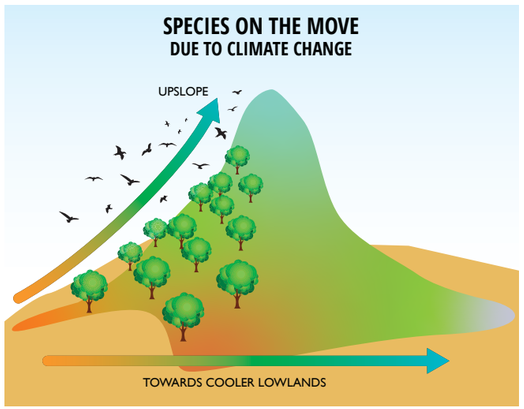
SOUTH AFRICA

Planning for Climate Change: **SPECIES ON THE MOVE**

WHAT IS AT **STAKE**

Species are on the move with climate change. Our conservation efforts need to keep pace. Representing all species and all ecosystems in conservation is challenging with moving species. Meeting national development goals and international shared goals depends on early effective planning for species on the move.



WHAT IS HAPPENING?

Species are moving in response to climate change. Every species has its own unique climatic tolerance, so as temperature and precipitation change, plants and animals move to track suitable climate.

Species are moving upslope in mountains to cooler areas to escape warming. In the lowlands, species have to move longer distances to find cooler landscapes,

This process happens over decades, across many generations for plants and animals, but it is already happening. Nature is being rearranged by climate change in this process will accelerate as climate change intensifies.

Our ability to meet Sustainable Development Goals, combat climate change and conserve nature are all affected by species on the move.

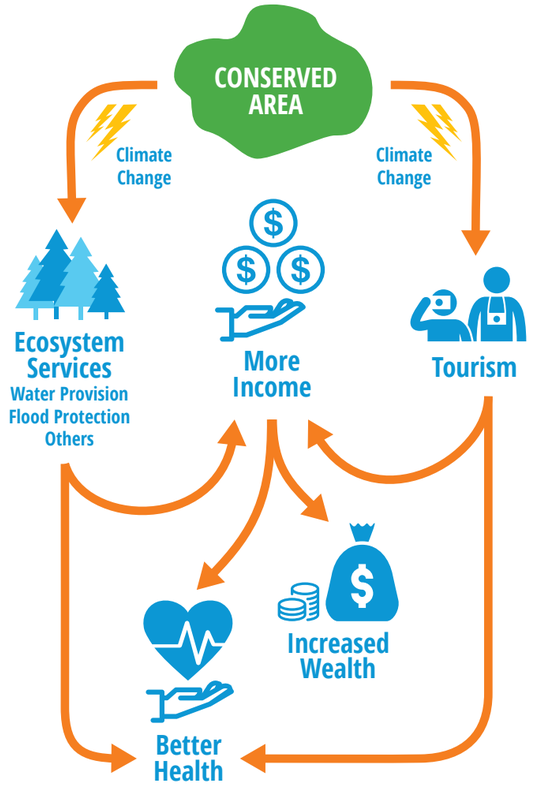
HOW CAN WE RESPOND?

To meet Sustainable Development Goals (SDG), combat climate change and conserve nature we need to plan for species on the move.

SDGs that depend on nature, such as access to fresh water and income from tourism, have to be able to adapt to changing natural conditions in order to deliver benefits to society. Representing all species and ecosystems in conservation areas requires that we understand and plan for species on the move. These core conservation areas provide stability and resilience in natural systems that help maintain carbon stocks and natural vegetation for fighting climate change.

To plan for these changes, we need to understand how fast climate will change in different parts of the country, how species will respond to these changes, including their sensitivity to change, and we need to understand how moving species will rearrange ecosystems.

This report emphasizes the steps needed to conserve nature when species are on the move. When we conserve high priority areas for species and ecosystems on the move, we are maintaining core areas critical for meeting SDGs and conserving biodiversity.

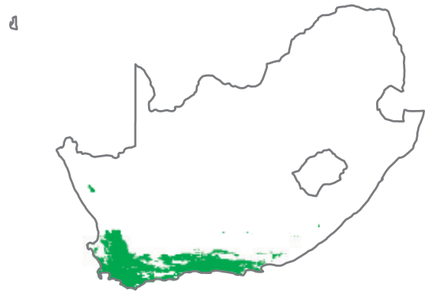


CURRENT

IUCN Range
Modeled Habitat
Absent

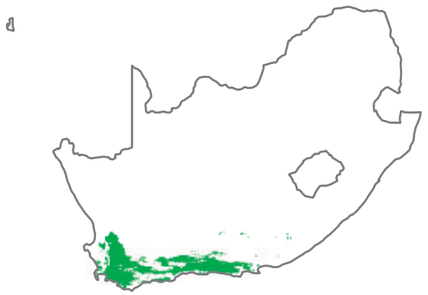
Cape Sugarbird
(Promerops cafer)

LOW CHANGE SCENARIO (RCP2.6)



Modeled Habitat
Absent

HIGH CHANGE SCENARIO (RCP8.5)



Modeled Habitat
Absent

QUICK FACTS

IUCN Status: Least Concern
Population Trend: Stable

Modeled Habitat Change
RCP2.6: 17.6% loss
RCP8.5: 40.3% loss

Icon created by Fabio Grande from the Noun Project

SPECIES ON THE MOVE

Species are on the move, responding to climate change, all around the world (Pecl et al. 2017). Thousands of species have already moved and millions will be moving in the near future.

Under high climate change scenarios many species will move long distances, while under low climate change scenarios movements are over shorter distances. Movements in mountains are generally over shorter distances than movements in lowlands.

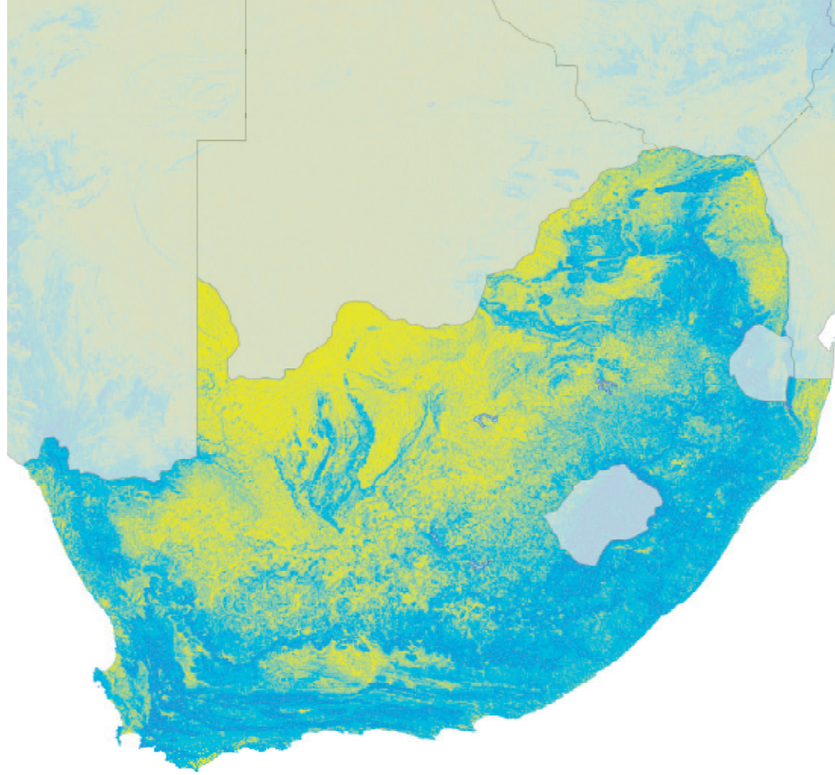
How far a species moves depends both on how fast climate changes and on the sensitivity of species to climate change.

WHERE AND HOW FAST WILL CLIMATE BE CHANGING?

Map at right shows the velocity of temperature change under a high change climate scenario measured in kilometers per year. Areas in yellow are comparatively higher velocity – meaning that a species need to move faster to keep pace with the change in temperature. Areas in blue are lower velocity—so a species does not need to move as quickly to keep pace with suitable climates.

Velocity (km/yr)

- <0.01
- 0.01 – 0.1
- 0.1 – 0.5
- 0.5 – 1
- 1 – 2
- 2+



SPEED OF CHANGE

The speed of climate change, also known as velocity of climate change is generally higher in the lowlands and lower in mountains. This is because mountain species can move shorter distances upslope to find cooler climates, while lowland species may have to move long distances to find cooler climates.

As an example, an antelope in the lowlands that is adapted to moderate temperatures and semi arid conditions, may need to move up into mountain slopes if lowland conditions become hotter and drier.

Understanding velocity of climate change isn't the only key to managing for climate change. We must also understand how sensitive species are to temperature change. But velocity of climate change allows us to understand areas in which species on the move may be more or less vulnerable to climate change.

PRIORITIES FOR CONSERVING SPECIES ON THE MOVE

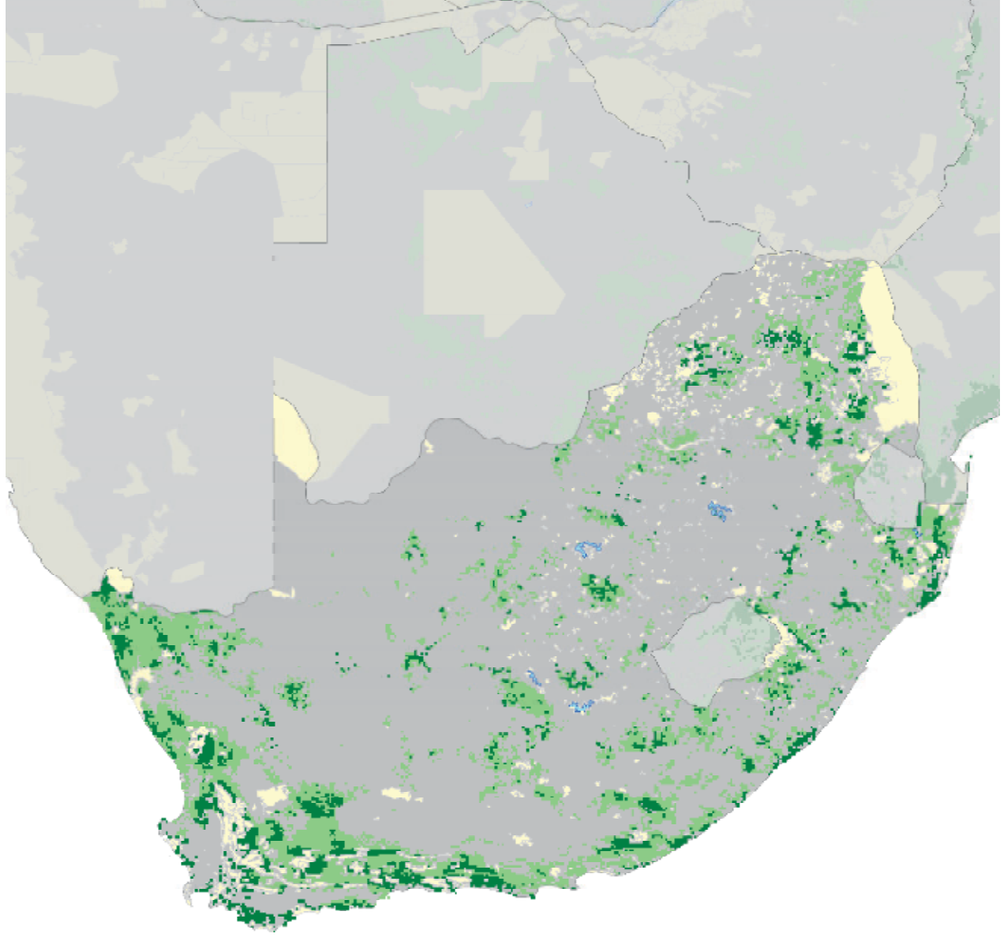
One of the most important goals for conservation areas is to represent all species. This helps ensure that no species extinctions occur. With species on the move due to climate change it is then important to represent all species both where they are now and where they will be in the future.

AREA PRIORITIES

Much of the western and southern regions of South Africa should be prioritized as conservation areas under climate change scenarios. Areas particularly important for representing species as they move include the region between Garden Route National Park and Woody Cape Nature Reserve; Agulhas National Park; St. Lucia Game Park; and Richtersveld National Park. In addition, expanding the Kruger National Park can help species adapt to climate-induced range shifts.

SPECIES PRIORITIES

Strategic planning for conserved areas can ensure more complete representation of all species under climate change (Hannah et al. 2005). Map at right shows the highest priority areas to add to the existing network of conserved lands to maximize the representation of species current and modeled future ranges. This prioritization for South Africa uses a 2070 high change climate scenario. The Zonation conservation planning software (Moilanen et al. 2007) was used to determine priorities based on present and future modeled species ranges for over 13,000 plant and animal species.



High Priority

Highest Priority

Protected Areas

HABITAT CHANGES

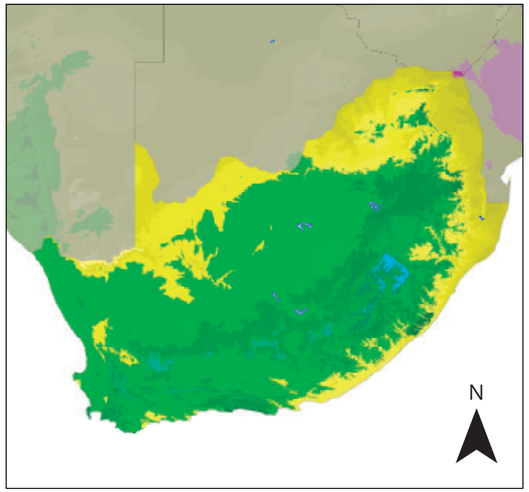
Ecosystems, or habitats, are comprised of groups of species that will respond differently to climate change. Species on the move each respond to climate change according to their unique temperature and precipitation tolerances. As species move differently from one another, some new ecosystems will appear while some existing ecosystems may reduce in size.

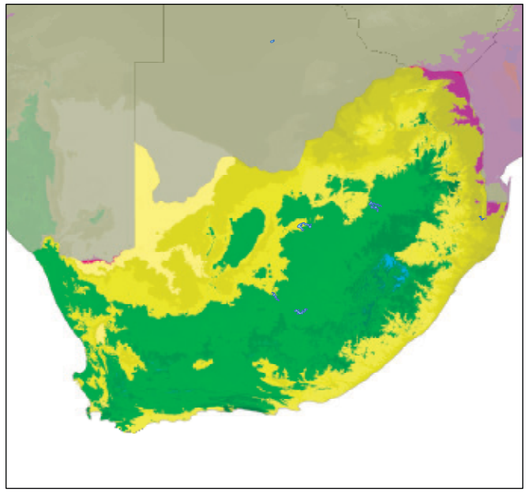
REPRESENTING ALL HABITATS

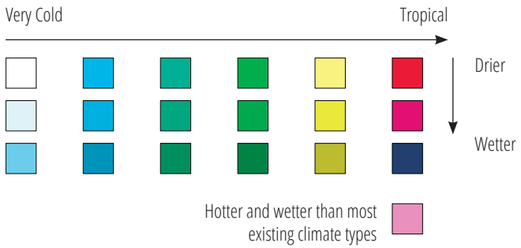
In conservation planning, a major principle is to maintain representative examples of all ecosystems. This helps reduce extinctions and improves our understanding of how species relate to one another in specific environments. When ecosystems shift due to climate change, we need to plan to conserve both their present and future locations.

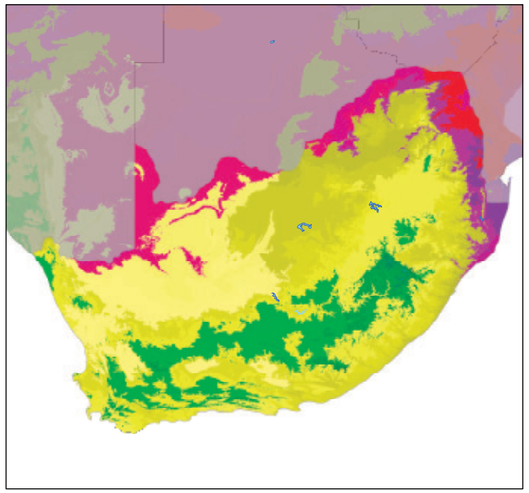
HABITAT PRIORITIES

Ecosystems in South Africa will shift significantly with climate change. Nama Karoo and grasslands will diminish largely, while arid and desert climates are projected to increase. Drier ecosystems are also likely to open around the northern and western borders of South Africa. Protecting grassland where it is likely to remain is of high importance in this country, especially as it may become more important for human use as well.









MAPPING HABITAT CHANGES

These three maps show ecosystem climate types and how they may change under a low and high climate change scenarios. Each color depicts a unique climate type representing an ecosystem on the ground. Colors are consistent across scenarios – meaning if an area is currently yellow, that same color yellow will show where that ecosystem will be and whether it is increasing or decreasing in the futue scenarios. Climate ecosystem types shown here were produced following the methods of the Global Environmental Stratfication (GEnS) described in Metzger et al. 2013.

Map at upper left is baseline climate, upper right is the low climate change scenario and lower right is the high climate change scenario. Both future climate projections are the mean of climates of the period 2060-2080 and is the majority agreement across ten global climate models.

RECOMMENDATIONS

POLICY

Plan for new conservation areas, incorporating consideration of species on the move.

Strengthen trans-border conservation efforts to help species moving across international boundaries.

Prioritize protected corridors and dispersal areas in order to sustain species numbers and distribution.

SPATIAL PLANNING

Prioritize conservation in Key Biodiversity Areas that intersect with high climate change conservation priorities.

Improve management effectiveness of future wildlife refuges under climate change.

HUMAN-WILDLIFE-CONFLICT

Enhance habitat connectivity and zoning so that species on the move can find suitable habitats without coming into conflict with people or livestock.

GOVERNANCE

Prioritize funding to strengthen capacity for species + ecosystem modeling and conservation planning for climate change in national conservation and land-use planning agencies.

SOUTH AFRICA BY THE NUMBERS

1.6°–3.78°C projected increase in mean temperature

47.5% of South Africa has greater than 1 km/yr climate velocity

13,206 plant and animal species modeled

146 existing species will move from South Africa to neighboring countries

73 new species will move enter South Africa from neighboring countries

15 sustainable development goals depend on the conservation of nature

8% of South Africa is currently protected area

THE SPARC PROJECT

Spatial Planning for Area Conservation in Response to Climate Change (SPARC) is the largest effort to predict species responses to climate change ever undertaken. SPARC is coordinated by Conservation International and involves scientists and policy experts from over 20 institutions across the tropics. SPARC was funded by the Global Environment Facility (GEF) to provide information that can help countries plan more effectively for conserved areas considering the effects of climate change.

RESOURCES

Research supported by Global Environment Facility (GEF) Project "Spatial Planning for Area Conservation in Response to Climate Change".

Project Partners

University of Arizona, University of Leeds, Stellenbosch University, Xishuangbanna Tropical Botanical Gardens, CSIRO, Pontificia Universidad Católica de Chile

Resources

Project Information and Results Available at:
www.conservation.org/gef/projects/Pages/SPARC.aspx
www.resilienceatlas.org
www.biendata.org
www.protectedplanet.net
hwww.ecoinformatica.net/GCMcompareR.html

References

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CONSERVATION INTERNATIONAL

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