Nature Undivided

Presented by: Gary M. Tabor VMD MES

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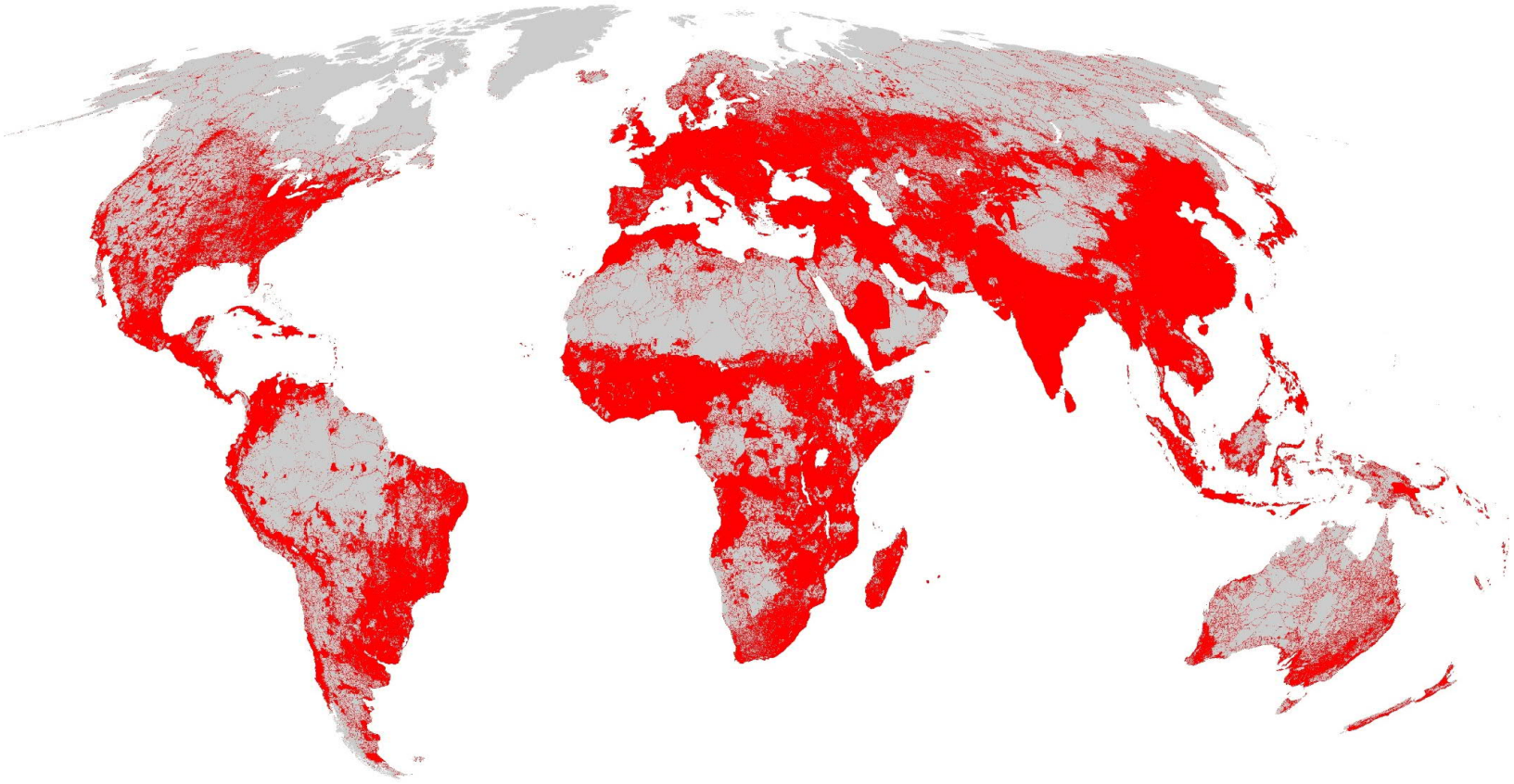
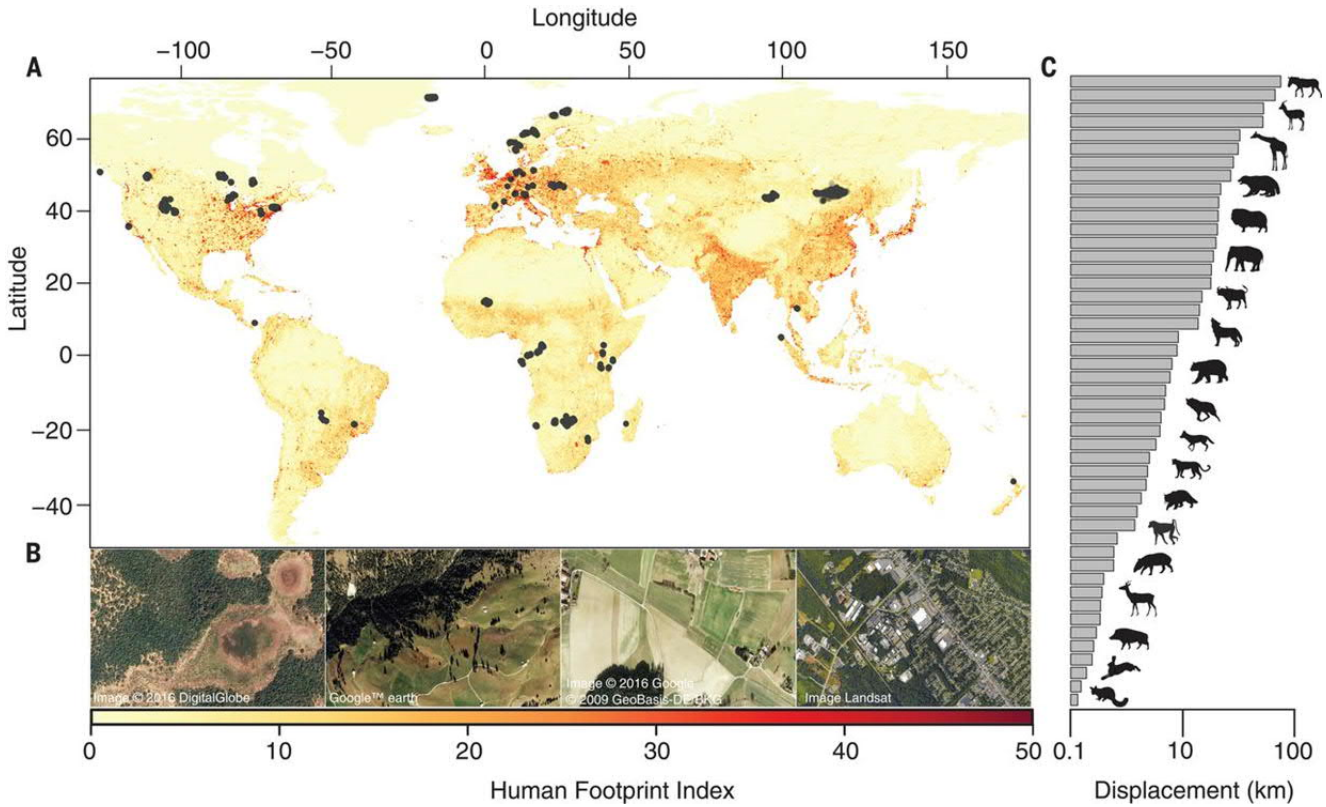
More than 50% of the Planet is Now Human Dominated Landscapes



Watson et al. 2016, Conservation Letters

Terrestrial movement of wildlife has been reduced by 30% to 50%

Less ability to find food, shelter, mates, disperse, etc.



Marlee A. Tucker et al. Science 2018: 359: 466-469

World Business Council
for Sustainable Development

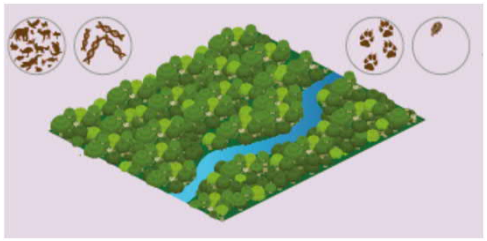
Sustainable Coastal Fisheries, Forestry and Agriculture

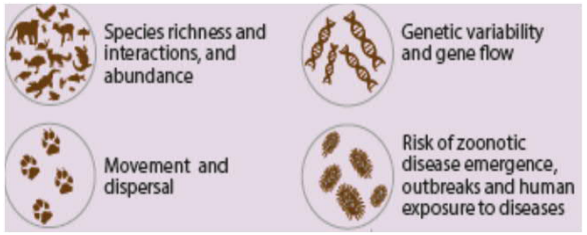
World Business Council for Sustainable Development

A CEO-led coalition of some 200 international companies (35 countries, 22 sectors) with a shared commitment to sustainable

More Disease

Landscape Health is Public Health



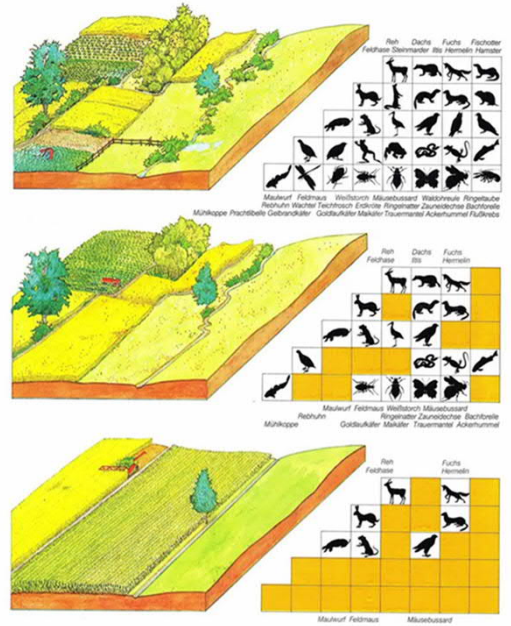


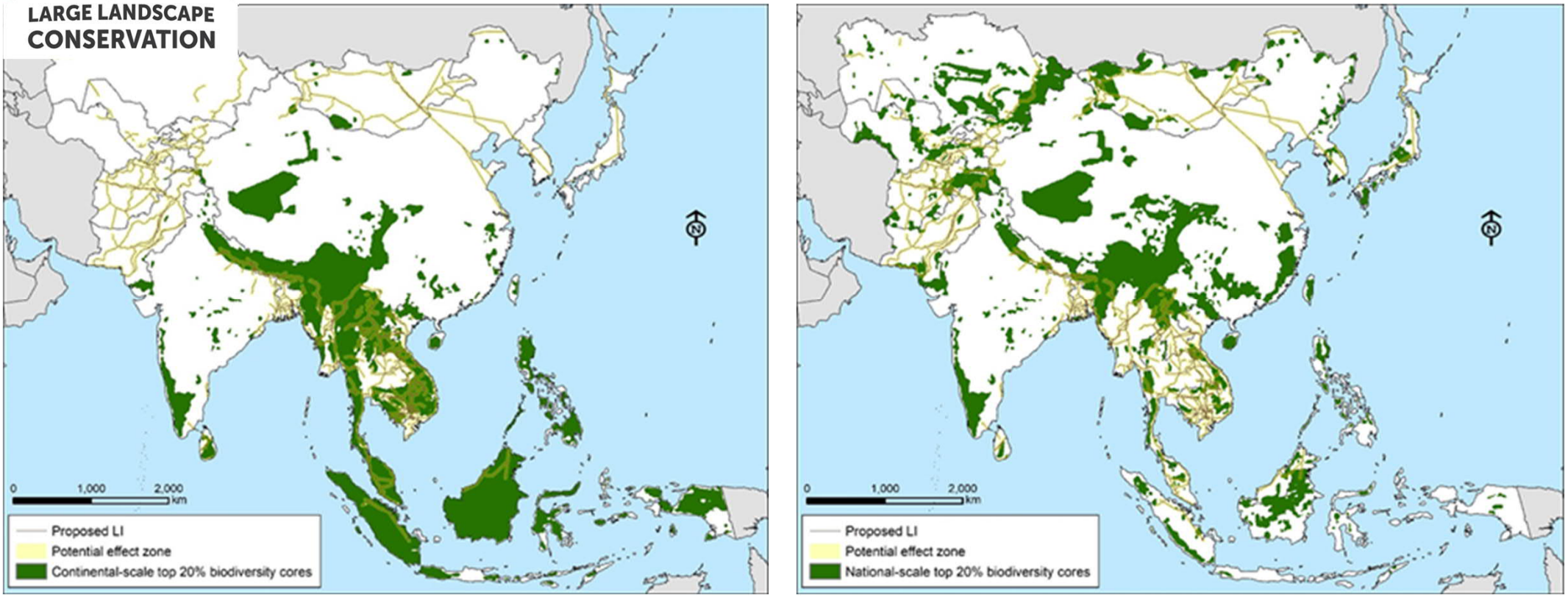
Unhealthy Landscapes: Policy Recommendations on Land Use Change and Infectious Disease Emergence

Jonathan A. Patz,[1] Peter Daszak,[2] Gary M. Tabor,[3] A. Alonso Aguirre,[4] Mary Pearl,[4] Jon Epstein,[2] Nathan D. Wolfe,[5]

Land use-induced spillover: a call to action to safeguard environmental, animal, and human health

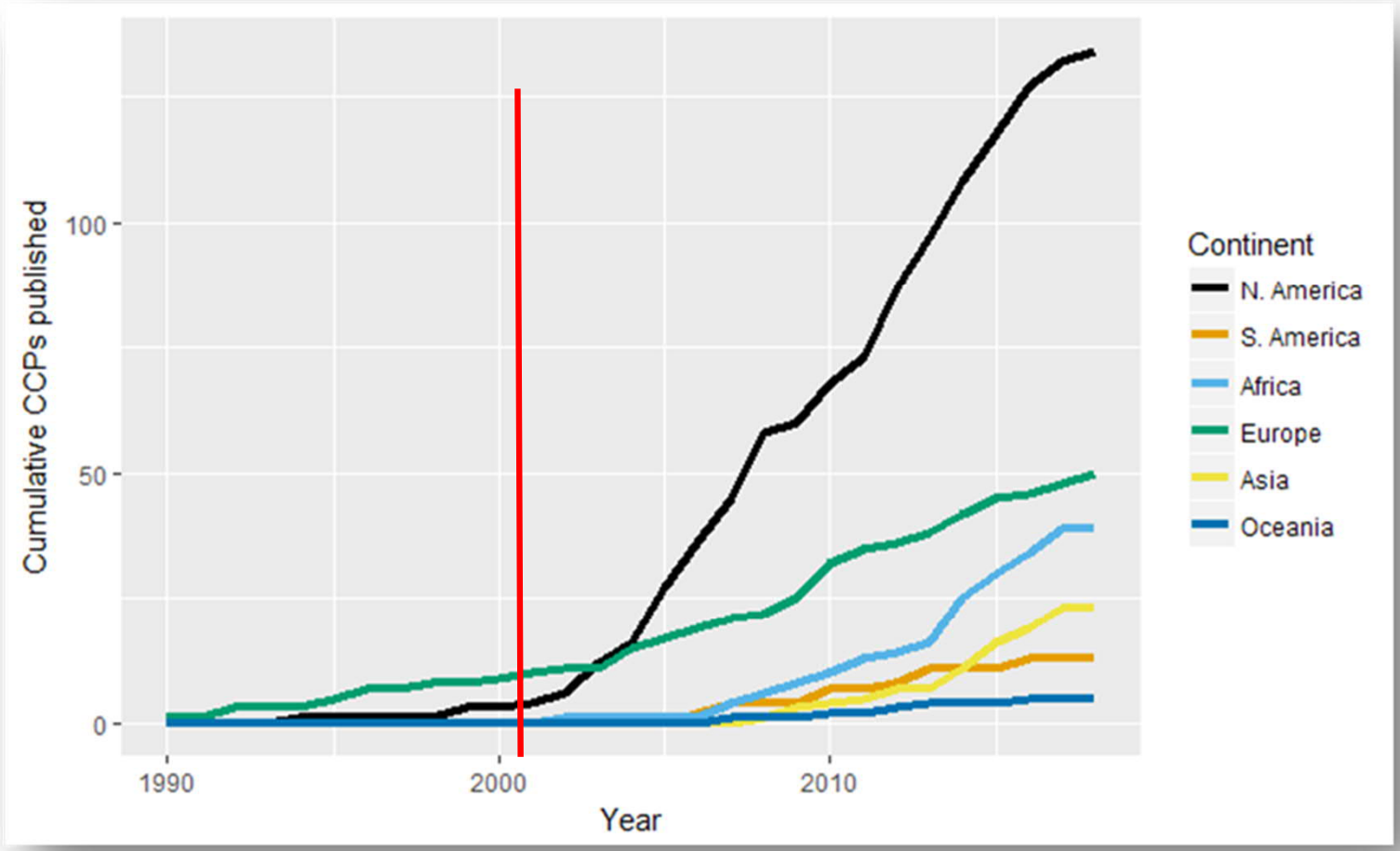
Raina K Plowright, Jamie K Reaser*, Harvey Locke, Stephen J Woodley, Jonathan A Patz, Daniel J Becker, Gabriel Oppler, Peter J Hudson, Gary M Tabor*





Overlap of proposed linear infrastructure from major initiatives with top 20% core biodiversity areas at a continental (left) and national (right) scale © Tyler Creech, CLLC

30 years of connectivity conservation planning



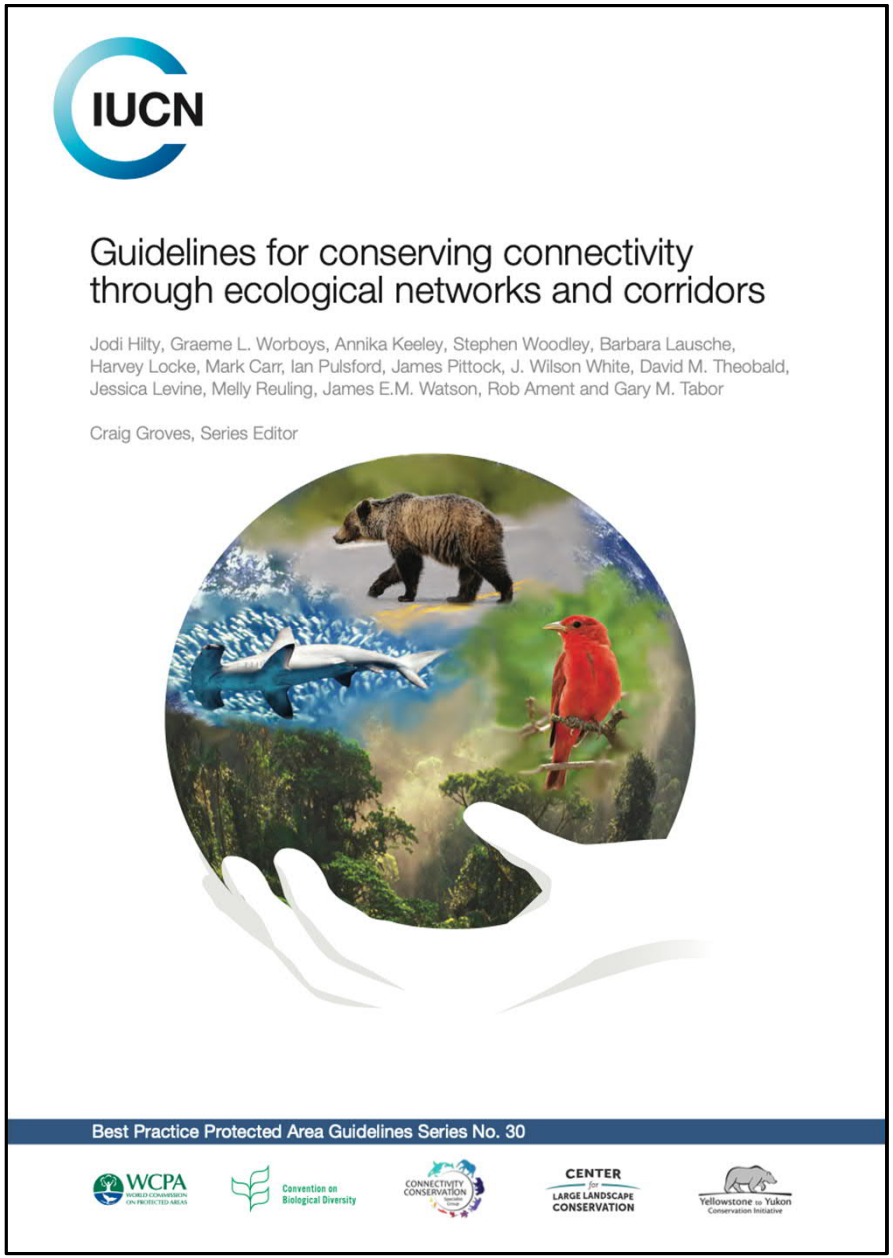
Authors: Keeley, Beier, Creech, Jones, Jongman, Stonecipher, and Tabor

Environmental Research Letters – Oct 1 2019

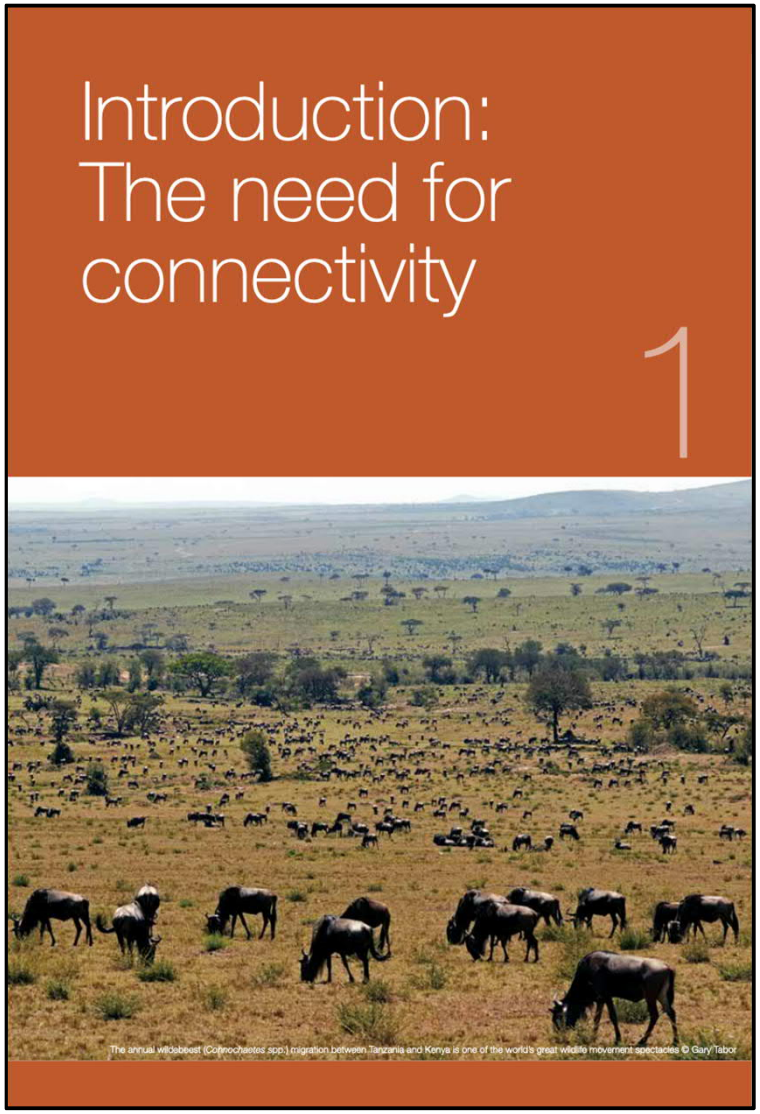
What is Needed - Consistent Practice Measurable Targets

IUCN Guidelines for Conserving Connectivity through Ecological Networks and Corridors

https://portals.iucn.org/library/node/49061



- 1 million species at risk of extinction
- Anthropogenic activities expanding
- Climate change
- While protected areas and other effective area-based conservation measures (OECMs) are essential, need connectivity
- The need: clarify and standardize a shift to large conservation networks.
- Ecological networks for conservation: designed, implemented and managed so ecological connectivity is maintained and enhanced where present, or restored where it has been lost



CONNECTIVITY
IS THE SAFETY NET OF NATURE

What is connectivity?

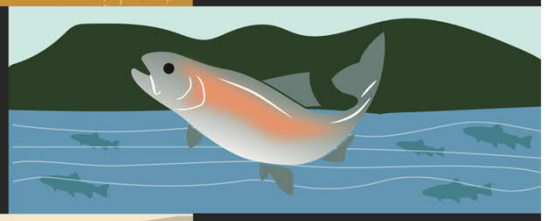
Connectivity is the degree to which landscapes and seascapes allow species movement and natural ecological processes.

What does connectivity do?

Allows species to migrate or disperse to feed, breed, and respond to climate change. Allows natural communities to thrive by maintaining ecosystem functions like pollination and stream flows.

What do we want?

Connected lands and waters: wildlife corridors, landscape linkage areas, free flowing and connected rivers, interconnected coastal and marine zones, and climate-resilient ecosystems.



Why do we care?

Connected lands and waters benefit nature and people. As the climate changes and development increases, we must act now to save and restore natural connections across all lands and waters.

IUCN WCPA WORLD COMMISSION ON PROTECTED AREAS CONNECTIVITY CONSERVATION Specialist Group

LEARN MORE:
conservationcorridor.org/ccsg

CENTER for LARGE LANDSCAPE CONSERVATION

CONNECTIVITY CONSERVATION Specialist Group

LA CONNECTIVITÉ
LE FILET DE SÉCURITÉ DE LA NATURE

Qu'est-ce que la connectivité?

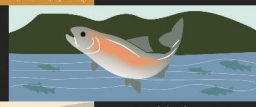
La connectivité c'est la qualité des liens naturels entre les paysages qui permettent aux espèces de se déplacer et aux processus écologiques de se réaliser.

À quoi sert la connectivité?

Elle permet aux espèces de migrer ou de se disperser pour se nourrir, se reproduire et réagir aux changements climatiques. Elle permet aux communautés naturelles de prospérer en maintenant les fonctions écosystémiques comme la pollinisation et l'écoulement naturel des eaux.

Que voulons-nous?

Nous voulons relier des milieux naturels terrestres et aquatiques : des corridors fauniques, des étendues de paysages inter-reliés, des zones côtières et marines connectées et des écosystèmes résilients aux changements climatiques.



Pourquoi c'est important?

Des cours d'eau, des milieux humides et des forêts interconnectés sont bénéfiques à la nature et à l'humain. Le climat change et les pressions de développement augmentent : nous devons agir maintenant pour maintenir ou rétablir des liens naturels entre les milieux terrestres et aquatiques.

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POUR EN SAVOIR PLUS :
conservationcorridor.org/ccsg

连通性是大自然的安全屏障

什么是连通性?

"连通性"是指陆地景观与海洋景观允许物种运动和自然生态变化的程度。

连通性有何用?

让物种得以迁徙或分散开来，以觅食、繁殖并应对气候变化，可使自然群落通过维持生态系统功能（如授粉和溪流）而生机勃勃。

我们想做什么?

形成互通的陆地与水域：野生动物廊道、景观连接地区、自由流淌且水系相通的河流、相互连接的沿海和海洋区域，以及富有气候弹性的生态系统。

为什么我们关注连通性?

互相连接的陆地和水域有益于大自然与人类。随着气候变化和发展的增长，我们现在必须采取行动，以保存并恢复所有陆地与水域的天然连通。

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详情参见：
conservationcorridor.org/ccsg

الترابط
شبكة أمان الطبيعة

ما هو الترابط؟

إنه المدى الذي تؤمنه للحياة البرية والمياه البحرية لحركة الأنواع والتفاعلات الإيكولوجية الطبيعية.

ما هي فوائد الترابط؟

يسمح للحيوانات بالهجرة بهدف البحث عن الطعام والتكاثر، والتكيف مع تغير المناخ وهو يؤدي إلى ازدهار المجتمعات الطبيعية من خلال صون وظائف النظام البيئي مثل التلقيح وتدفق المجاري المائية.

ماذا نريد أن نحقق؟

أراضٍ ومياه مترابطة
ممرات الحياة البرية:
مناطق ربط للشاهد الطبيعية
أنهار طبيعية مترابطة
مناطق ساحلية وبحرية مترابطة
أنظمة بيئية متكيفة مع الأحوال المناخية.

لماذا نهتم؟

مع تغير المناخ وزيادة التطور، حان الوقت لأن نتحرك لإنقاذ واستعادة حركة الترابط الطبيعي عبر المناطق البرية والمائية وذلك بعود بالنفع على الطبيعة والإنسان.

IUCN WCPA WORLD COMMISSION ON PROTECTED AREAS CONNECTIVITY CONSERVATION Specialist Group

للمزيد من المعلومات
conservationcorridor.org/ccsg

CONECTIVIDAD
ES LA RED DE SEGURIDAD DE LA NATURALEZA

¿Qué es conectividad?

La conectividad es el grado en que los paisajes terrestres y marinos permiten el movimiento de especies y procesos ecológicos naturales.

¿Qué hace la conectividad?

Permite a las especies migrar o dispersarse para buscar alimento, reproducirse y adaptarse al cambio climático. También permite prosperar a las comunidades naturales manteniendo funciones ecosistémicas como la polinización y los cauce de ríos y quebradas.

¿Qué queremos?

Tierras y aguas conectadas: corredores de vida silvestre, áreas de conectividad del paisaje, ríos conectados que fluyen libremente, zonas costeras y marinas interconectadas, y ecosistemas resilientes al clima.

¿Por qué deberia importarte?

Las tierras y las aguas conectadas benefician a la naturaleza y a las personas. A medida que el clima cambia y el desarrollo urbano aumenta, se hace más urgente actuar para salvar y restablecer las conexiones naturales a través de todos los paisajes terrestres y acuáticos.

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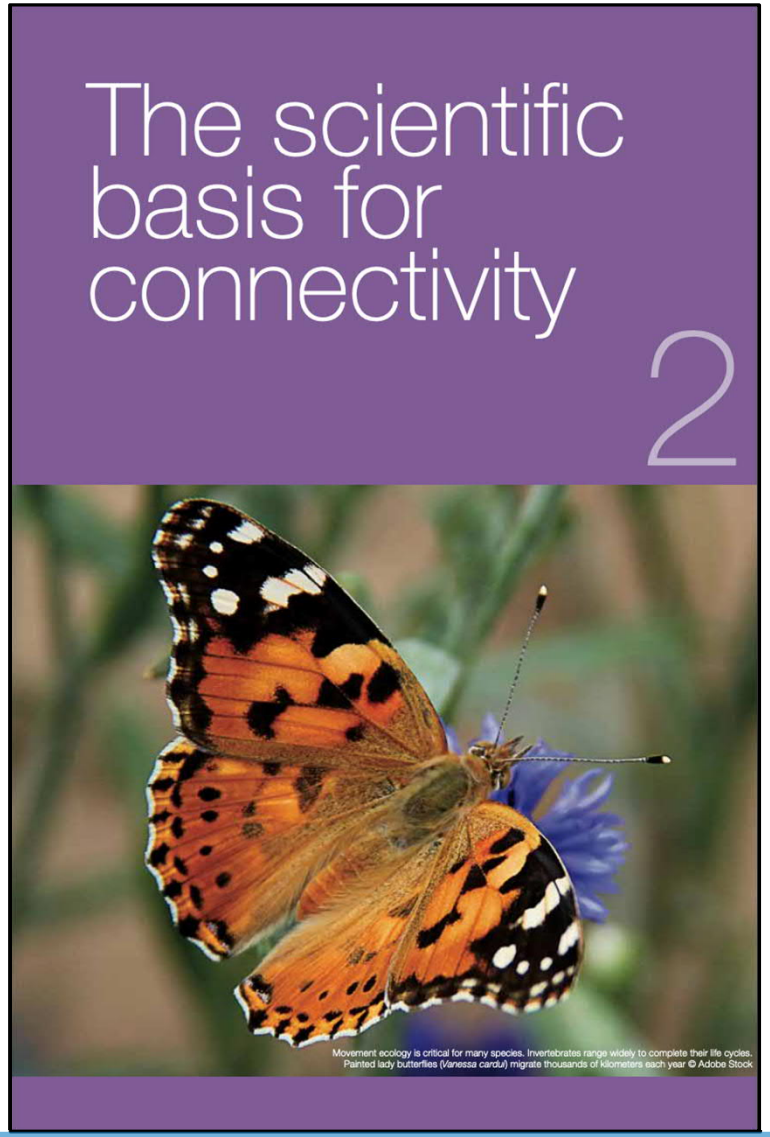
APRENDA MÁS:
conservationcorridor.org/ccsg

- Many terrestrial protected areas within human-dominated systems are isolated from one another.
- Island biogeography and metapopulation theory
- Spatially distinct subpopulations can be reconnected by movement of individuals = genetic exchange and possible re-establishing of populations.
- Improving or sustaining connectivity between protected areas and OECMs = key for conservation of biodiversity.
- Common approaches for modeling connectivity



Connected Landscape Structure = Higher Levels of Ecological Function

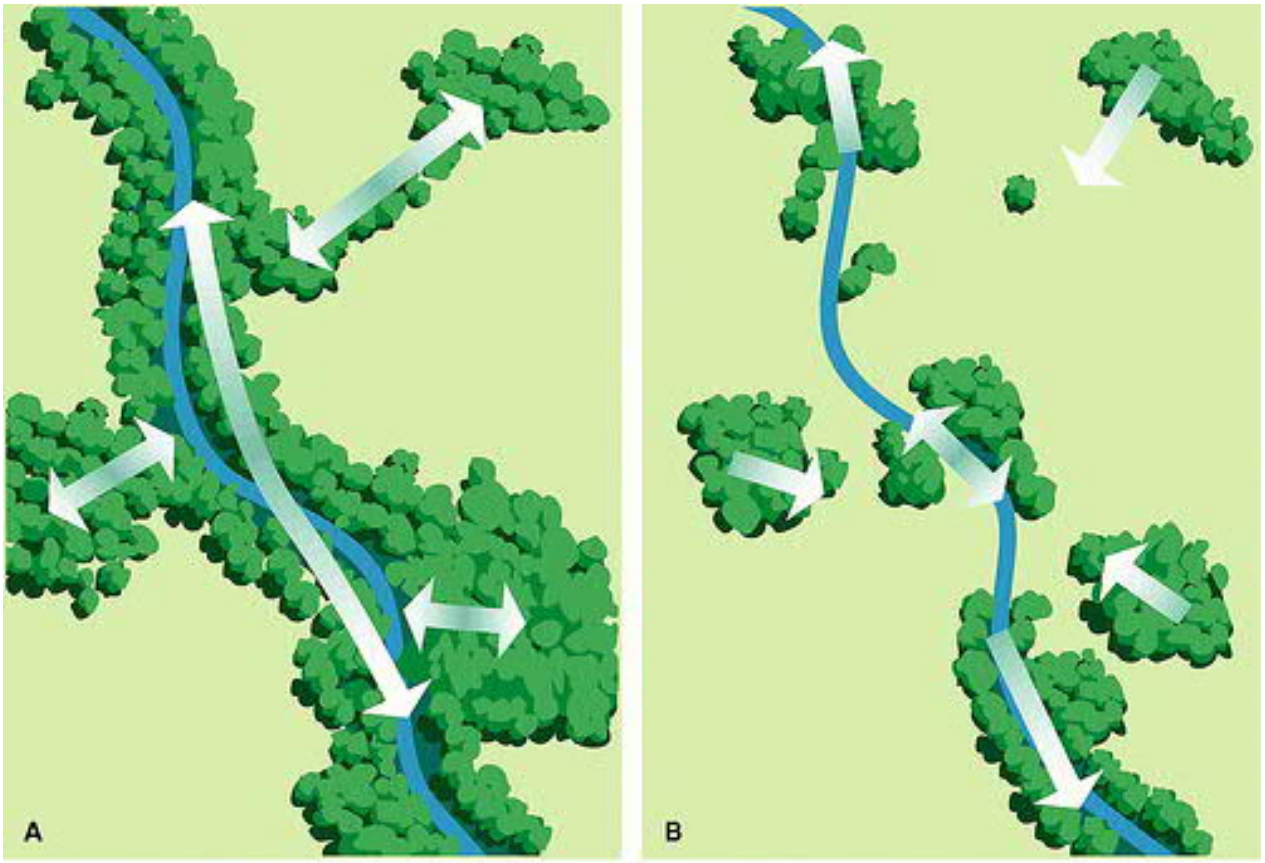
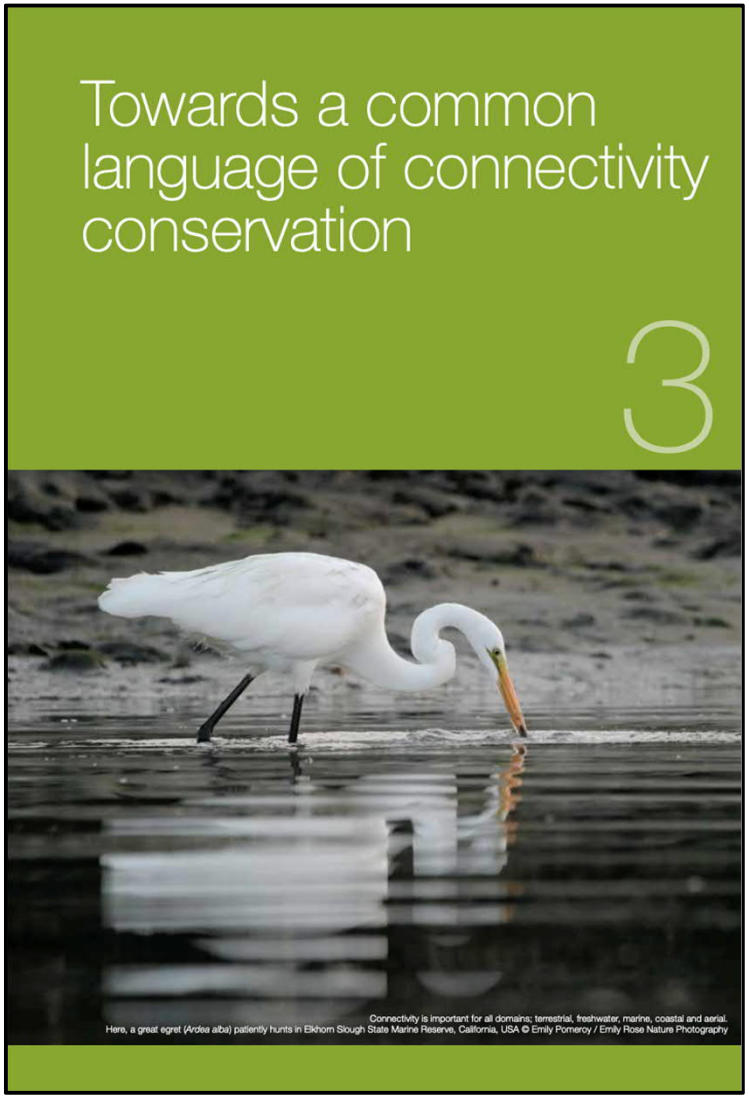


Fig. 2.38 -- Landscapes with (A) high and (B) low degrees of connectivity. A connected landscape structure generally has higher levels of functions than a fragmented landscape.
In Stream Corridor Restoration: Principles, Processes, and Practices (10/98)
by the Federal Interagency Stream Restoration Working Group (FISRWG) (15 Federal agencies of the U.S.)

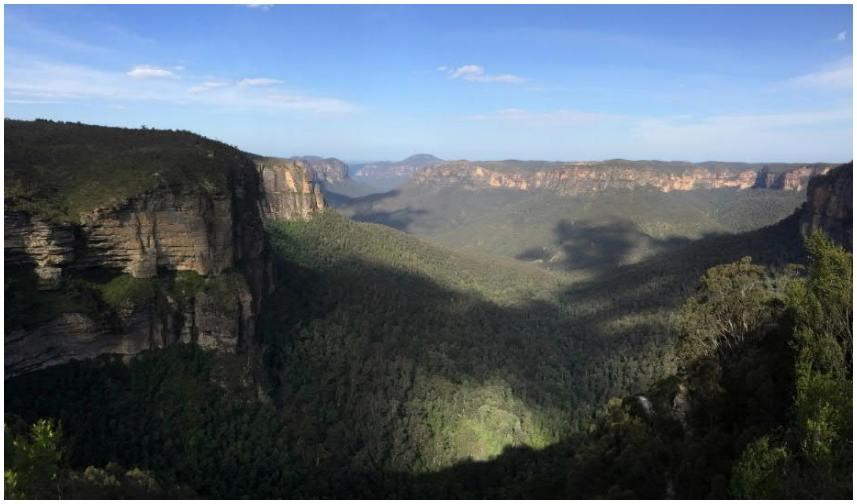
Making sense of the predominant and interchangeable terms used in connectivity conservation



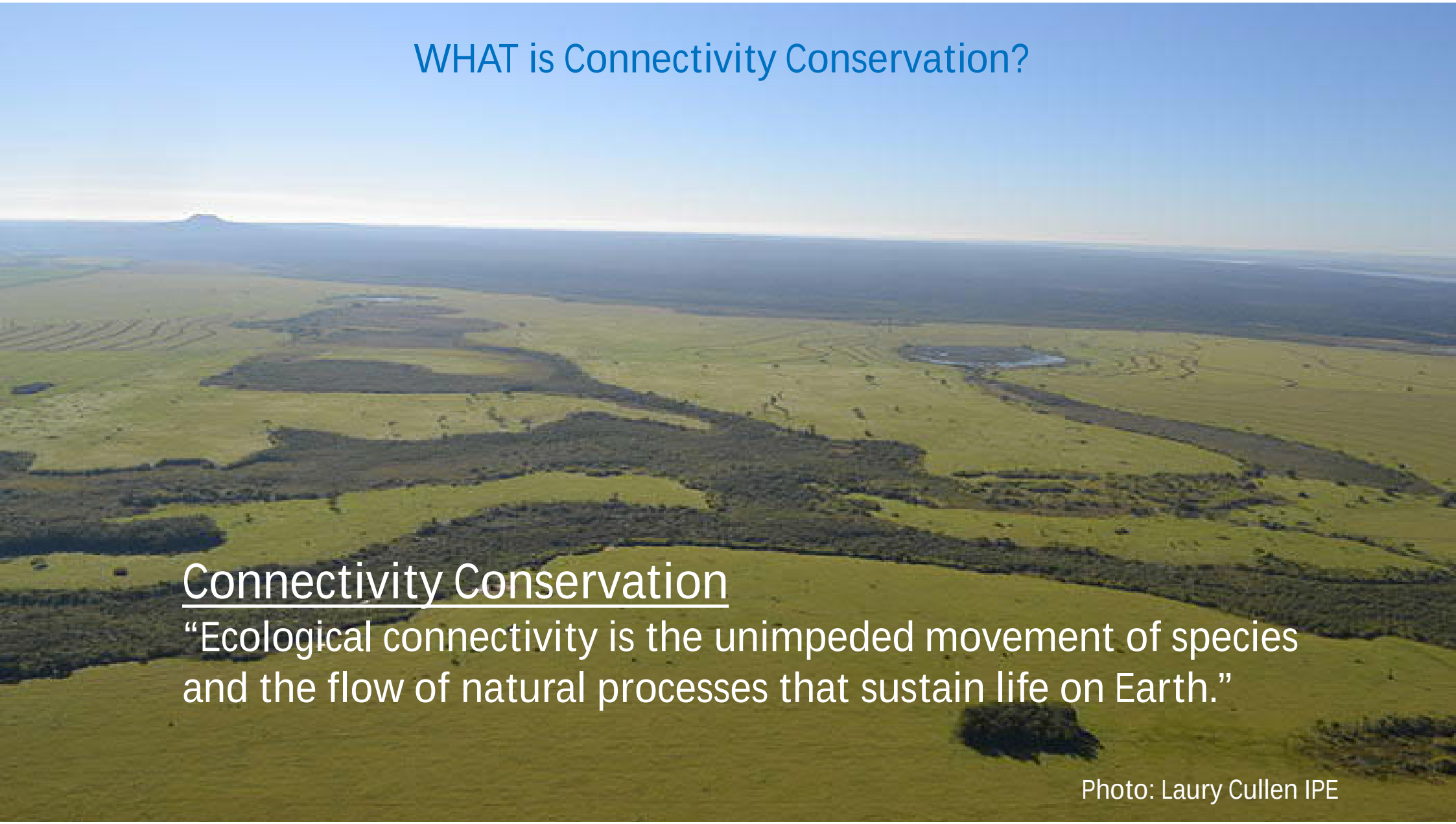
WHAT is Connectivity Conservation?

There are different terms and practices used around the world!

- Areas of connectivity conservation
- Biological corridors
- Climate corridors
- Conservation lands networks
- Conservation management networks
- Linkage zones
- Permeability areas
- Territorial systems of ecological stability
- Marine protected area networks
- Transboundary conservation areas
- Wildlife corridors



WHAT is Connectivity Conservation?



Connectivity Conservation

"Ecological connectivity is the unimpeded movement of species and the flow of natural processes that sustain life on Earth."

Photo: Laury Cullen IPE

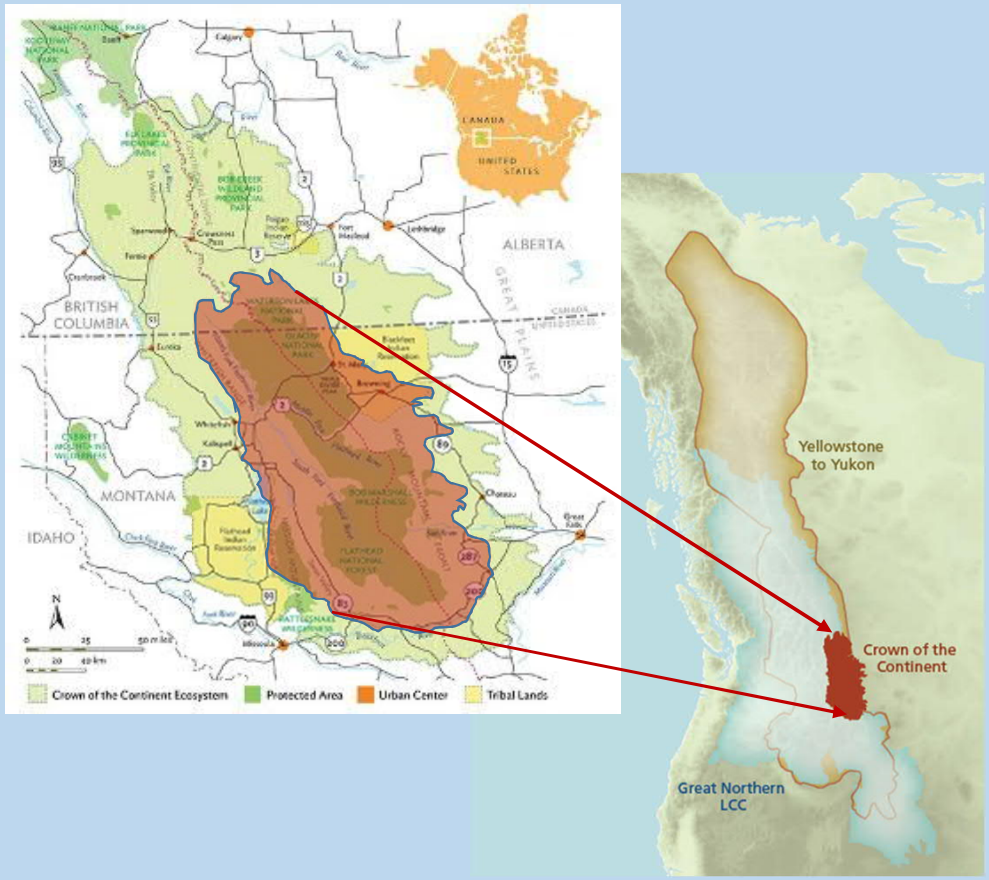
Definitions:

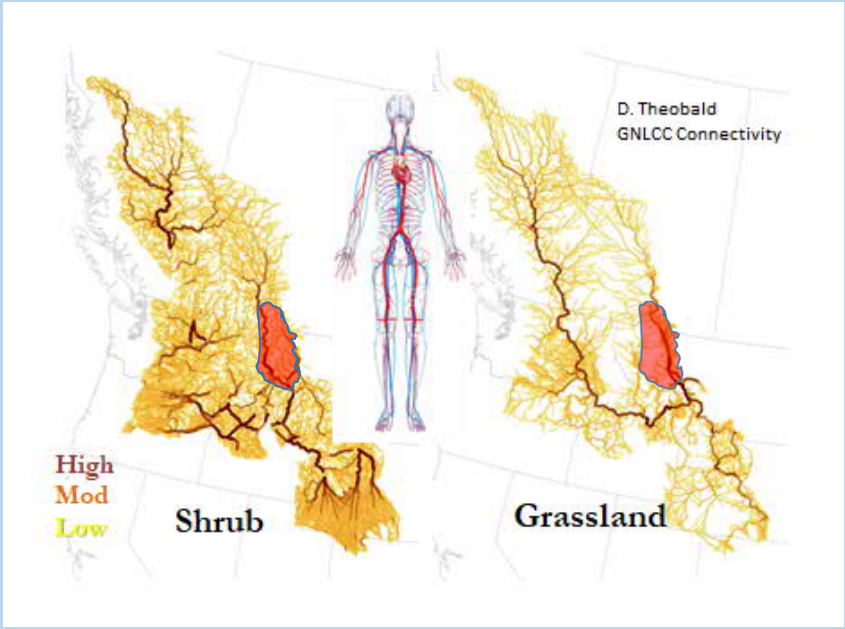
“Ecological connectivity is the unimpeded movement of species and the flow of natural processes that sustain life on Earth” (CMS, 2020).

and

“The movement of populations, individuals, genes, gametes and propagules between populations, communities and ecosystems, as well as that of non-living material from one location to another.”

Connectivity:
Circulatory System of Nature





Waterton Lakes Canada – Glacier National Park US International Peace Park – World's First International Peace Park

Also known as Crown of the Continent Ecosystem

Conservation Happens on ALL Lands and Waters

21st Century Conservation - Advancing Conservation Outside of Protected Areas – Known as the “Matrix”

- Wildlife Movement Ecology
- Seasonal and Long Distance Migration
- Dispersal
- Local Connectedness
- Pollination
- Nutrient Cycling
- Trophic Structure and Dynamics
- Stream Flows
- Hyporheic Zone Dynamics
- Fire Behavior
- Disturbance Regimes
- Ecological Succession
- Wildlife Behavior Patterns
- Mycorrhizal Networks
- Climate Resilience

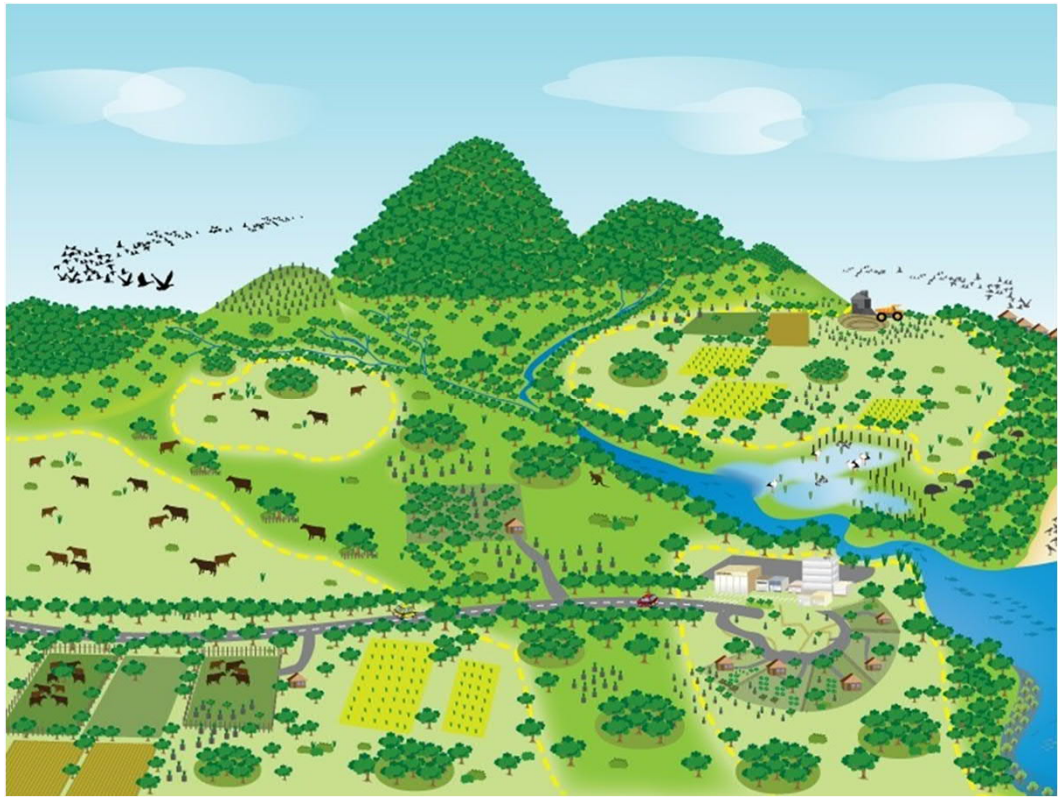
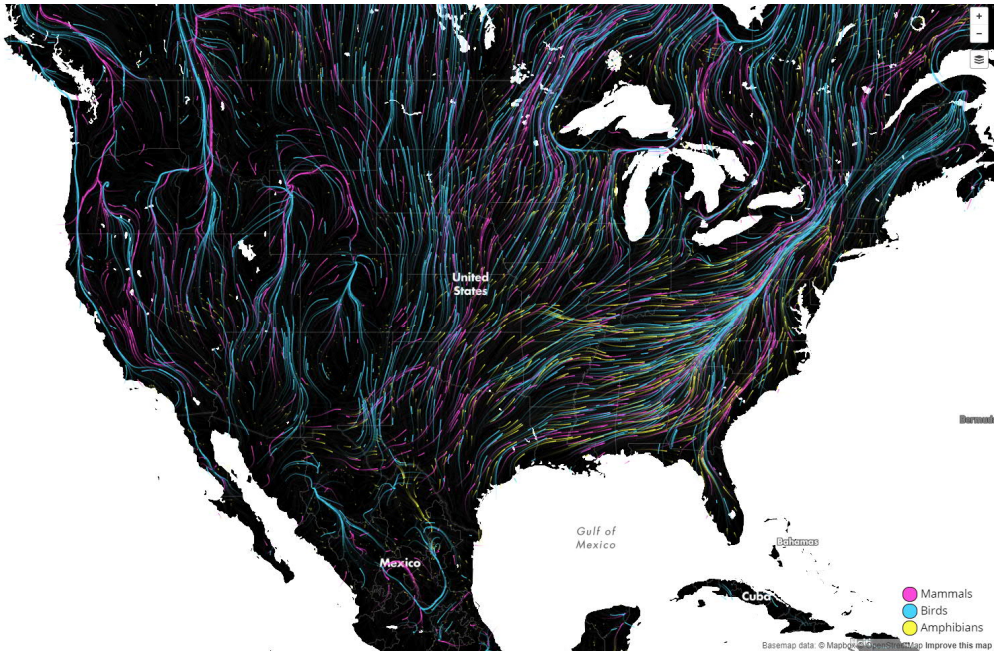


Image Courtesy of Australia Ministry of Environment and Energy

Climate connectivity: Linking Biodiversity and Climate

Connect current to future ranges: use species distribution models to predict location of future habitat, then design corridors that connect current and future habitat patches

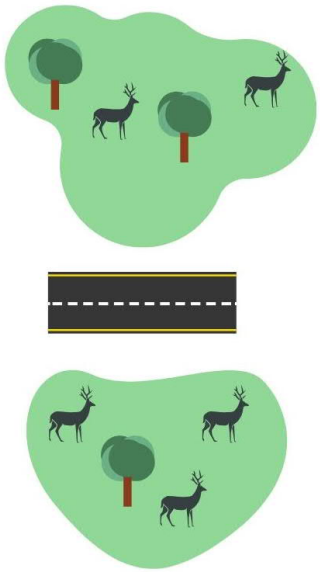


Animals react to climate change in only three ways:

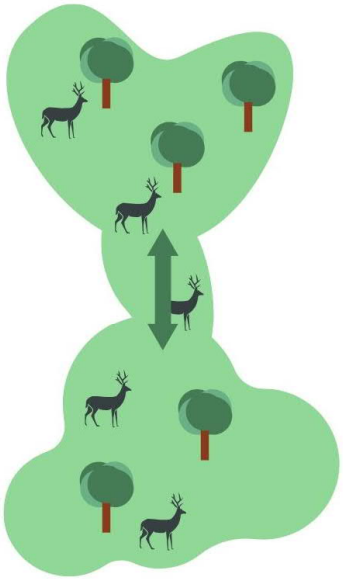
1. Move
2. Adapt
3. Die

Source: The Nature Conservancy. http://maps.tnc.org/migrations-in-motion/#4/48.08/-125.11

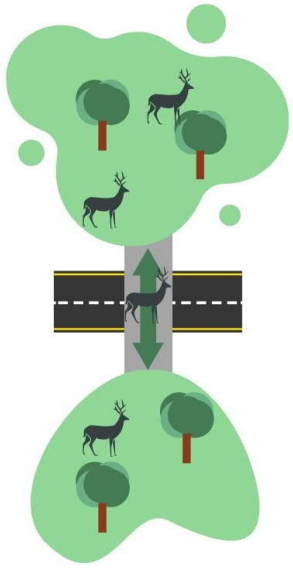
Corridor vs. Crossing vs. Network - What's the Difference?



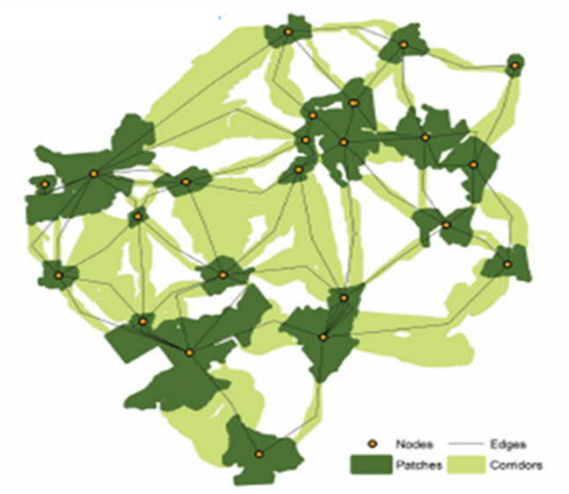
No connectivity



Connectivity via corridor



Connectivity via crossing



Network of core areas and corridors

What Is a Corridor?

Ecological corridors, or 'corridors,' are parts of the landscape that allow animals to move between larger areas of intact habitat. Animals need corridors to reach daily and seasonal needs like food, water, and mates.

What Is a Crossing?

Wildlife crossings are human-built infrastructure, like bridges or tunnels, designed to help wildlife safely cross roads. Crossings reconnect habitat (including corridors) that has been (or will be) bisected and fragmented by roads, railways, and pipelines.

What Is an Ecological Network?

Ecological network for conservation is a system of core habitats (protected areas, OECMS, and other intact natural areas connected by ecological corridors.

Ecological Corridor

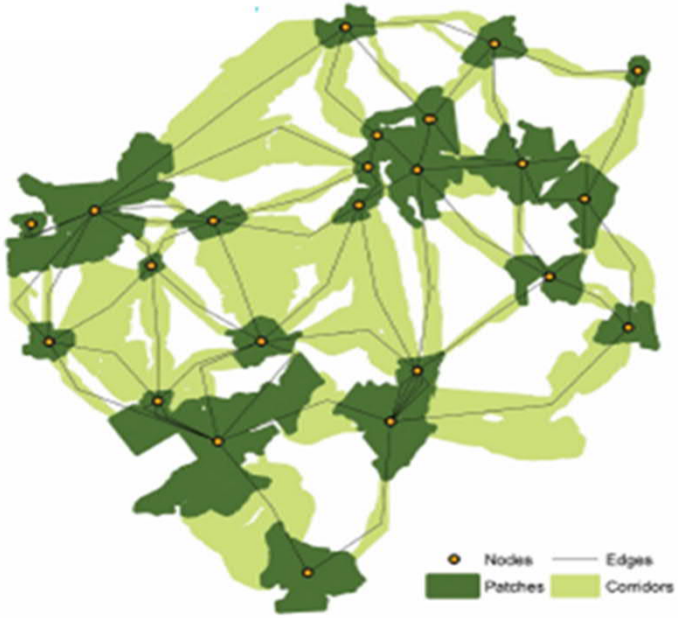
A clearly defined geographical space that is governed and managed over the long-term to maintain or restore effective ecological connectivity

	Protected areas	OECMs	Ecological corridors
MUST conserve *in situ* biodiversity	●	●	
MAY conserve *in situ* biodiversity			●
MUST conserve connectivity			●
MAY conserve connectivity	●	●	

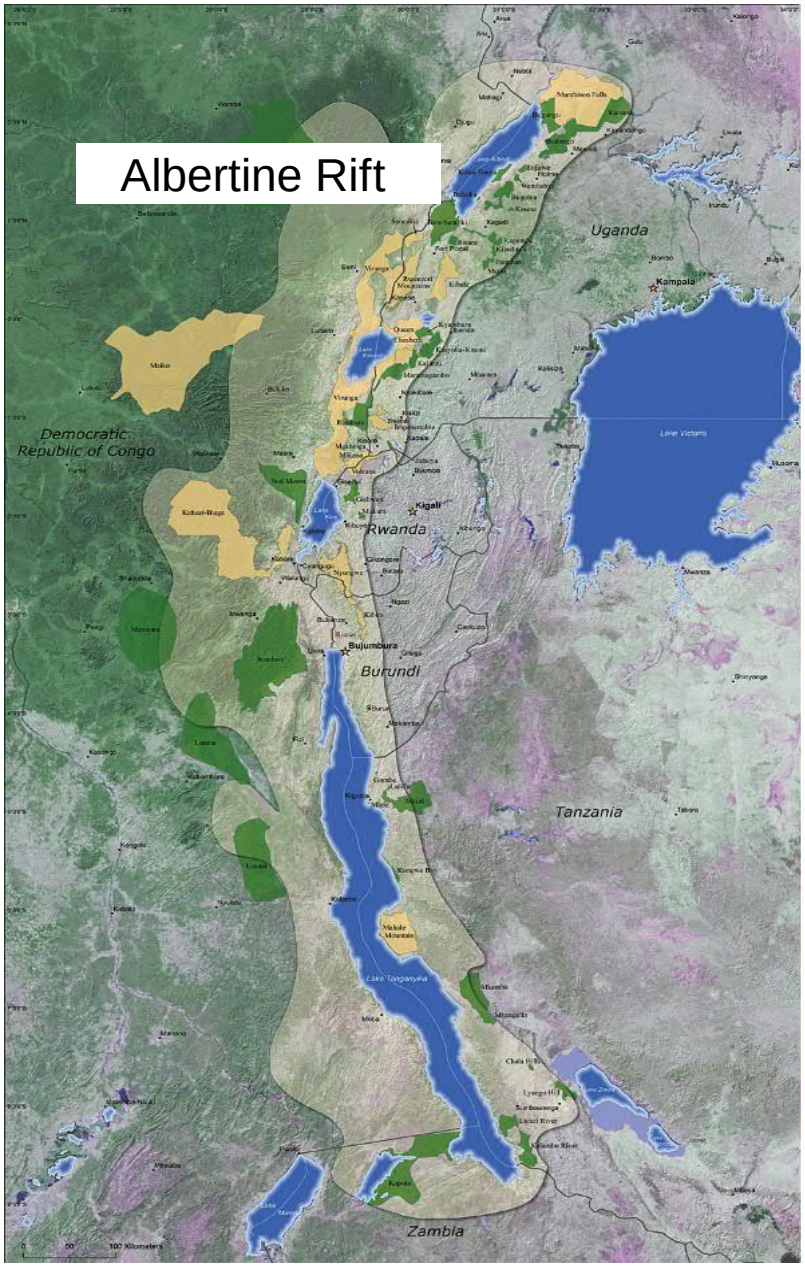
The Architecture for Large Scale Conservation

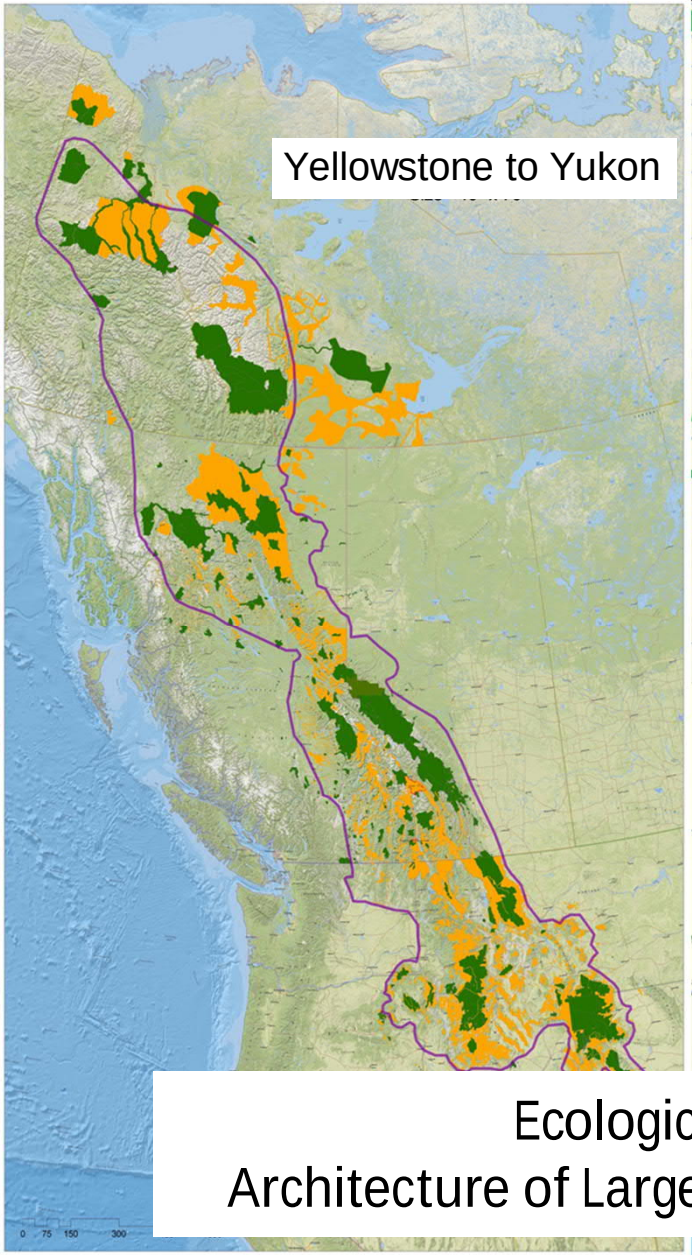
Ecological networks for conservation

4

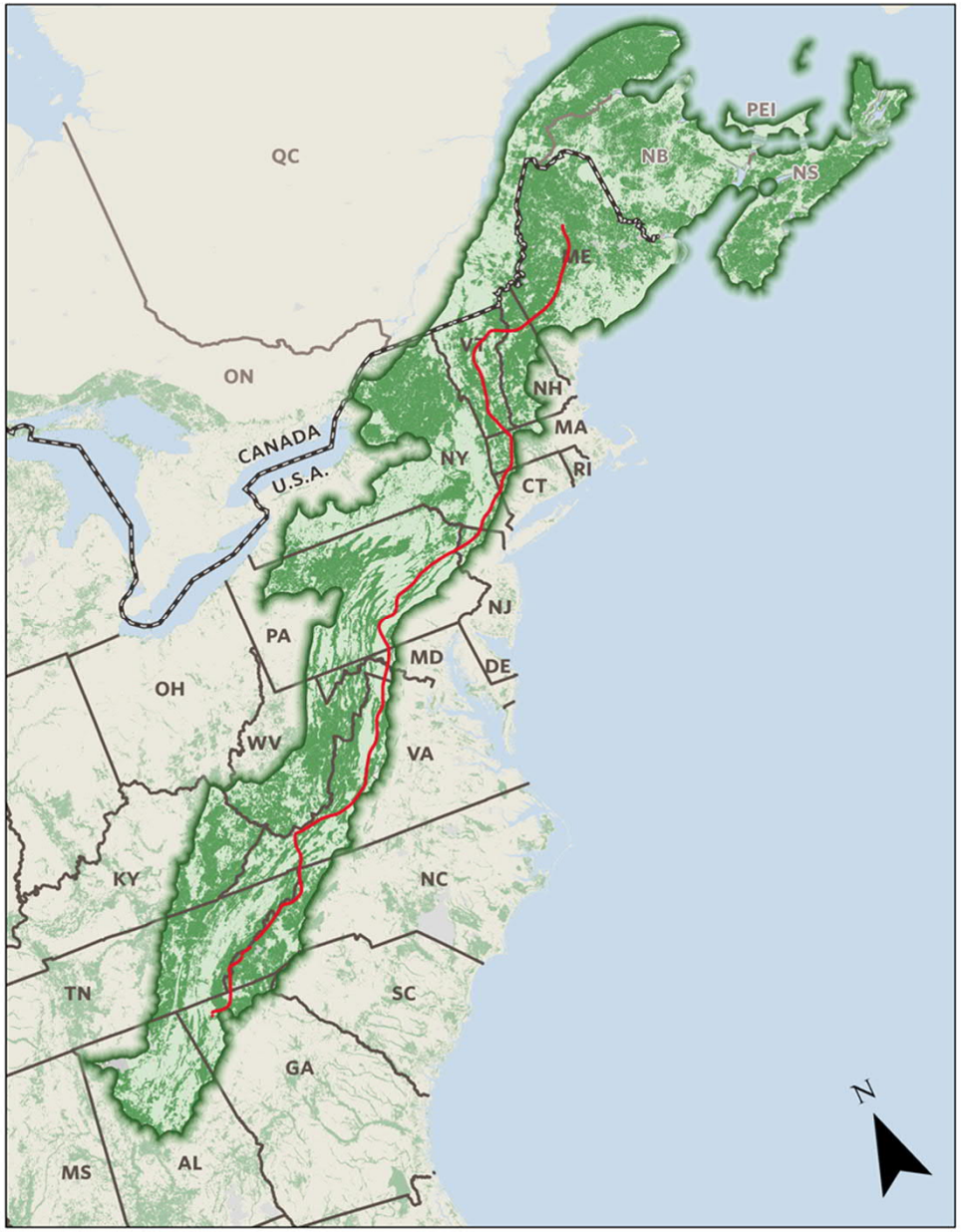


IUCN WCPA WORLD COMMISSION ON PROTECTED AREAS CONNECTIVITY CONSERVATION Specialist Group CENTER for LARGE LANDSCAPE CONSERVATION





Ecological Networks: Architecture of Large Landscape Conservation



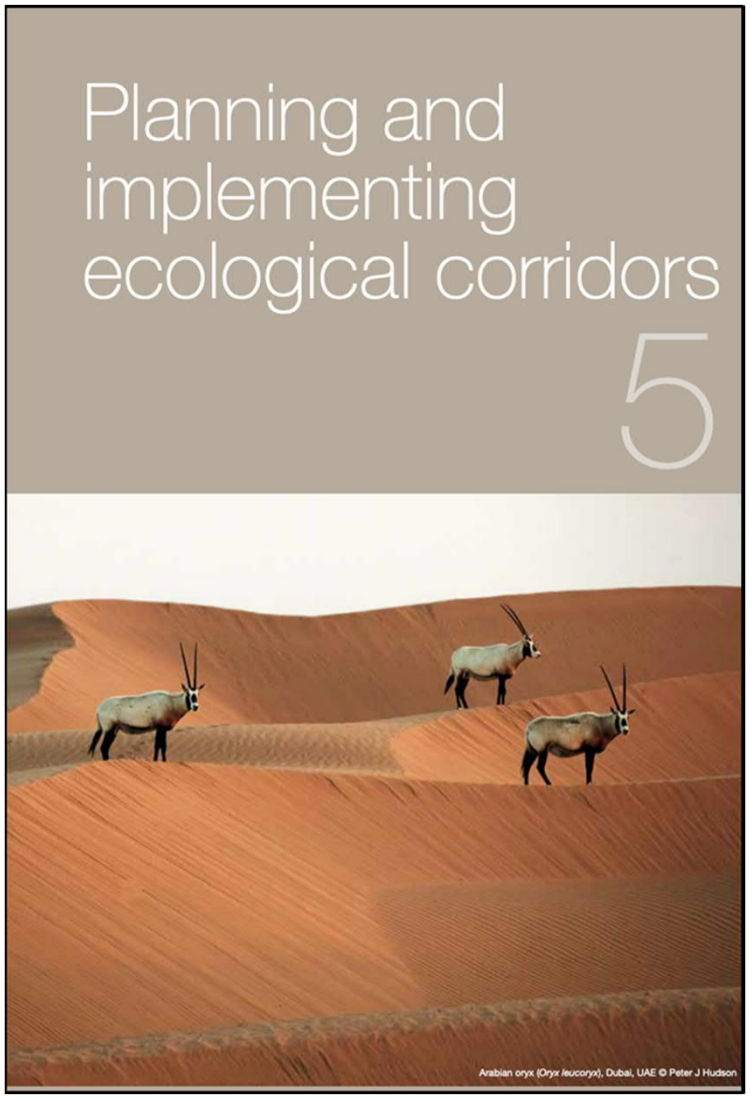
Second 100 Year Vision for the Appalachian Trial

Appalachian Mountain Landscape: Eastern Climate Corridor

- Appalachian Trail – 3525 kms long (2190 miles)
- Watershed for 190 million people
- Globally important landscape
  for carbon, biodiversity and water
- Climate Refugia

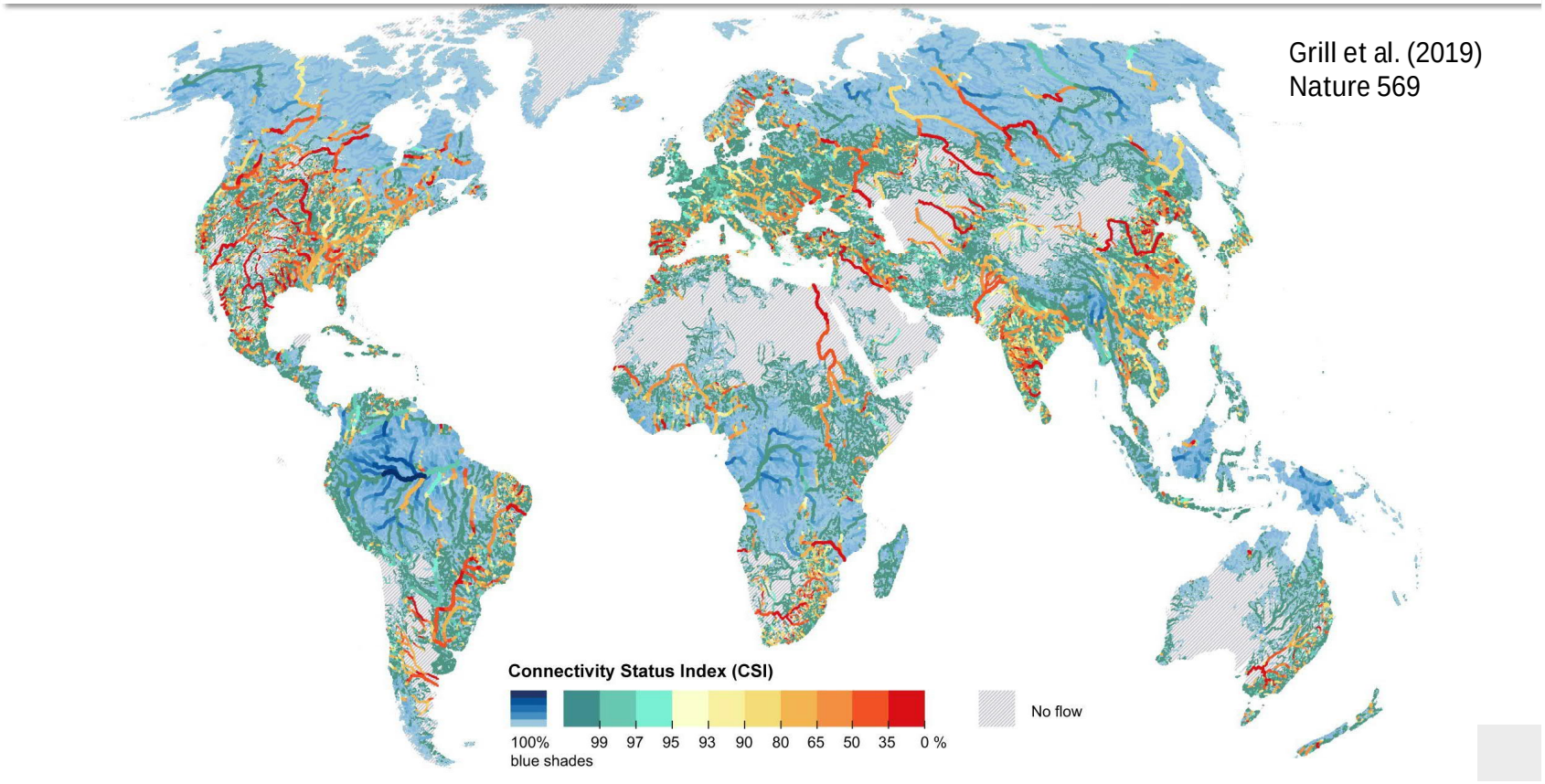
Emergent Conservation Strategies

- Tenure, Governance, Cultural Values
- Corridor legislation;
- Land use plans and zoning for landscapes;
- Marine spatial plans and zoning for seascapes;
- Covenants and easements;
- Incentives and disincentives;
- Regulatory controls for public health and safety;
- Development controls and building standards; and
- Written voluntary conservation agreements with specific landowners or rightsholders.



Connectivity is relevant across a range of environments from **terrestrial** and **marine** to **freshwater** and **airspaces**.

Freshwater Global Connectivity Status (CSI)



Grill et al. (2019)
Nature 569

- Connectivity conservation a basic requirement to achieve many conventions and agreements

- Many places developing legislation and guidance

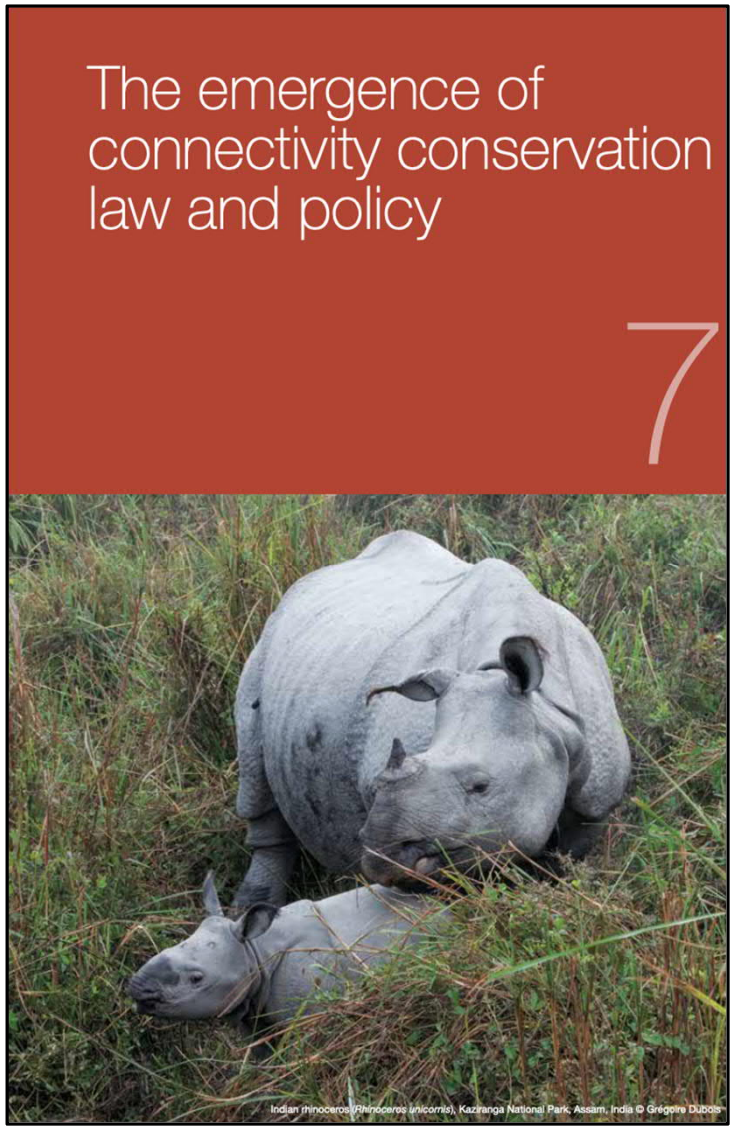
UNITED NATIONS DECADE ON ECOSYSTEM RESTORATION 2021-2030

United Nations Framework Convention on Climate Change

UNCCD United Nations Convention to Combat Desertification

CONVENTION ON MIGRATORY SPECIES

2020



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Global Policy 2021

Unanimous Adoption: UN General Assembly Resolution on Connectivity

Nature Knows No Borders

During the adoption of the resolution, along with the general support of all Member States, 60 Member States co-sponsored the resolution of Kyrgyzstan: Afghanistan, Armenia, Azerbaijan, Belarus, Bhutan, Bolivia, Burkina Faso, Cameroon, Central African Republic, Chile, China, Colombia, Costa Rica, Cuba, Djibouti, Dominican Republic, Egypt, Equatorial Guinea, Ethiopia, Gambia, Grenada, Guatemala , Guinea, Guyana, India, Japan, Jordan, Kazakhstan, Laos, Lebanon, Lesotho, Malaysia, Maldives, Mauritania, Mongolia, Morocco, Mozambique, Nauru, Nepal, Nicaragua, Nigeria, Paraguay, Peru, Philippines, Qatar, Romania, Russian Federation, Rwanda, Saint Lucia, Saint Vincent and the Grenadines, Senegal, Singapore, Tajikistan, Togo, Tunisia, Turkmenistan, Uzbekistan, Vietnam, Zambia and Zimbabwe

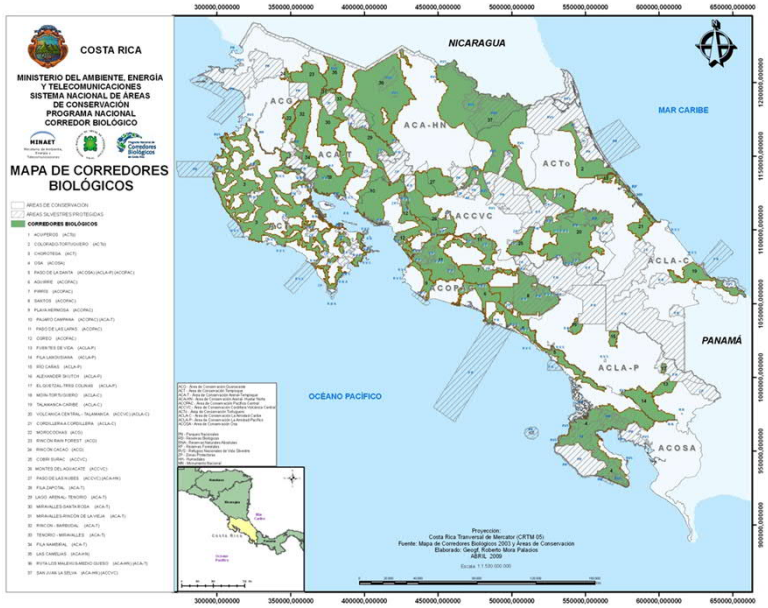
G7 United Kingdom 2021

G7 Climate and Environment Ministers' Meeting Communiqué

London, United Kingdom
20 – 21 May 2021

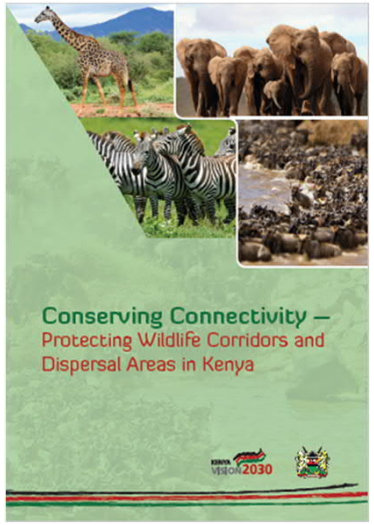
We commit to champion ambitious and effective global biodiversity targets, including conserving or protecting at least 30 percent of global land and at least 30 percent of the global ocean by 2030 …..through effectively and equitably managed, ecologically representative and well-connected systems of protected areas

National Policy

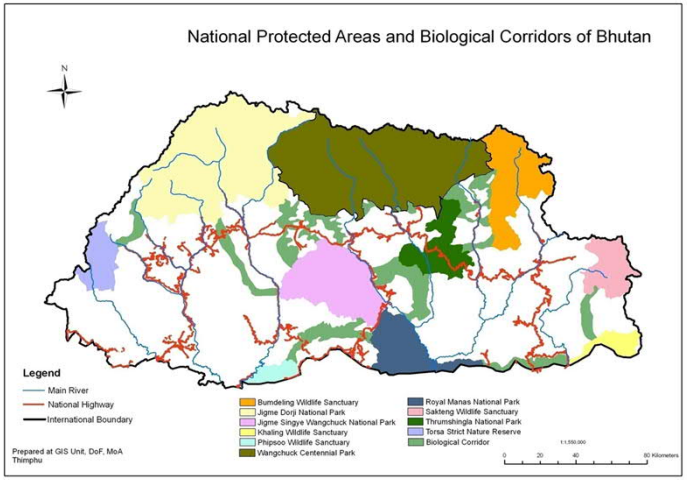


Costa Rica

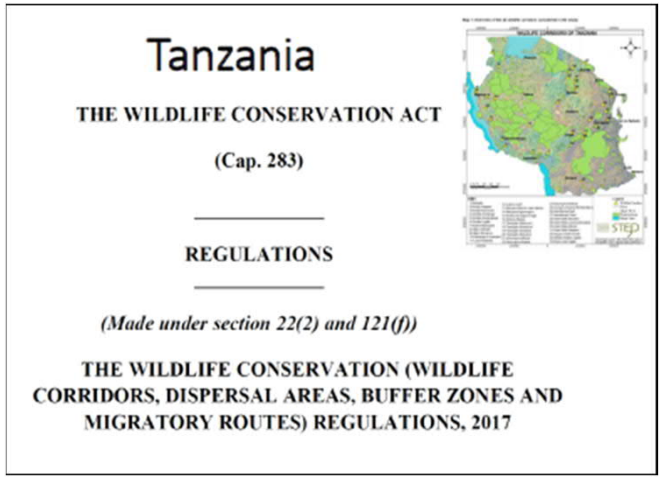
Kenya



Bhutan



Tanzania



Canada

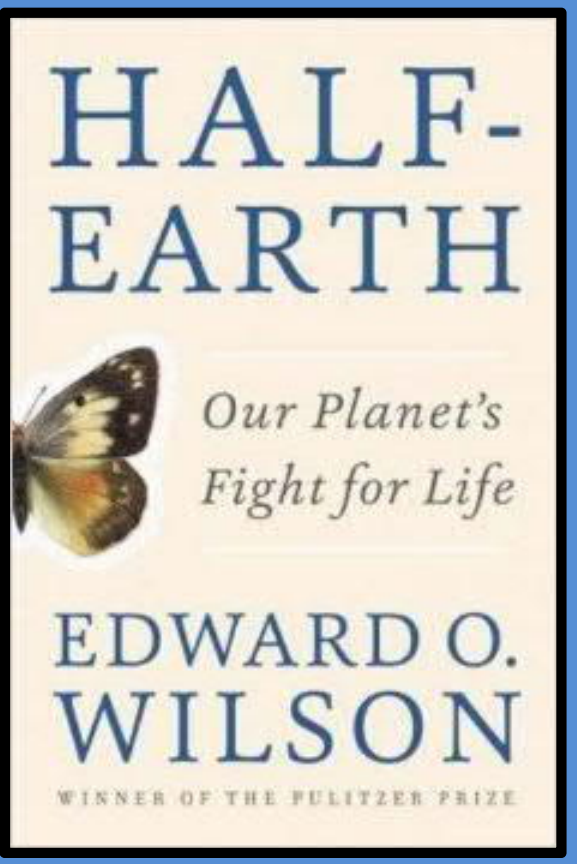
Pathway to Canada Target 1

A principal recommendation of these Guidelines is that the designation ‘ecological corridor’ be recognized in regional, national, and subnational law and policy, such as:

- Bhutan
- Costa Rica,
- Croatia,
- India,
- Kenya,
- Malaysia,
- The Netherlands

Can We Save Nature in a Crowded World?

Nature Needs Half™

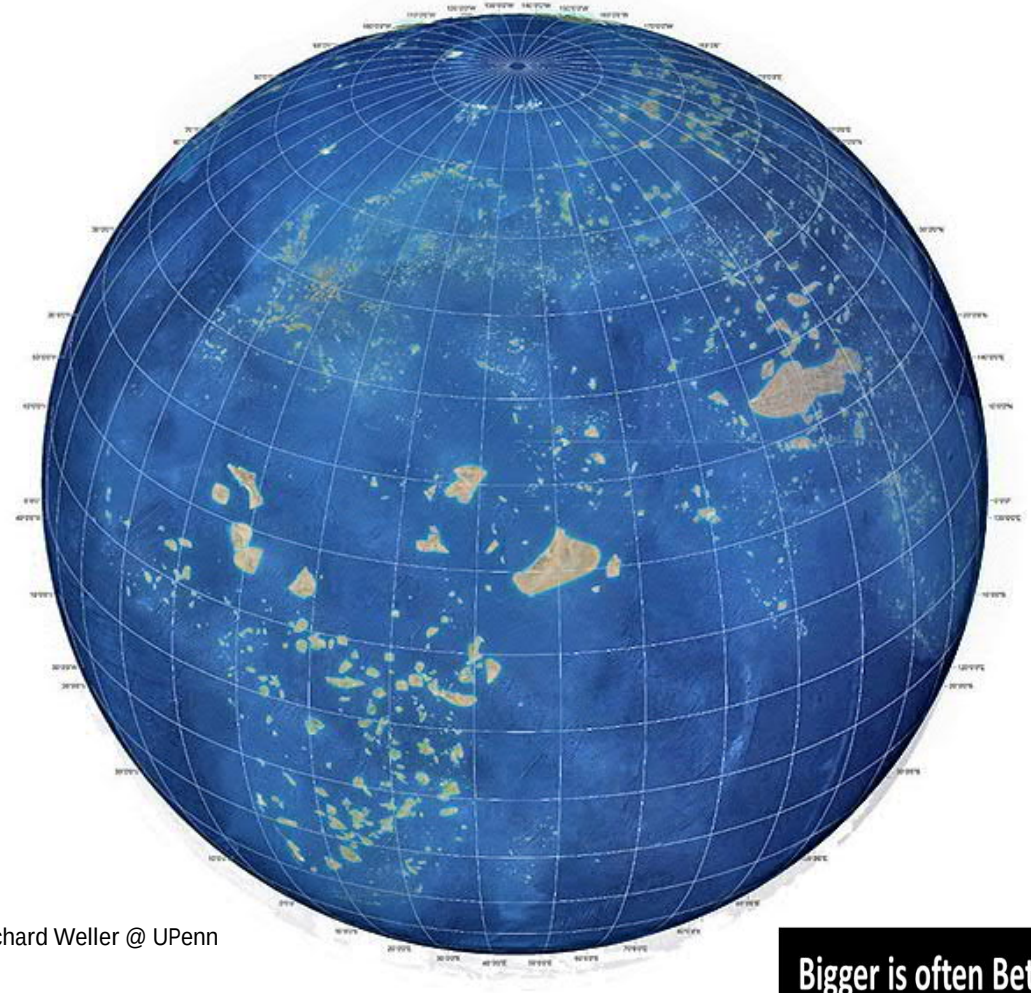


30% by 2030

NATIONAL GEOGRAPHIC

Protecting 30% of all land and waters by 2030

Currently 15.4% Terrestrial Protected Areas



© Richard Weller @ UPenn

Convention on Biological Diversity

- Aichi Target 11: “By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes”

Bigger is often Better but Well-Connected is More Effective

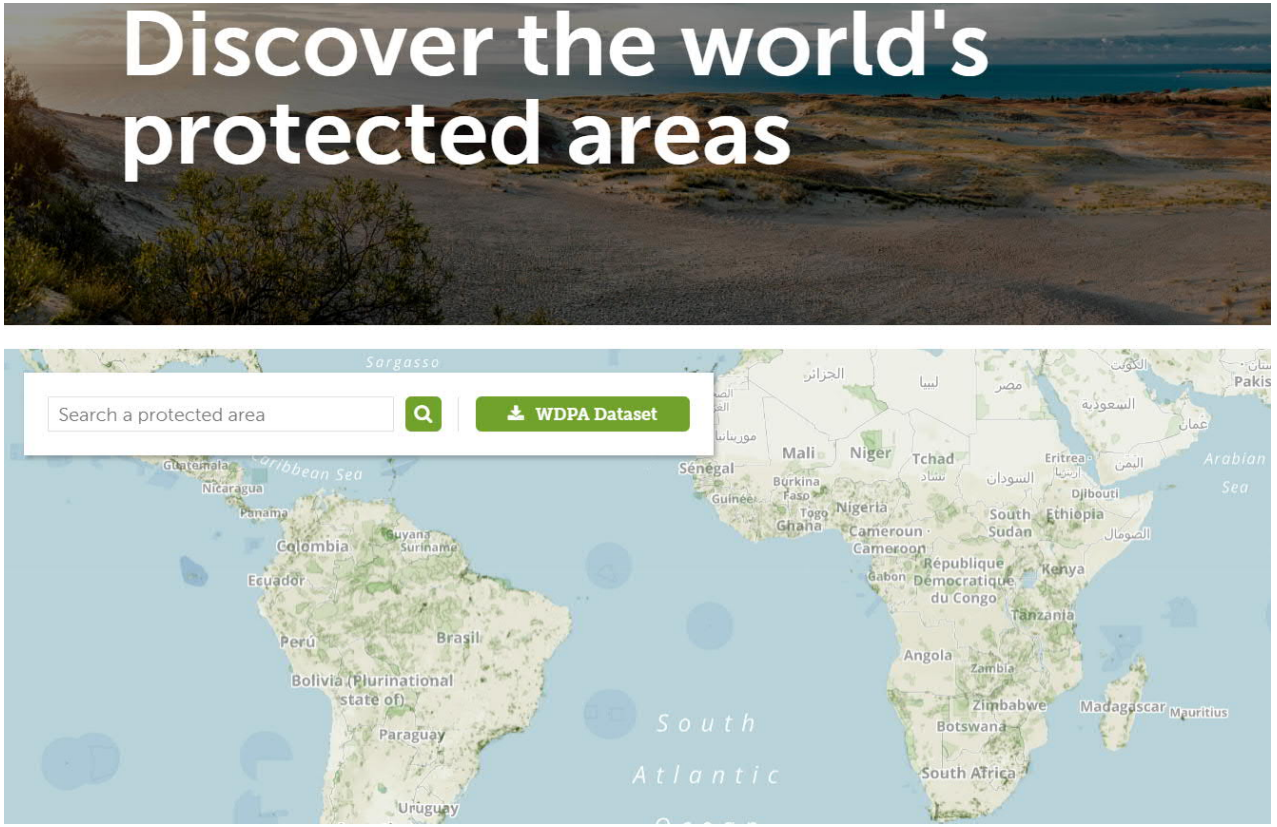
Tools & Reporting

Protected Planet: World Database on Protected areas

- Area-based commitments

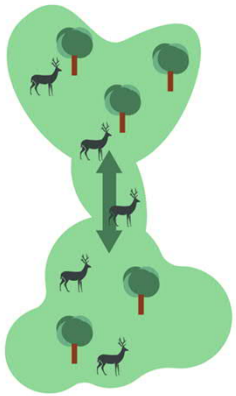
UN environment

WCMC

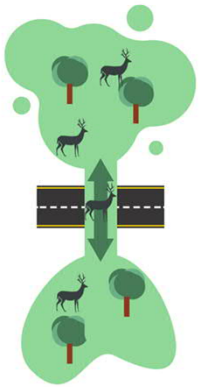


IUCN WCPA WORLD COMMISSION ON PROTECTED AREAS CONNECTIVITY CONSERVATION Specialist Group CENTER for LARGE LANDSCAPE CONSERVATION

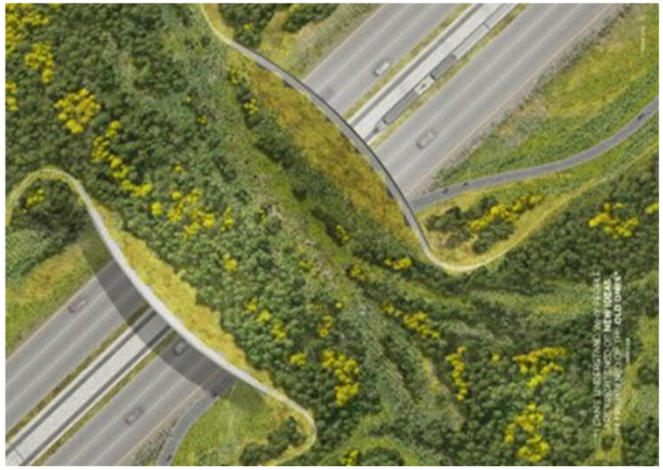
Our Next Guidance: Greener Road, Rail, Canal Designs

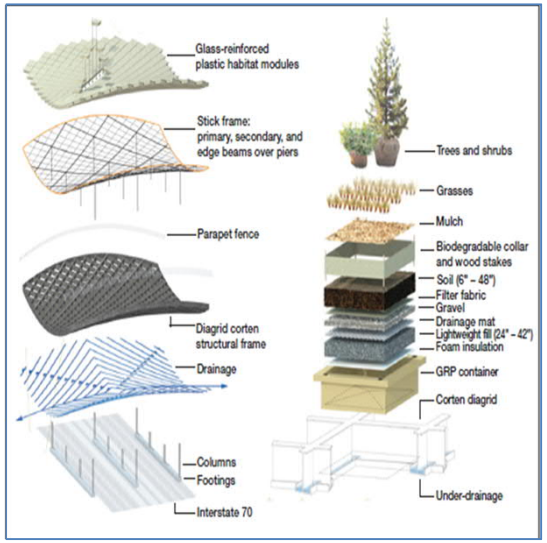


Connectivity via corridor

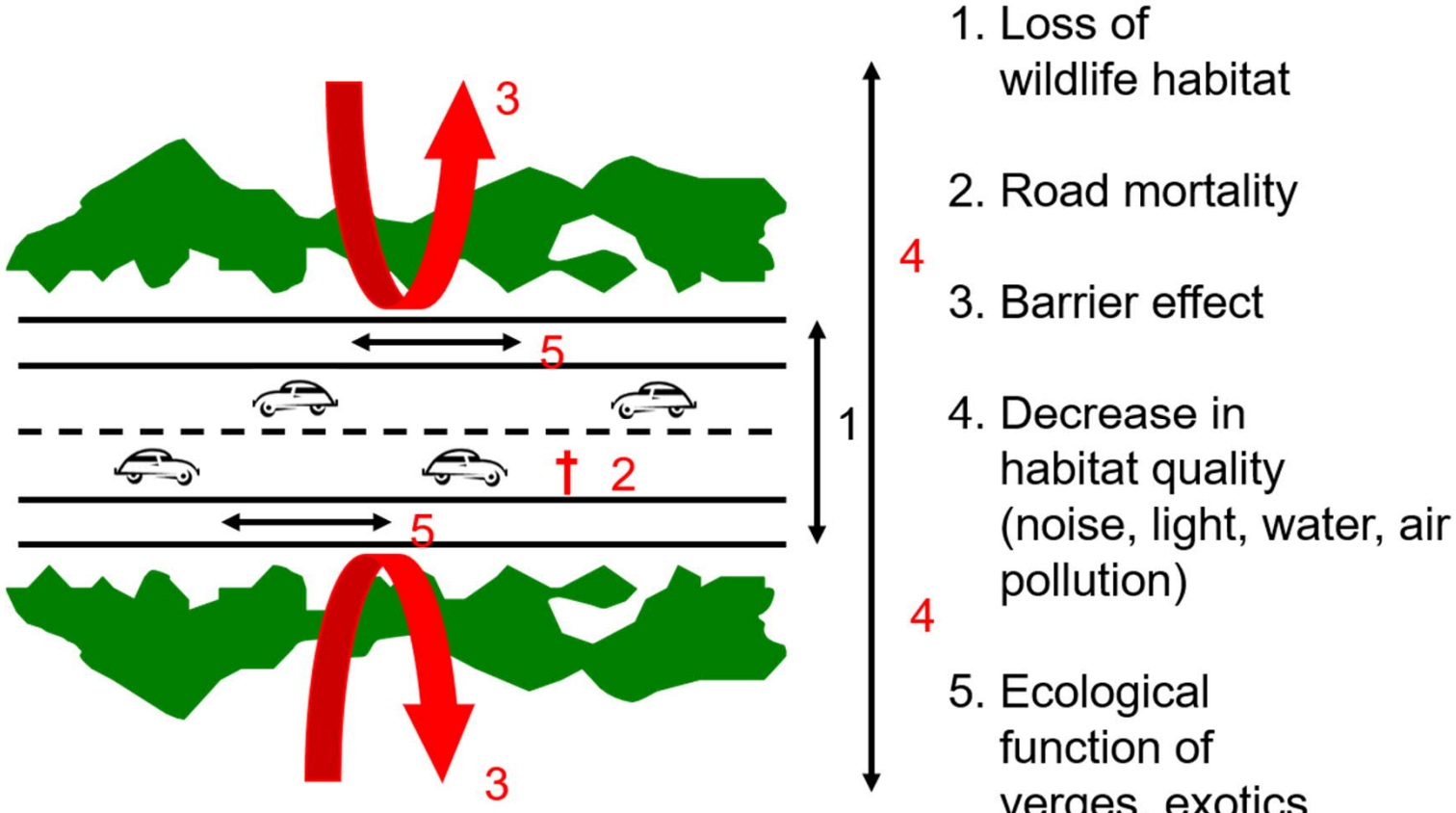


Connectivity via crossing





Ecological impacts of roads and rails



Courtesy Marcel Huijser, Western Transportation Institute – Montana State University

"sex across the highway."

The New York Times

Home on the Range: A Corridor for Wildlife

The Rockies are among the last refuges of animals like the bighorn sheep.
Florian Schulz/Visions of the Wild

May 23, 2006

Les choses ne sont pas toujours ce qu'elles paraissent.

Le cerf ne traverse pas la route - la route traverse la forêt.

CONNECTIVITY CONSERVATION
Specialist Group
TRANSPORT Working Group