



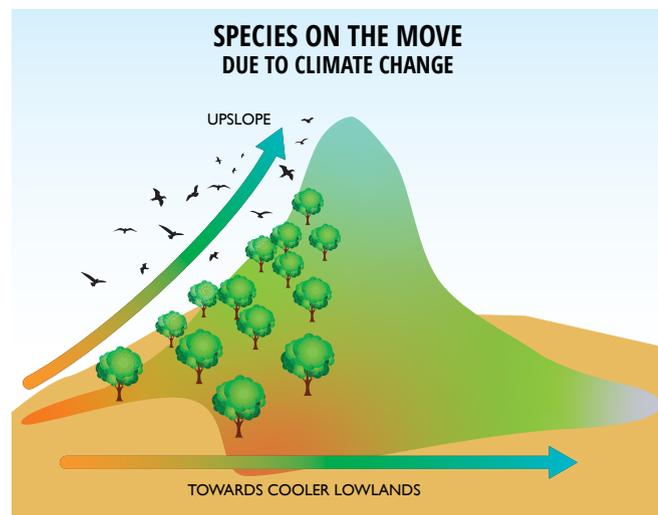
# MALAYSIA

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



## WHAT IS AT STAKE

Climates are changing and our conservation efforts need to change as well. When the climate changes, species can adapt, move, or die. Future ecosystems will therefore be different from those of today and our ability to meet conservation and development goals will depend on effective planning for these changes.



## WHAT IS HAPPENING?

Every species has its own unique climatic tolerance. As temperature and rainfall change, some species may be able to adapt to the new conditions where they are, while others will move to track suitable climates. Some may not be able to do either of these and are likely to disappear.

Changes can be rapid with short-lived highly mobile species, but may happen over decades or even centuries in long-lived trees. Nature is being rearranged by climate change and this will accelerate as climate change intensifies.

Our ability to meet Sustainable Development Goals, combat climate change, and conserve nature are all affected by this rearrangement of Nature.

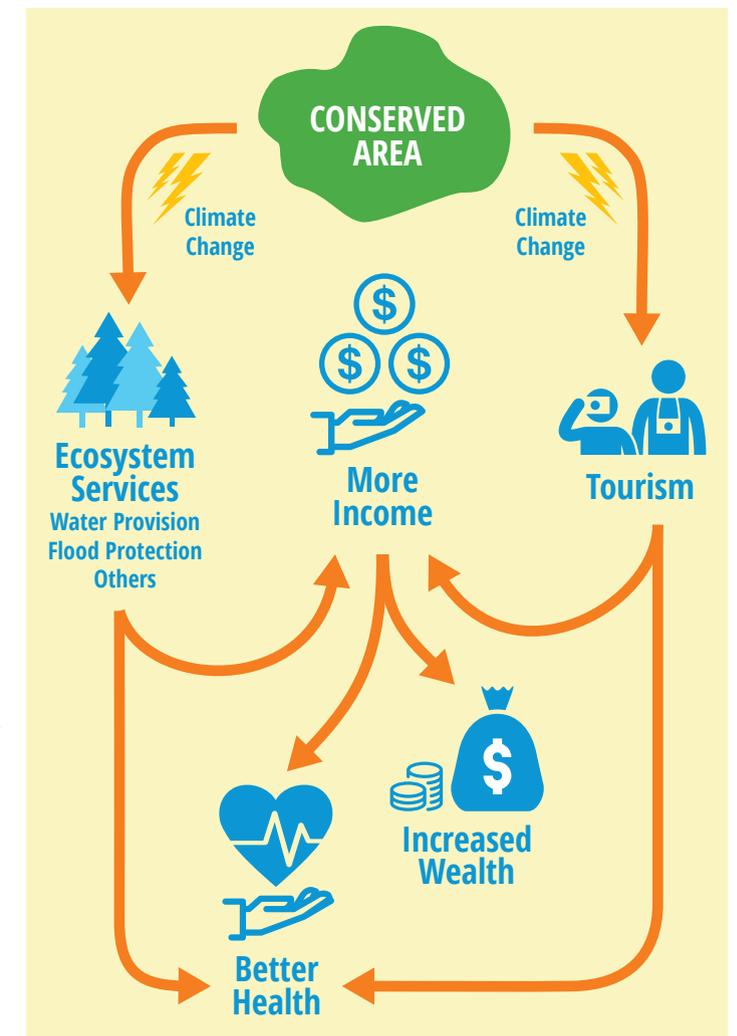
## HOW CAN WE RESPOND?

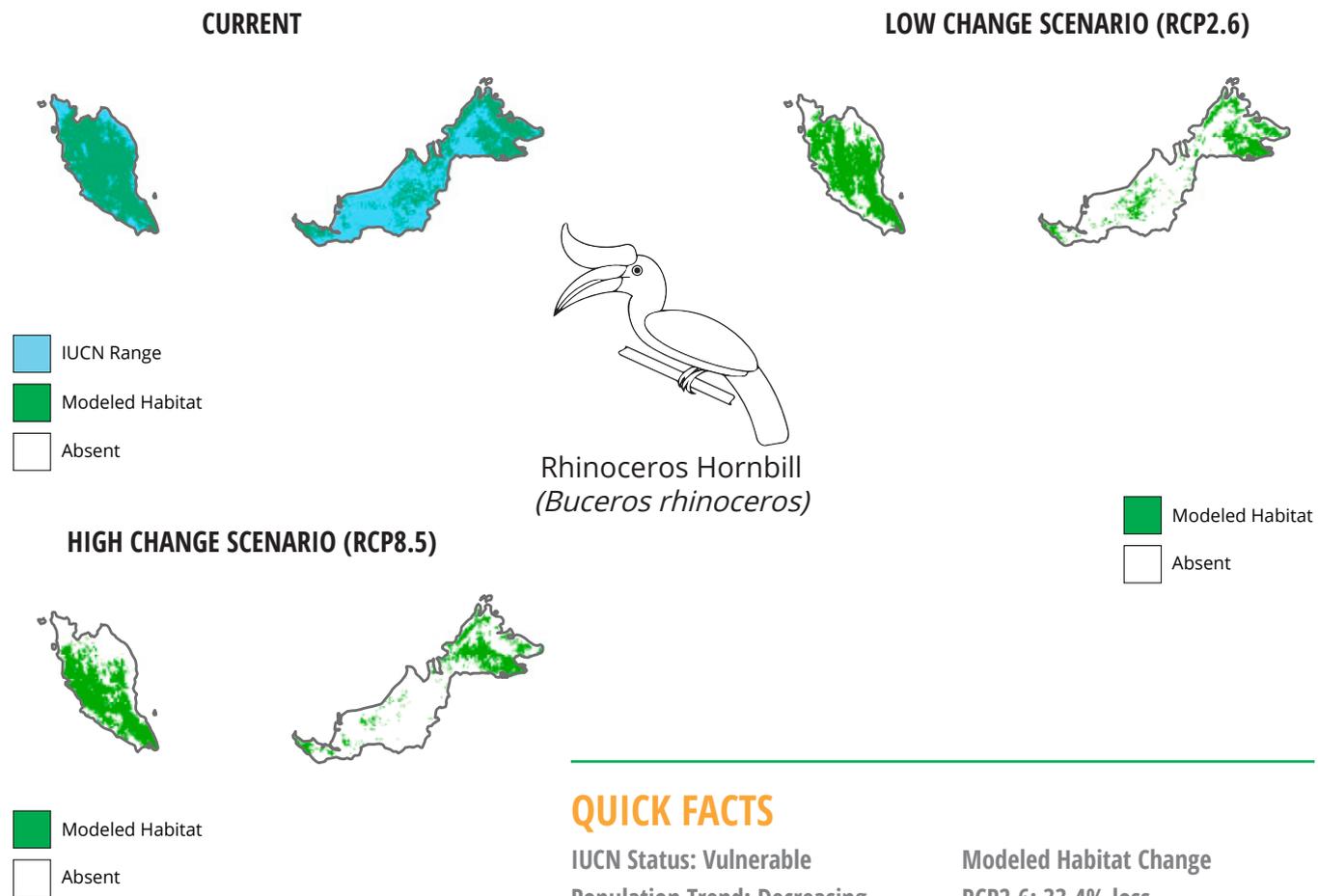
To meet Sustainable Development Goals (SDG), combat climate change, and conserve nature we need to plan for changing climates.

SDGs that depend on nature, such as access to fresh water and income from tourism, must adapt to changing natural conditions in order to continue to deliver benefits to society. Continuing to represent all species and ecosystems in conservation areas requires that we understand and plan for species responses to climate change. These conservation areas can then also provide the stability and resilience that are needed to maintain natural carbon stocks for fighting climate change.

To plan for these changes, we must first understand how and how fast climate will change in different parts of the country, how species will respond to these changes, and how the varying responses of species will rearrange ecosystems and impact the services they provide to people.

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





### QUICK FACTS

IUCN Status: Vulnerable  
Population Trend: Decreasing

Modeled Habitat Change  
RCP2.6: 33.4% loss  
RCP8.5: 40.3% loss

Icon created by Veremeya from the Noun Project

## NATURE IN TRANSITION

Species are already responding to climate change all around the world and, as a result, ecosystems are changing everywhere. These changes will continue to increase for at least the next few decades.

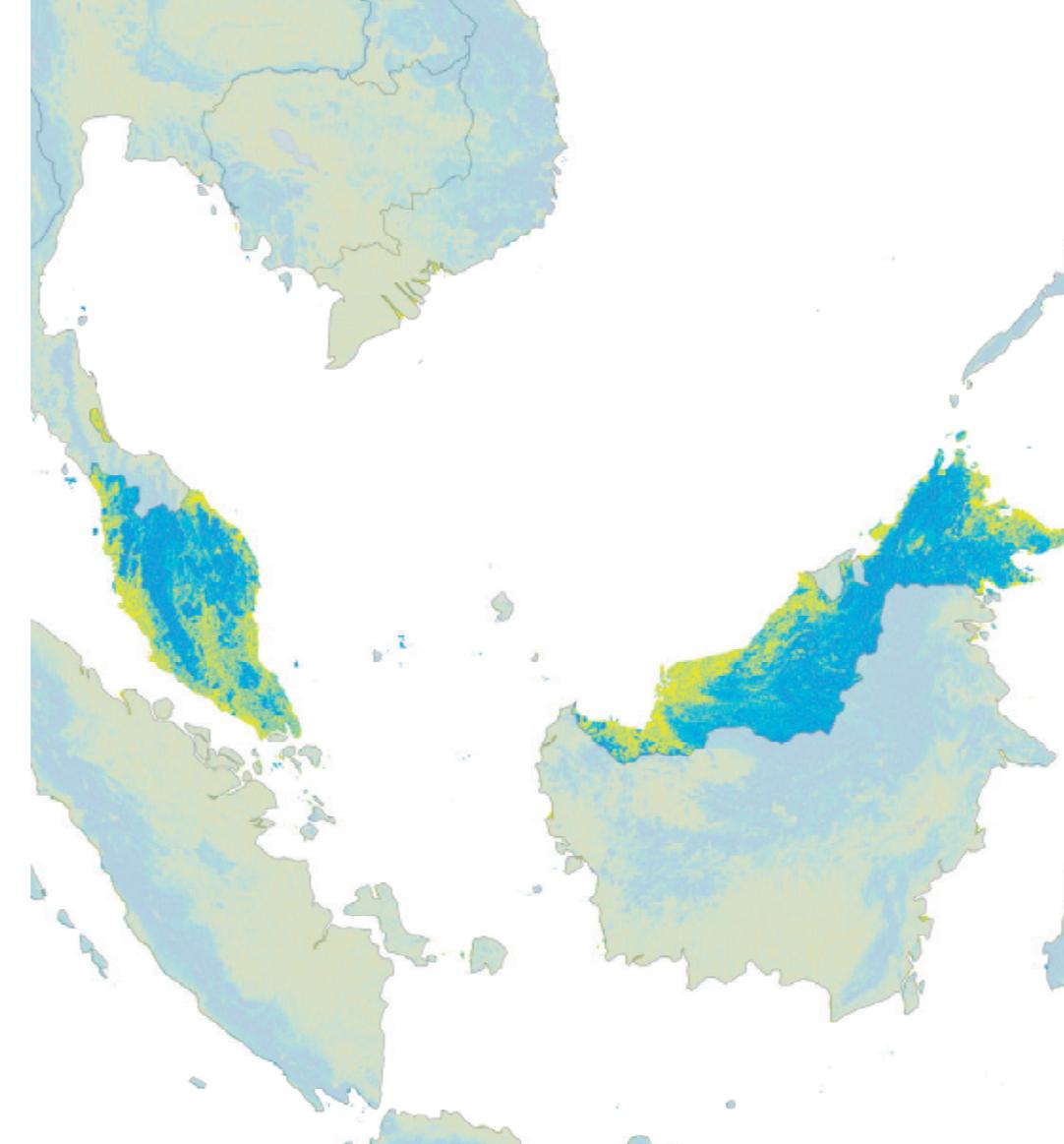
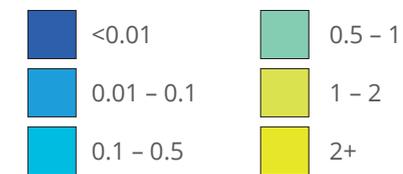
The future rate of climate change will depend on several factors, including how fast atmospheric

greenhouse-gas concentrations increase. More rapid climate change is more difficult for species to adapt to and requires faster movements for species to track their preferred climate across the landscape. Extinctions therefore become more likely when change is rapid.

## THE VELOCITY OF CLIMATE CHANGE

The map on the right shows the velocity of climate change in kilometers per year under a rapid change scenario. These velocities show how fast a species must move to keep pace with a suitable climate: yellow is high and blue is low. Velocities are high on plains and low in mountains, where a species needs to move only a short distance upslope to find somewhere cooler.

### Velocity (km/yr)



## SPEED OF CHANGE

The velocity, or speed, of climate change can be used to identify areas where species will be most vulnerable to change. On lowland plains, a species must move far and fast to stay within its range of climatic tolerance, while in rugged mountain topography, even poorly dispersed species can move fast enough to track cooler climates up hill.

Mountains have summits, however, and species at the highest altitude cannot move higher. Lowland plains and mountain summits may be inherently vulnerable, but there are also varied abilities of individual species to adjust. Some lowland species have broad native ranges, and may be able to tolerate considerable change, while some mountain species have narrow ranges and may be less tolerant. Conservation needs to allow for a range of responses.



## PRIORITIES FOR CONSERVING SPECIES ON THE MOVE

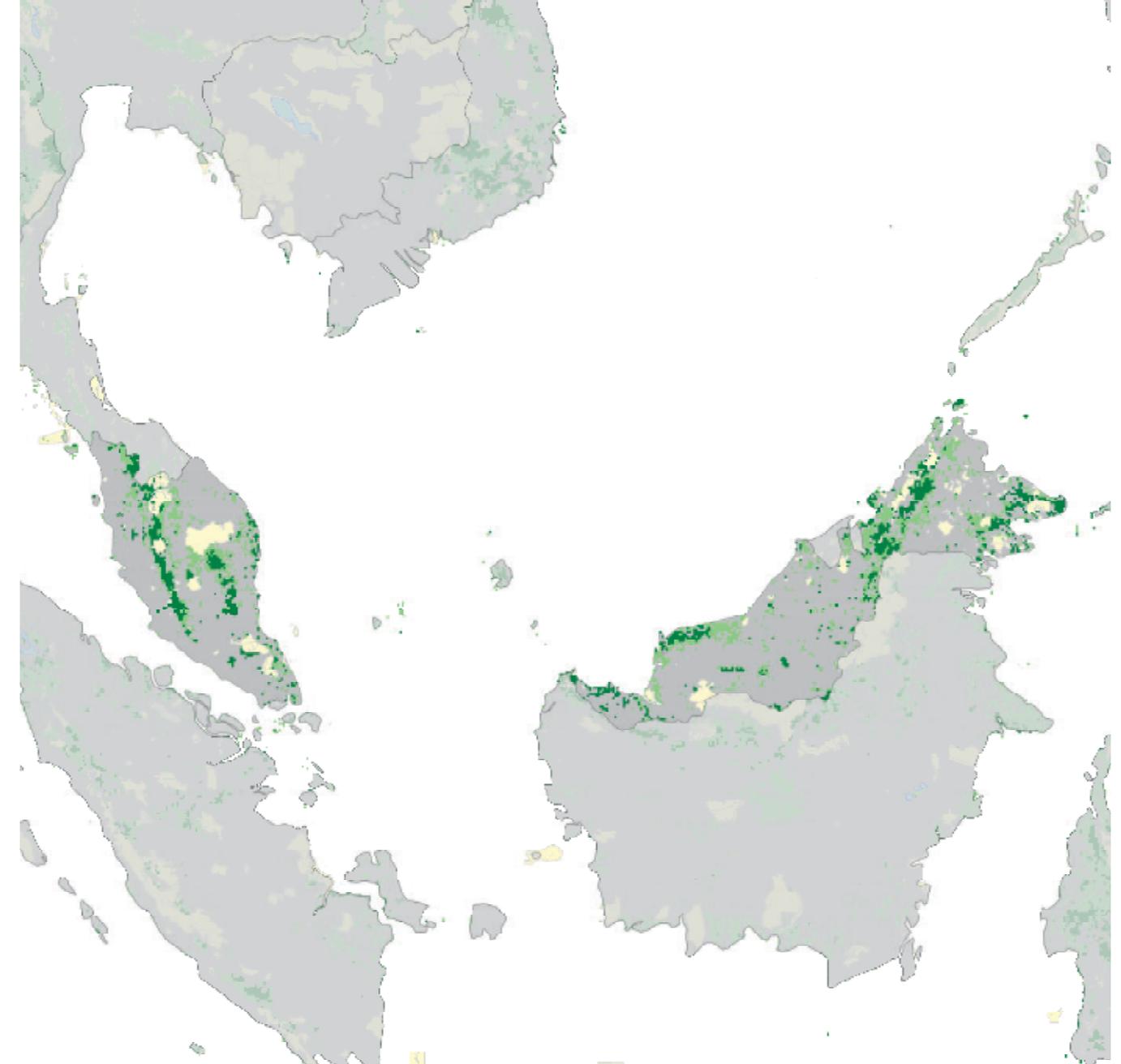
One of the most important goals for conservation areas is to represent all species. This helps ensure that no species extinctions occur. With species on the move due to climate change it is then important to represent all species both where they are now and where they will be in the future.

### AREA PRIORITIES

High priority areas for representing all species in Malaysia are the Barisan mountains on Peninsular Malaysia, the area between Kinabalu National Park and Taman Negara Banjaran Crocker National Park on East Malaysia, and the coastal stretch from Palau Bruit to Bintulu. Additionally, species may move between Sarawak and Sabah, making connectivity opportunities highly important there.

### SPATIAL PLANNING

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 Malaysia 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 4,000 plant and animal species.



- High Priority
- Highest Priority
- Protected Areas



# 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 in the northern region.

## 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.



## MALAYSIA BY THE NUMBERS

**1.21°–2.85°C** projected increase in mean temperature

**34.5%** of Malaysia has greater than 1 km/yr climate velocity

**4766** plant and animal species modeled

**251** existing species will move from Malaysia to neighboring countries

**74** new species will enter Malaysia from neighboring countries

**15** sustainable development goals depend on the conservation of nature

**19.1%** of Malaysia is currently protected area



## THE SPARC PROJECT

Spatial Planning for Area Conservation in Response to Climate Change (SPARC) is the largest effort to estimate species movements due 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](http://www.conservation.org/gef/projects/Pages/SPARC.aspx)

[www.resilienceatlas.org](http://www.resilienceatlas.org)

[www.biendata.org](http://www.biendata.org)

[www.protectedplanet.net](http://www.protectedplanet.net)

[hwww.ecoinformatica.net/GCMcompareR.html](http://hwww.ecoinformatica.net/GCMcompareR.html)

## References

Hannah, L., Midgley, G., et al. Protected area needs in a changing  
climate. *Frontiers in Ecology and the Environment*, 5(3) (2007)

Metzger, M. J. et al. A high-resolution bioclimate map of the world.  
*Global Ecology and Biogeography* 22 (2013)

Pecl, G. T. et al. Biodiversity redistribution under climate change:  
Impacts on ecosystems and human well-being. *Science* 355 (2017)

Moilanen, A. Landscape Zonation, benefit functions and target-  
based planning: Unifying reserve selection strategies. *Biological  
Conservation* 134 (2007)



## PHOTO CREDITS

COVER: Trond Larsen

PAGE 2 AND 3: MIKE PRINCE, Creative Commons;  
Haroldo Castro, Conservation International;  
Craig Morey; Thomas Quine, Creative Commons;  
Francesco Veronesi, Creative Commons

PAGE 6: Visions of Domino, Creative Commons

PAGE 8: Irwandy Mazwir, Creative Commons

PAGE 10 AND 11: Benjamin Drummond; Benjamin  
Drummond; Shankar Raman, Creative Commons

## FOR MORE INFORMATION CONTACT

Lee Hannah, [lhannah@conservation.org](mailto:lhannah@conservation.org)

Patrick Roehrdanz, [proehrdanz@conservation.org](mailto:proehrdanz@conservation.org)