
Landscape-mediated processes and services (e.g. freshwater flows, erosion regulation)
Fine-scale species-based models
Least-cost pathway modeling
Trait-based assessments
Site-scale CC shifts (e.g. analogs, magnitude)
MONITORING!!
Species-mediated processes (e.g. competition, pollination)
Other climate-related and non-climate related threats to sites
'Local' AMF
Other climate-related and non CC-related threats to species

# Monitoring is KEY!

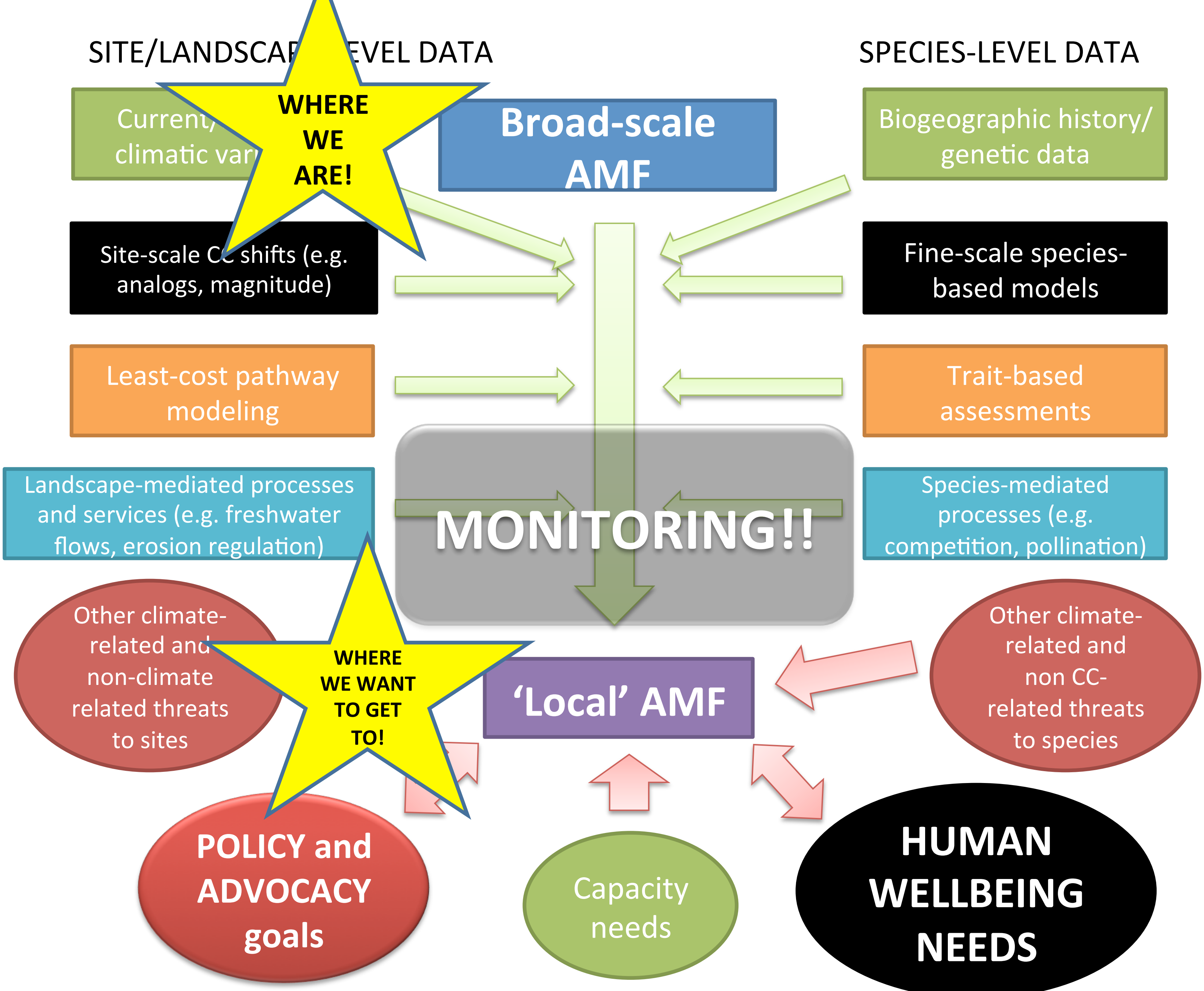
- Models can only give us an indication of *possible* shifts
- Monitoring allows us to:

1. Validate model projections
2. Evaluate likely trends at finer, more relevant scales
3. **Adjust the AMF to realized conditions!**

# Monitoring

- David Ochanda (Makerere University)
- Point count methodology for monitoring Albertine Rift endemics in three forest blocks: Nyungwe (Rwanda), Echuya (Uganda) and Kibira (Burundi)
- Four rounds – each round:

| Forest | Transects | Points |
|---|---|---|
| Nyungwe | 8 | 117 |
| Kibira | 7 | 64 |
| Echuya | 5 | 74 |
| **TOTAL** | **20** | **255** |


SITE/LANDSCAPE-LEVEL DATA
SPECIES-LEVEL DATA
WHERE WE ARE!
Current/ climatic var
Broad-scale AMF
Biogeographic history/ genetic data
Site-scale CC shifts (e.g. analogs, magnitude)
Fine-scale species-based models
Least-cost pathway modeling
Trait-based assessments
Landscape-mediated processes and services (e.g. freshwater flows, erosion regulation)
MONITORING!!
Species-mediated processes (e.g. competition, pollination)
Other climate-related and non-climate related threats to sites
WHERE WE WANT TO GET TO!
'Local' AMF
Other climate-related and non CC-related threats to species
POLICY and ADVOCACY goals
Capacity needs
HUMAN WELLBEING NEEDS

## WCS Conference on Building Consensus on Albertine Rift Climate Change Adaptation for Conservation

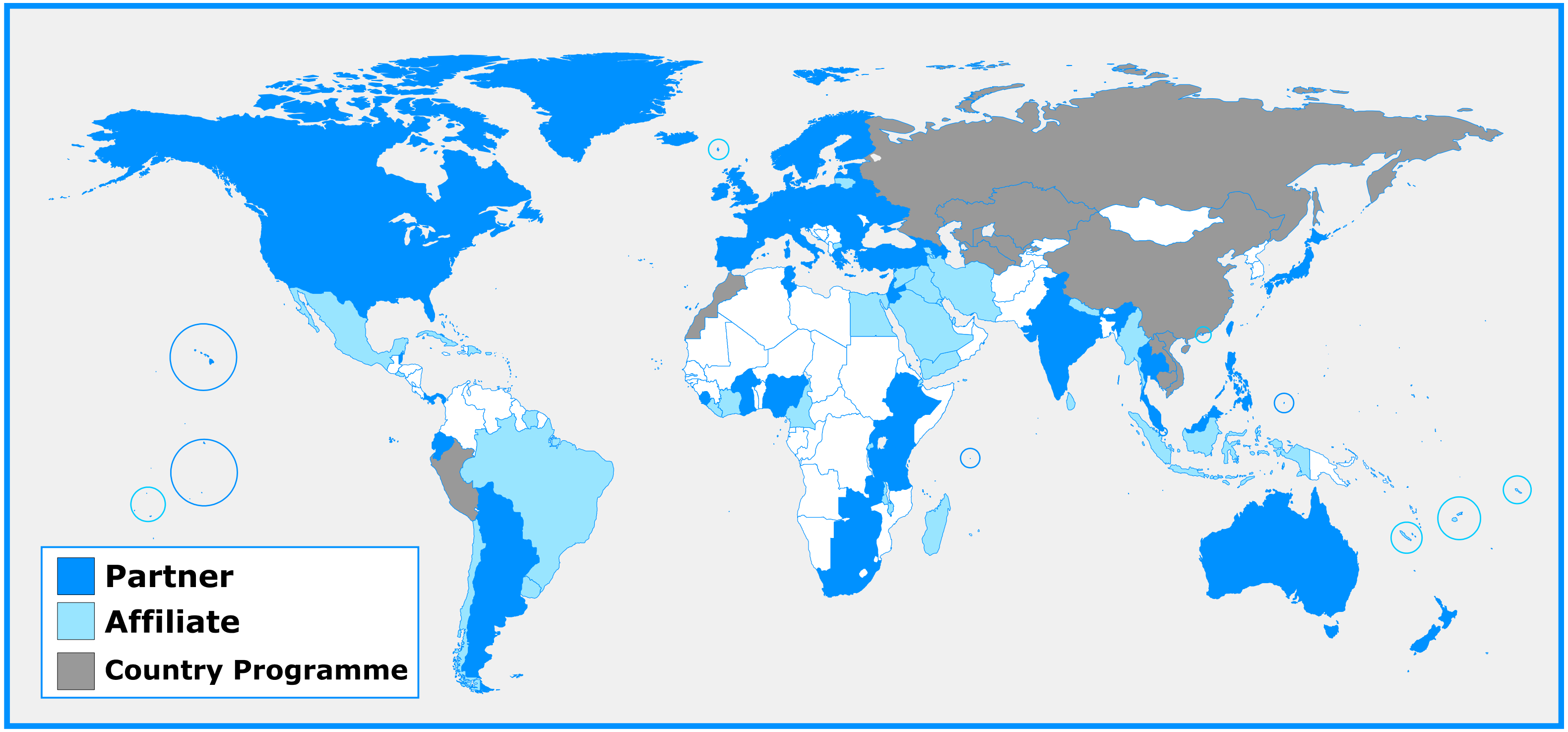
*Gashora, Rwanda, 23rd February 2011*

# From Science to Policy action: BirdLife's perspective

Ken Mwathe
Project Manager BirdLife Africa Climate Change Project
Ken.mwathe@birdlife.org

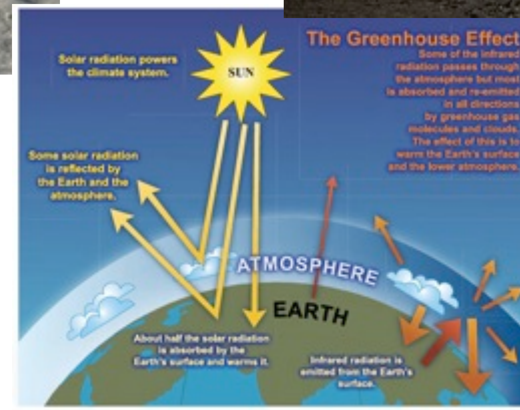
# Together we are BirdLife International

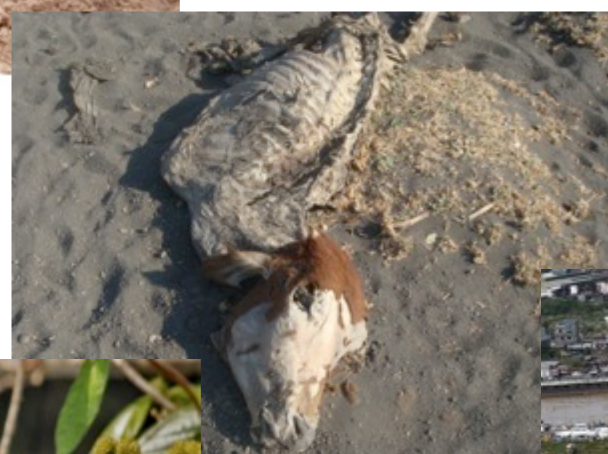
# Global Partnership for nature and people

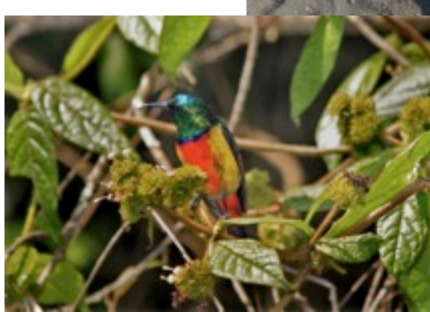



BirdLife International is a partnership of 114 national conservation organisations and the world leader in bird conservation. BirdLife's unique local to global approach enables it to deliver high impact and long term conservation for the benefit of nature and people.

BirdLife in Africa works in 23 African countries


The Greenhouse Effect
Some of the infrared radiation passes through the atmosphere but most is absorbed and re-emitted in all directions by greenhouse gas molecules and clouds. The effect of this is to warm the Earth's surface and the lower atmosphere.
Solar radiation powers the climate system.
SUN
Some solar radiation is reflected by the Earth and the atmosphere.
ATMOSPHERE
EARTH
About half the solar radiation is absorbed by the Earth's surface and warms it.
Infrared radiation is emitted from the Earth's surface.





# BirdLife Climate Change Projects

- ***Developing an adaptive management framework (AMF) for the conservation of birds and other biodiversity across Africa. (2007-2009)***

- ***Implementing and monitoring an adaptive Management Framework in the Albertine Rift (2009-2012)***

***Developing an adaptive management framework (AMF) for the conservation of birds and other biodiversity***

## Objectives

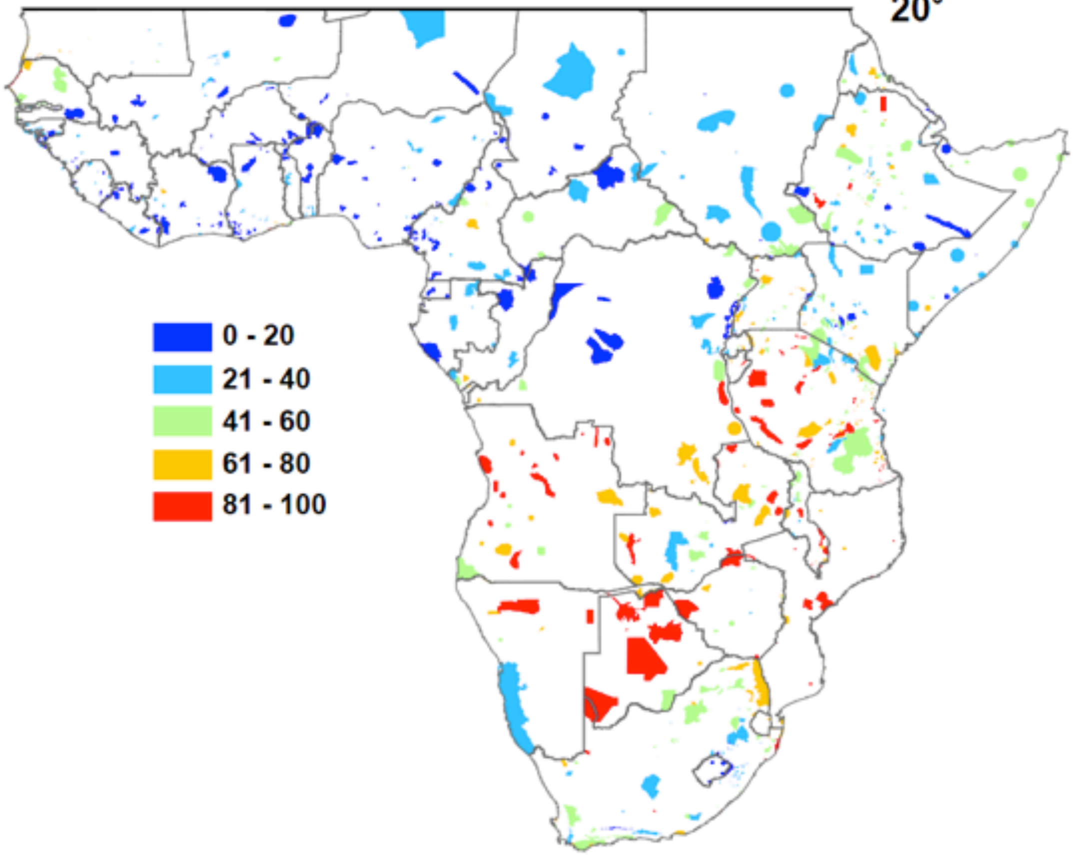
1. Develop an Adaptive Management Framework for a network of high-biodiversity sites - using IBAs

2. Refine and progress implementation of the AMF in the Albertine Rift.

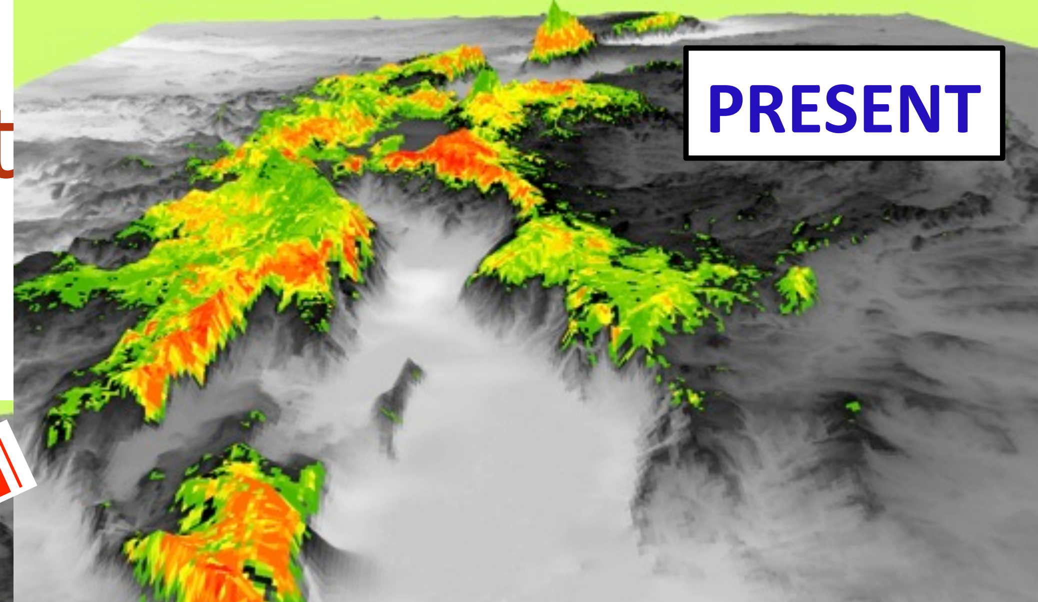
3. Develop the a knowledge-exchange facility - Africa Climate Exchange

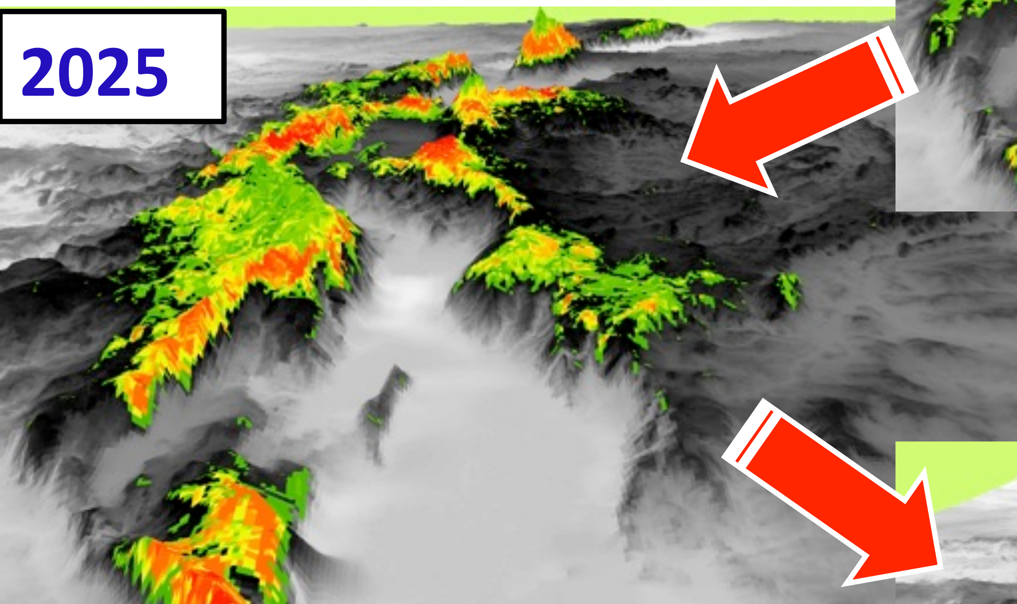
# What was achieved?

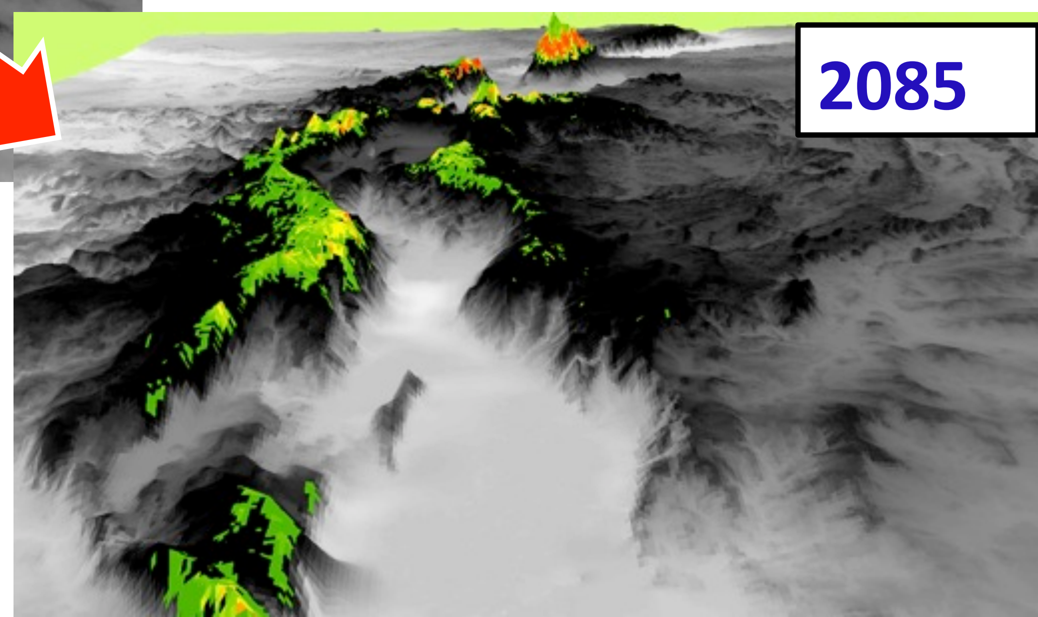
**MODELLING**



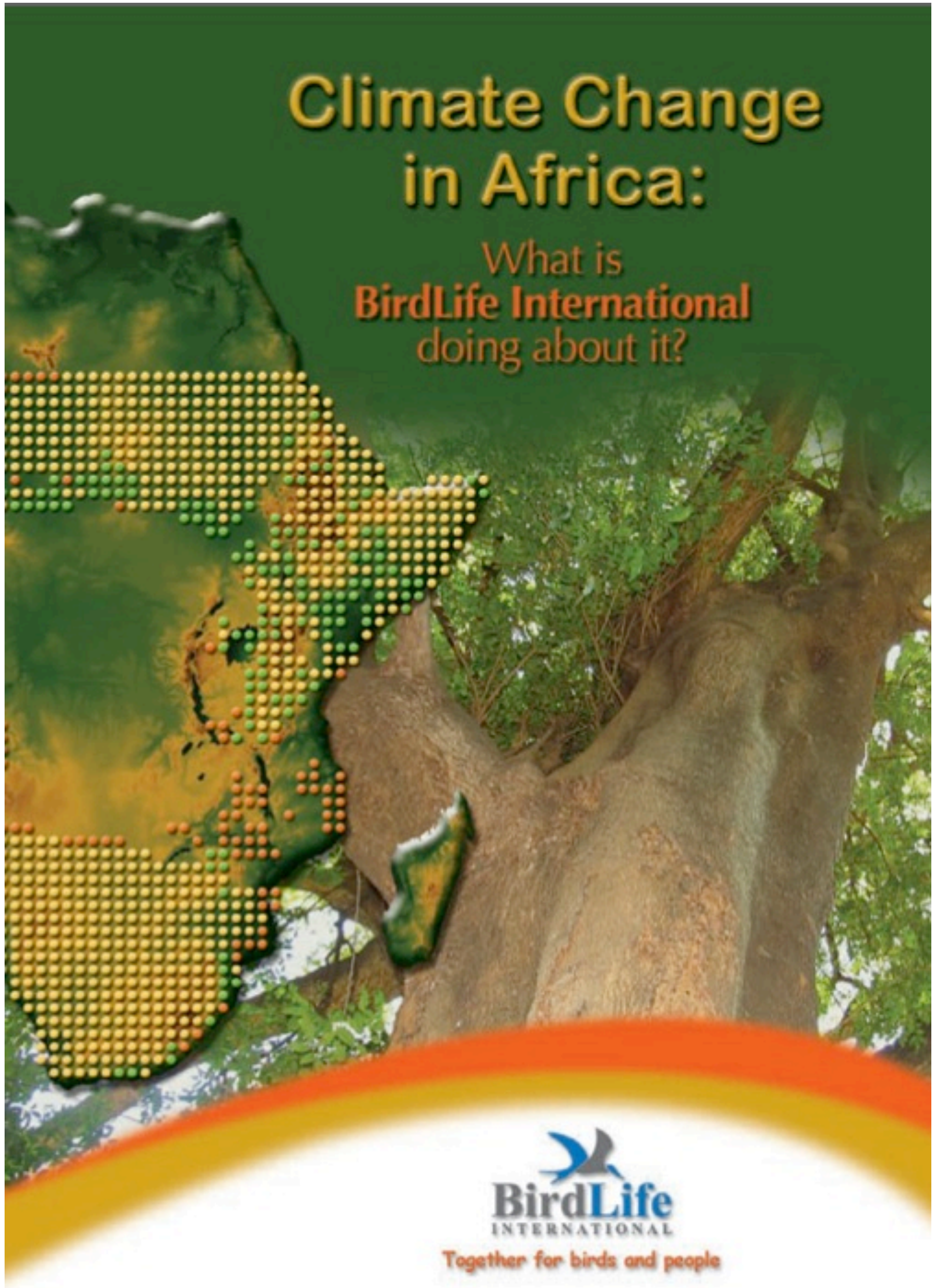
# The Albertine Rift




MODELLING


Climate Change
in Africa:
What is
BirdLife International
doing about it?
BirdLife
INTERNATIONAL
Together for birds and people

# THE AFRICA CLIMATE EXCHANGE

- One stop portal on climate change in Africa
- www.africa-climate-exchange.org
- Created over a period of 2 years
- Hosted through squarespace
- Special website holds the 1,600 species maps
- Home, library, news, maps, links

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# Africa Climate exChange

out Library News Maps Links

## ne Africa Climate Exchange

eveloped by BirdLife International, serves as a one stop shop on
climate change, mitigation and adaptation in Africa. Using birds and
rtant Bird Area network as entry points, it demonstrates how
Africa will respond to climate change and what can be done.

ate Exchange (ACE) links to various sources of information on climate
a and other parts of the world. A growing Library of 350 downloadable
reely available. This website will spur dialogue and debate on various
e issues. We are also making active follow up of developments after the
Conference on Climate Change UNFCCC COP15 recently concluded
n and its implications to Africa. ACE can be used by ordinary people
rmation on climate change and impacts, as well as experts seeking
ation. More »

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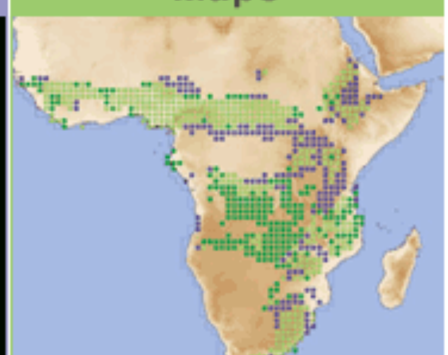
News

Maps



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Tuesday, February 22, 2011

**Forests for water and wetlands**

**Climate Change Mystery: 'Snowball Earth' 440 Million Years Ago - ABC News**

**FARA Secretariat: African activists awarded for climate change ...**

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# Africa Climate exChange

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# Africa Climate exChange



**role for biodiversity in the battle against poverty and climate change**
ure's riches can play a major role in poverty eradication, but only if
ernments and businesses recognise the true economic...
**.0/2010**

**ICA: Going rural and green**
rce: IRIN Rural Africa needs to wake up to climate change, which is
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**ca: African Leaders at UN-Backed Forum Urge Funding for Climate Change ptation**
an leaders gathered in a United Nations-backed meeting today urged the
rnational community to support a fund intended to help...
**.0/2010**

**n of Africa daily: Ethiopia: Official says climate change ...**
rding to him, more and more climate change-related disasters, such as
ding and drought, were striking Africa, throwing increasing numbers...
**.0/2010**

**Life calls upon the EU to champion biodiversity in Nagoya and at home**
Life International handed in to the European Commissioner for the

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# Africa Climate exChange



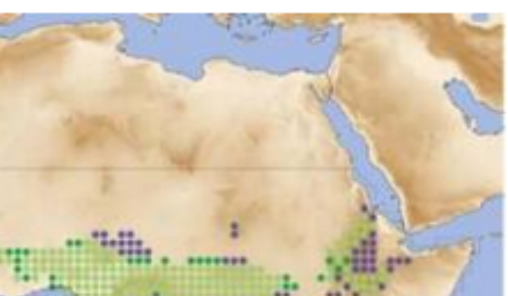
f maps, showing how the ranges of the majority of bird species breeding in
aran Africa could be impacted by climate change, is made available here online.

ch by Common Name
ch by Scientific Name
ch by Family

aps, depict modeled present-day and modeled projections of future species
pproximating to four discrete time periods: present-day (based on the mean
etween 1970–2000), 2025 (a mean of climate projections for the period
39), 2055 (mean for 2040–2069) and 2085 (mean for 2070–2099).

s have been developed collaboratively by BirdLife International and Durham
y with data provided by the Zoological Museum of the University of
gen (see here) for 'observed' distributional data for all terrestrial bird species
in sub-Saharan Africa.

nges have been prepared for 1608 species, the entire breeding avifauna of
aran Africa, minus 71 species recorded from fewer than five grid cells, for which
was impractical.



The "climate envelope" of a species represents the association between its present-day distribution and current climatic variables. Future distributions are then estimated by projecting this relationship onto scenarios of climate change, making the assumption that

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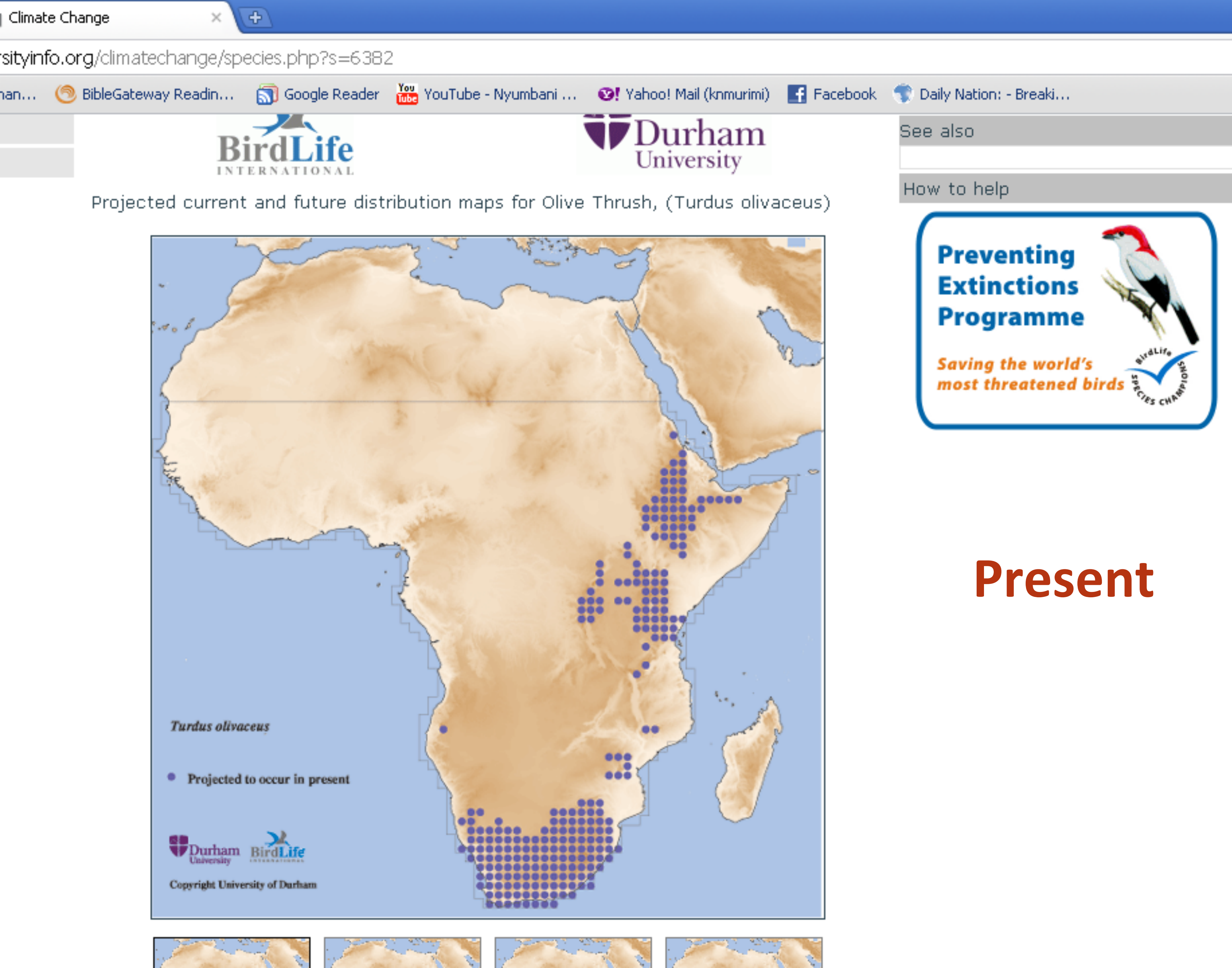
**Species Impact Maps**

Search by Common Name
Search by Scientific Name
Search by Family

Africa's IBAs & Climate Change
Focus on the Albertine Rift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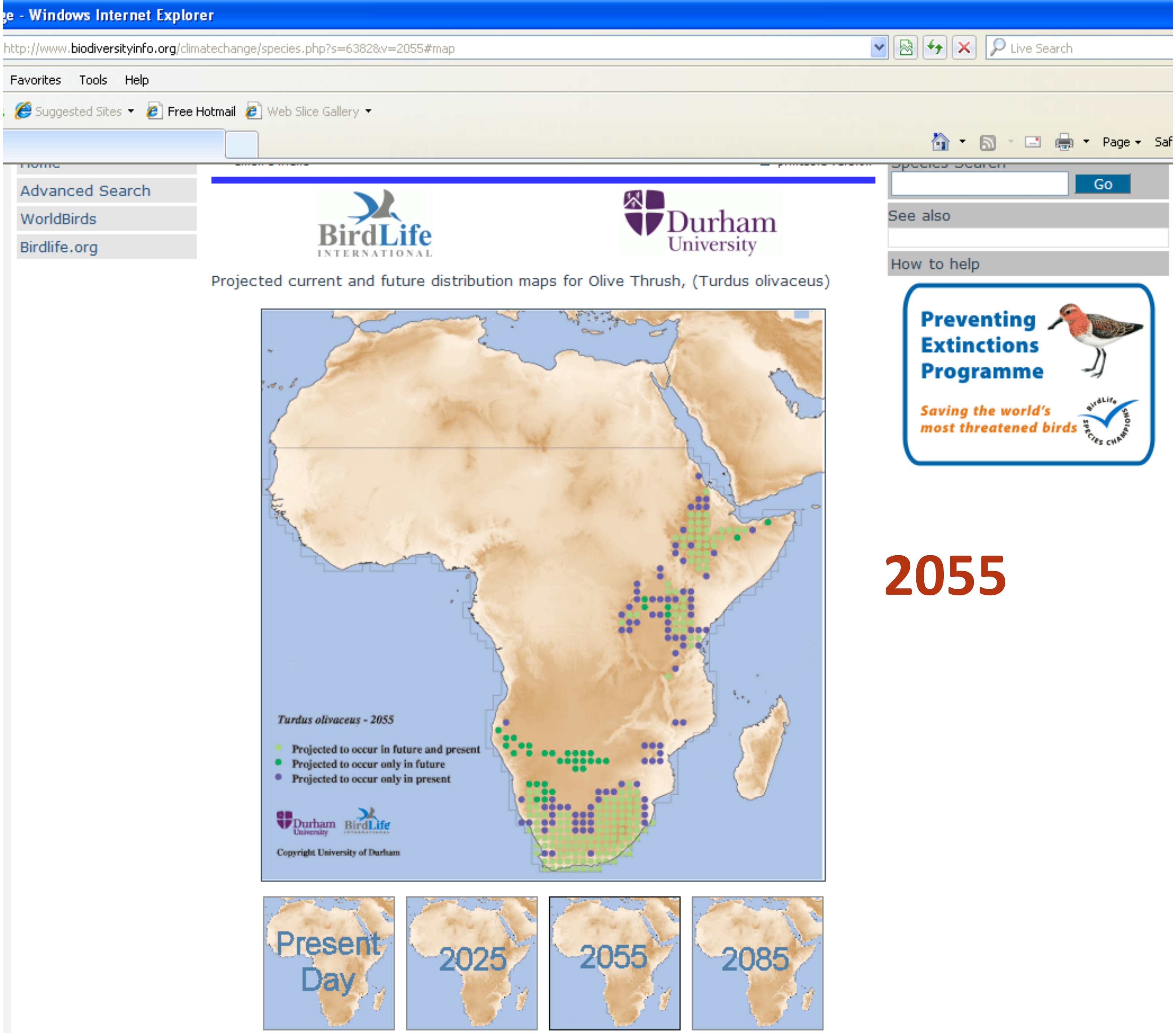
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2085

***Implementing and monitoring an adaptive Management Framework in the Albertine Rift***

## Project components

1. **Policy and advocacy**

2. **Capacity Building**

3. **On the ground action**

# Policy and Advocacy

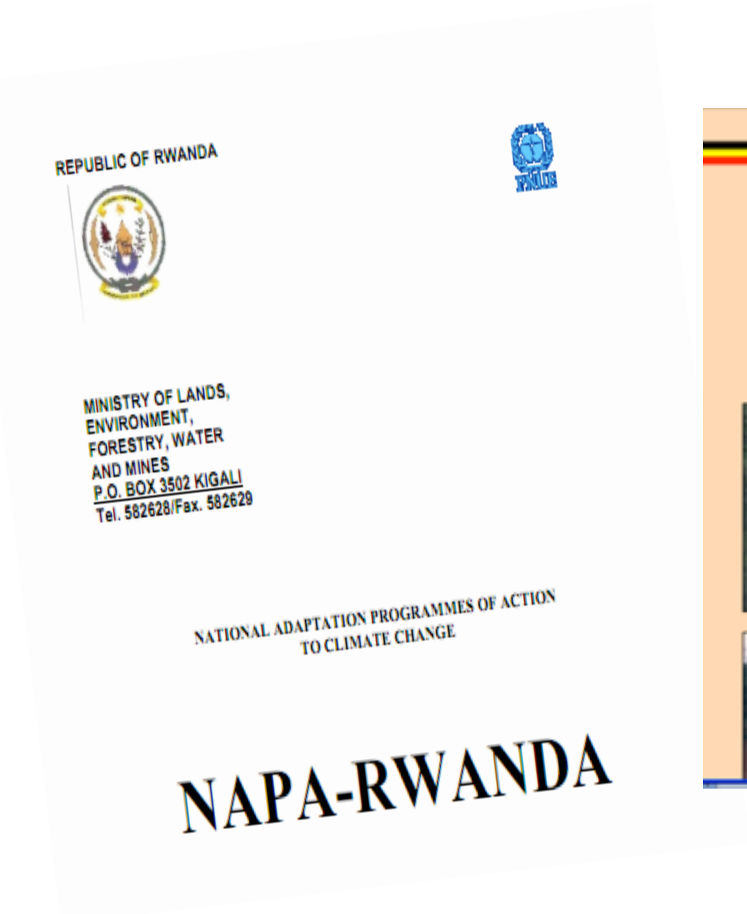
## Policy approaches

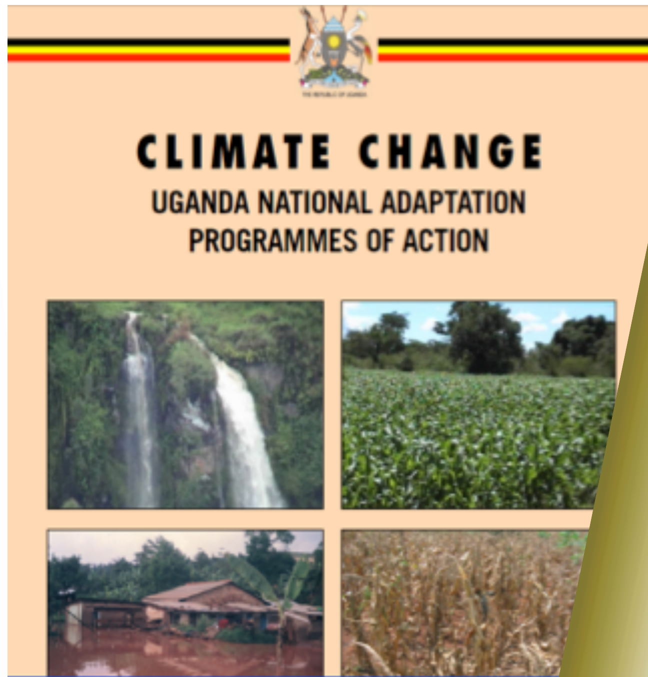
- Based on sound, science-based information and guidance
- Guided by practical, on-the-ground experience
- Policy analysis to establish the state of play, the gaps and the targets for advocacy
- Review of key national strategies, plans and reports
- Compilation of recommendations, guidelines and examples of best practice
- Feed into regional and international institutions and processes
- build effective linkages to Government planning processes

# Policy and Advocacy

- Regional meetings held in Bujumbura Burundi in Feb 2010 and  Musanze Rwanda in Nov 2010
- Policy and Advocacy Officers identified and trained
- Training on identifying advocacy targets, messaging and strategies
- Advocacy plans for each country developed.
- Process of analysis of NAPAs commenced in Rwanda, Burundi and Uganda.
- Steering Committee chaired by INECN
- Lessons from Project shared during CBD SBSTTA 14 in Nairobi
- Lessons shared during at BirdLife Asia Climate Change Meeting and CBD COP10 Side Event in Nagoya, Japan

# NAPA Analysis





Others: NBSAPs, PA plans, PRSPs





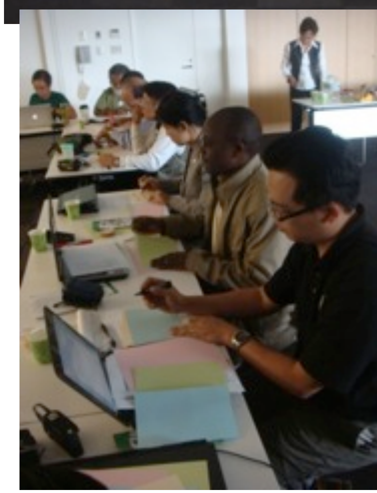




REGIONAL WORKSHOP ON CLIMATE CHANGE
NITORING AND ADVOCACY IN THE ALBERTINE RIFT
HOTEL, MUSANZE, RWANDA 8TH–12TH NOVEMBER 2010


# CBD COP 10


Impacts of Climate Change on Endemic Species in Africa's Albertine Rift
Projected
Key




COP10
AICHI-NAGOYA
Welcome to CBD COP10

## Management Actions that need policy input/change

- Maintain ecosystems/habitats in as optimal condition as possible
- Mitigation of threats, and restoration of sub-optimal or degraded habitat.
- Actions that retain key species for as long as possible and/or create space for incoming species.
- Creating the right conditions for persistent species.
- Improving ability to disperse and identifying key corridors
- Increasing the extent of current sites to accommodate emigrating species

# Capacity Building

- Msc Student identified and monitoring research commenced
- Three representatives of local community at three sites trained
- 40 NGO and Government staff trained in cc monitoring and advocacy
- CC session at CAP in Botswana 2010
- Policy and Advocacy Officers trained

# On the ground action

- Adaptation planning at key forest blocks (Echuya, Nyungwe, Kibira)
- Connectivity modelling (land cover and other data sets)
- Supported by climate change monitoring
- Development of a Monitoring Guide

# Challenges

- Bridging of science with action on the ground (coarse scale modelling vs management actions)
- AMF: Generic vs specific.
- Fine scale modelling is data intensive
- Need for capacity at all levels - community (site); national (BirdLife Partners) & regional levels.
- Policy implications – need to work with Government and policy makers

# Way ahead

- Complete remaining project work
- Looking beyond current project
    - ✓ Land use, population changes into the models
    - ✓ Adaptive planning at landscape level beyond key sites (ecosystem services, connectivity…)
    - ✓ Vulnerability assessments
    - ✓ Livelihood diversification for improved resilience
    - ▪ Transboundary GEF Project for DRC and Uganda (in process)

***THANK YOU***

***MERCI***

***ASANTENI***

***MURAKOZE***

***MWEBARE***