Can China's Protected Area network co-deliver biodiversity conservation and sustainable human development goals?

Wildlife & Conservation Student Conference
Beijing 2012

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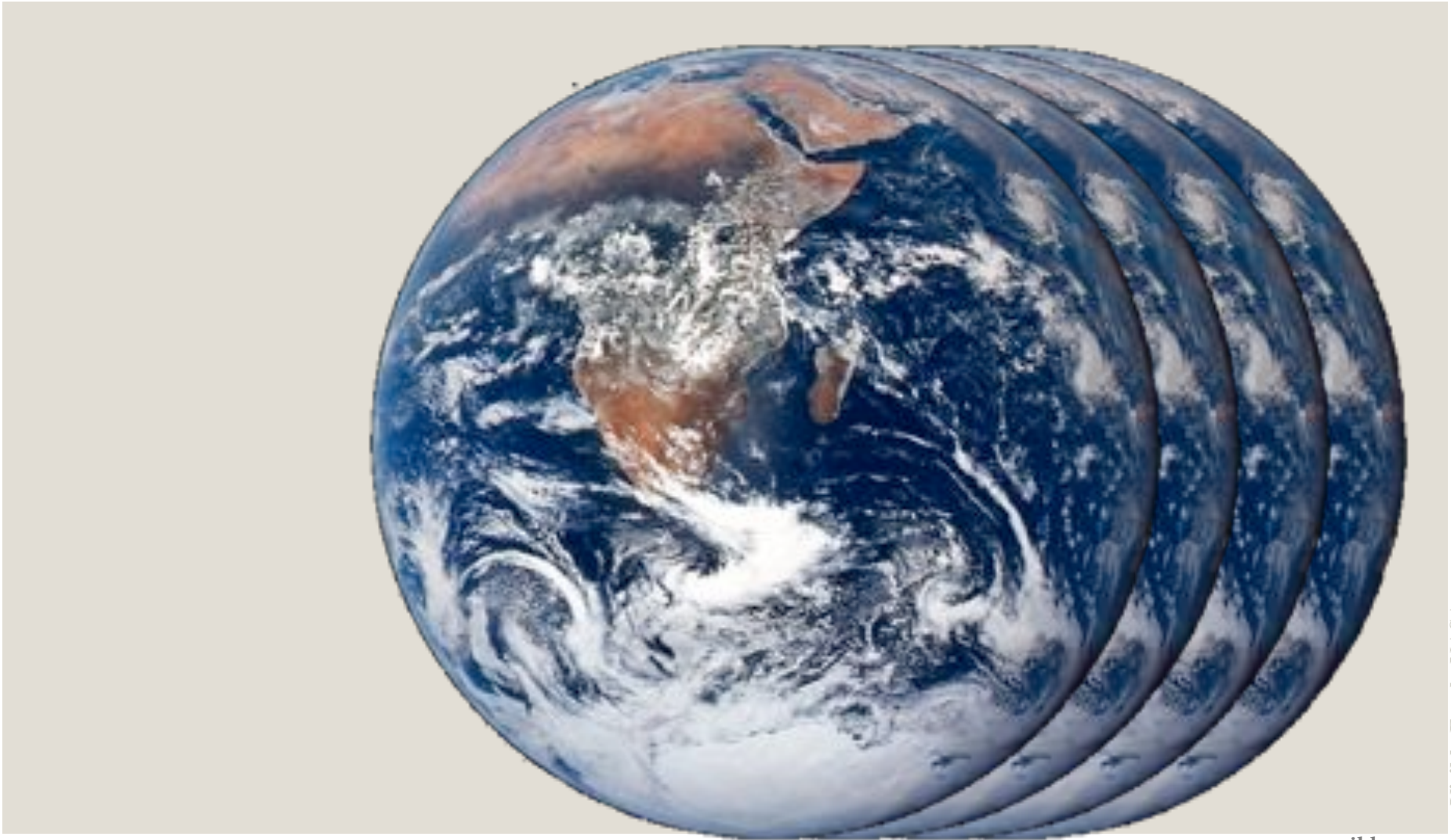
The planet's human population increases by more than 200,000 people every day



Visible Earth, NASA

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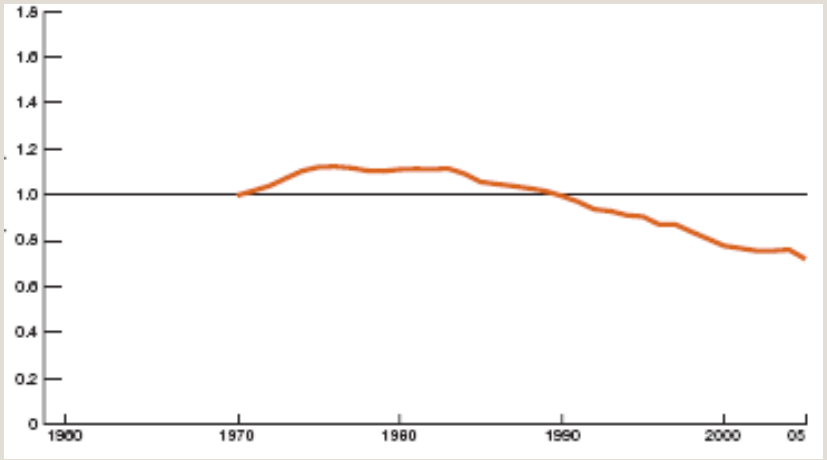
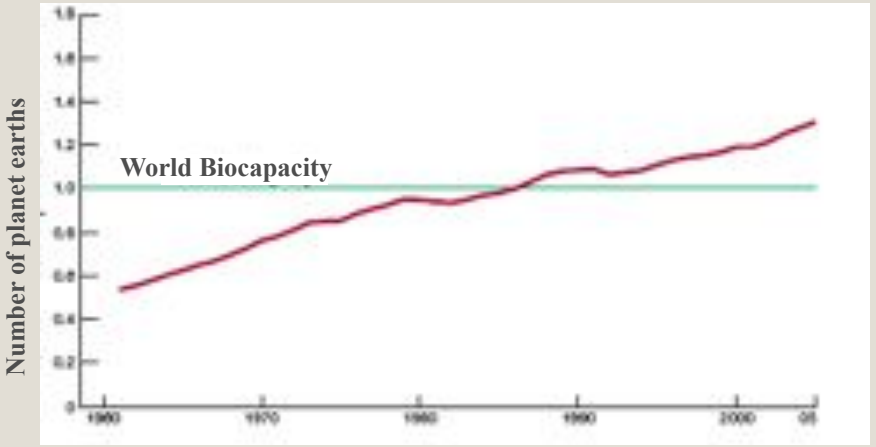
Of 4000 mammal species, 25% are endangered (IUCN 2008)

Living Planet Index of Biodiversity, 1970-2005



Humanity's Ecological Footprint, 1961-2005



WWF 2008 *Living Planet Report*

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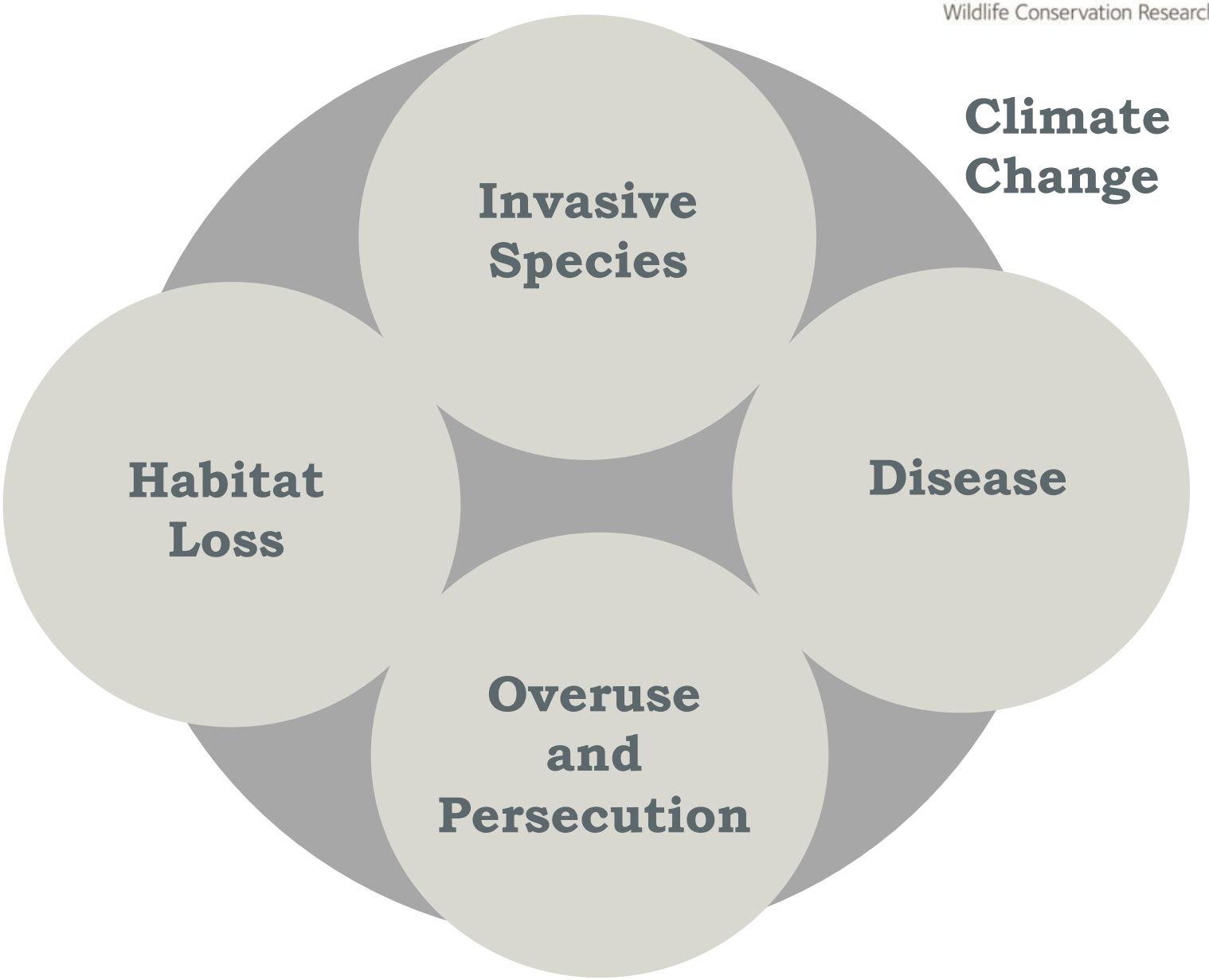

Adapted from: The Evil Quartet, Jared Diamond 1989

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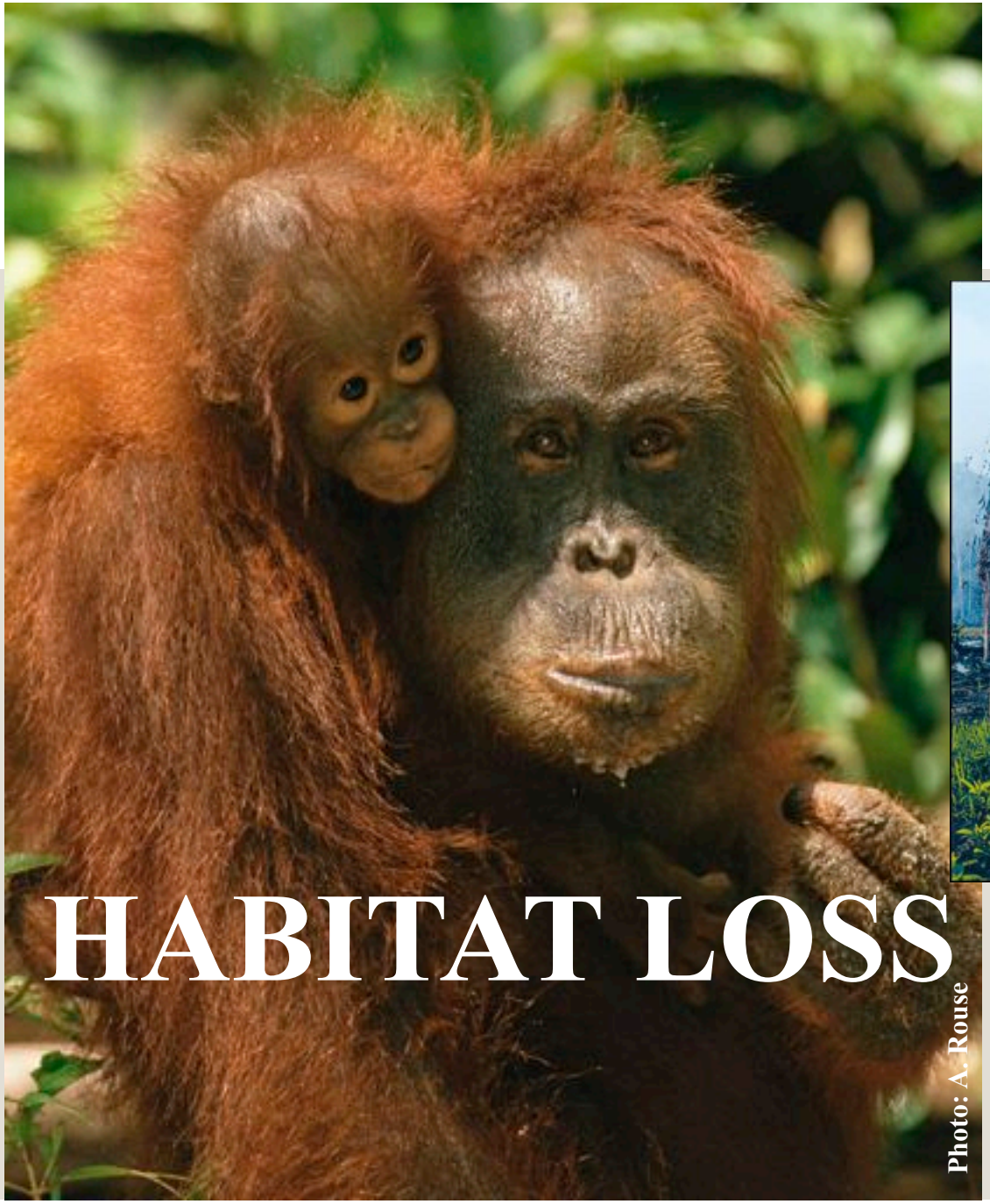


HABITAT LOSS

Photo: A. Rouse

PERSECUTION

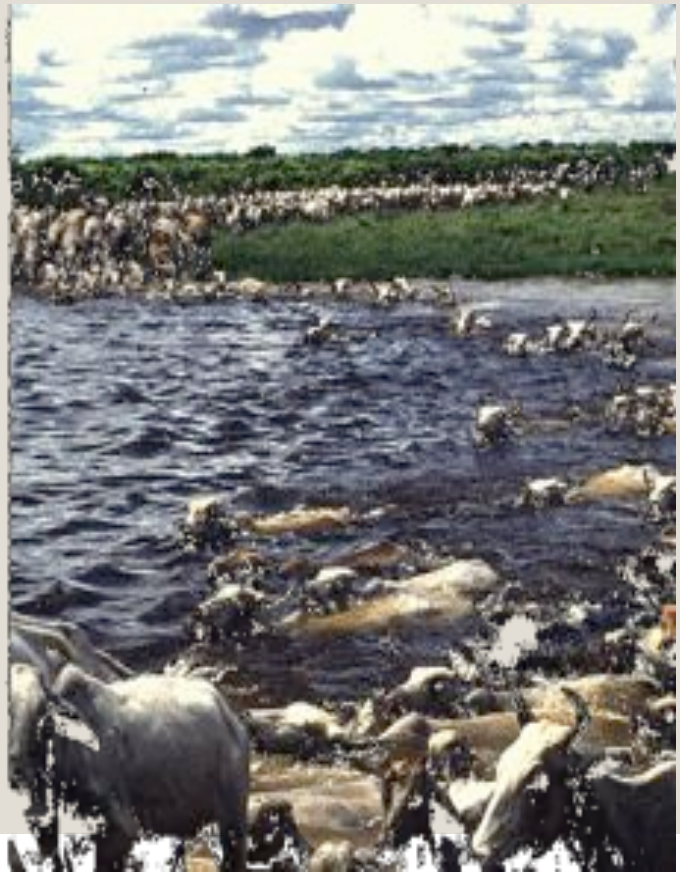
Photo: A. Rouse

DISEASE

Photo: M. Harvey

INVASIVES

Photo: A. Harrington



zoom-
zoom

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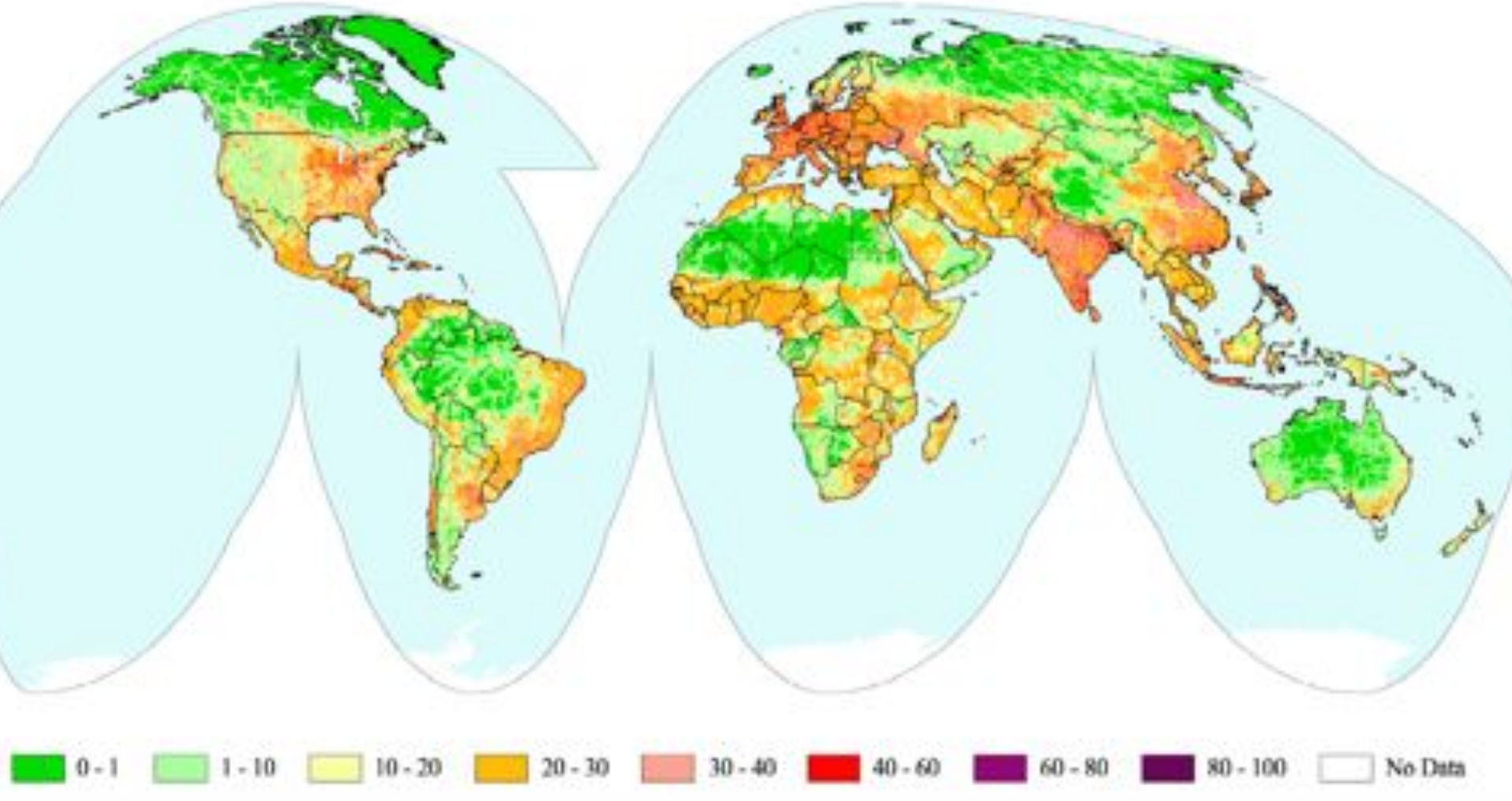
Global Human Footprint



Protected Areas (IUCN Definition)

"an area of land and/or sea especially dedicated to the protection and maintenance of biodiversity, and of natural and associated cultural resources, and managed through legal or other effective means".

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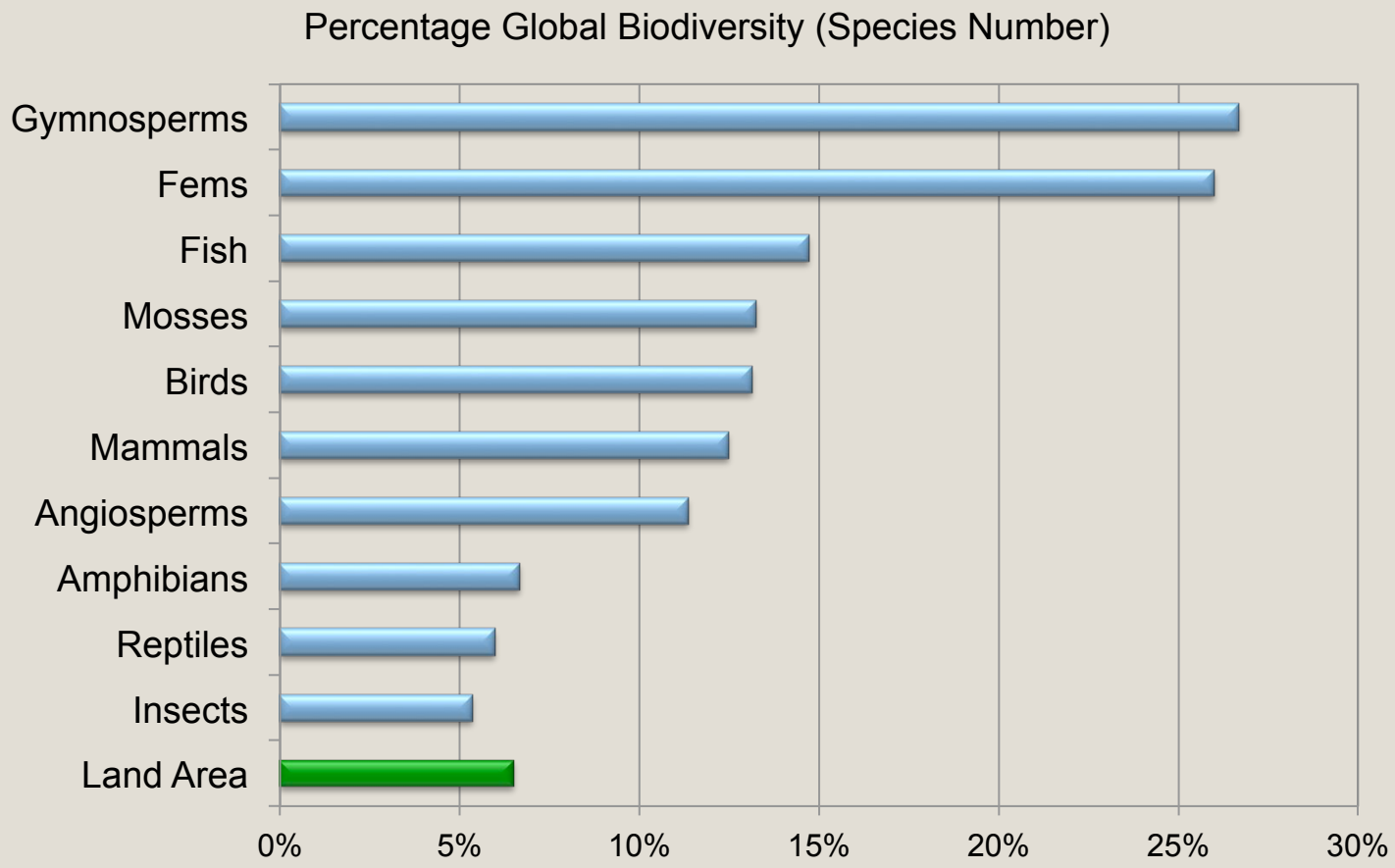
Biodiversity in China



National Environmental Protection Agency, China

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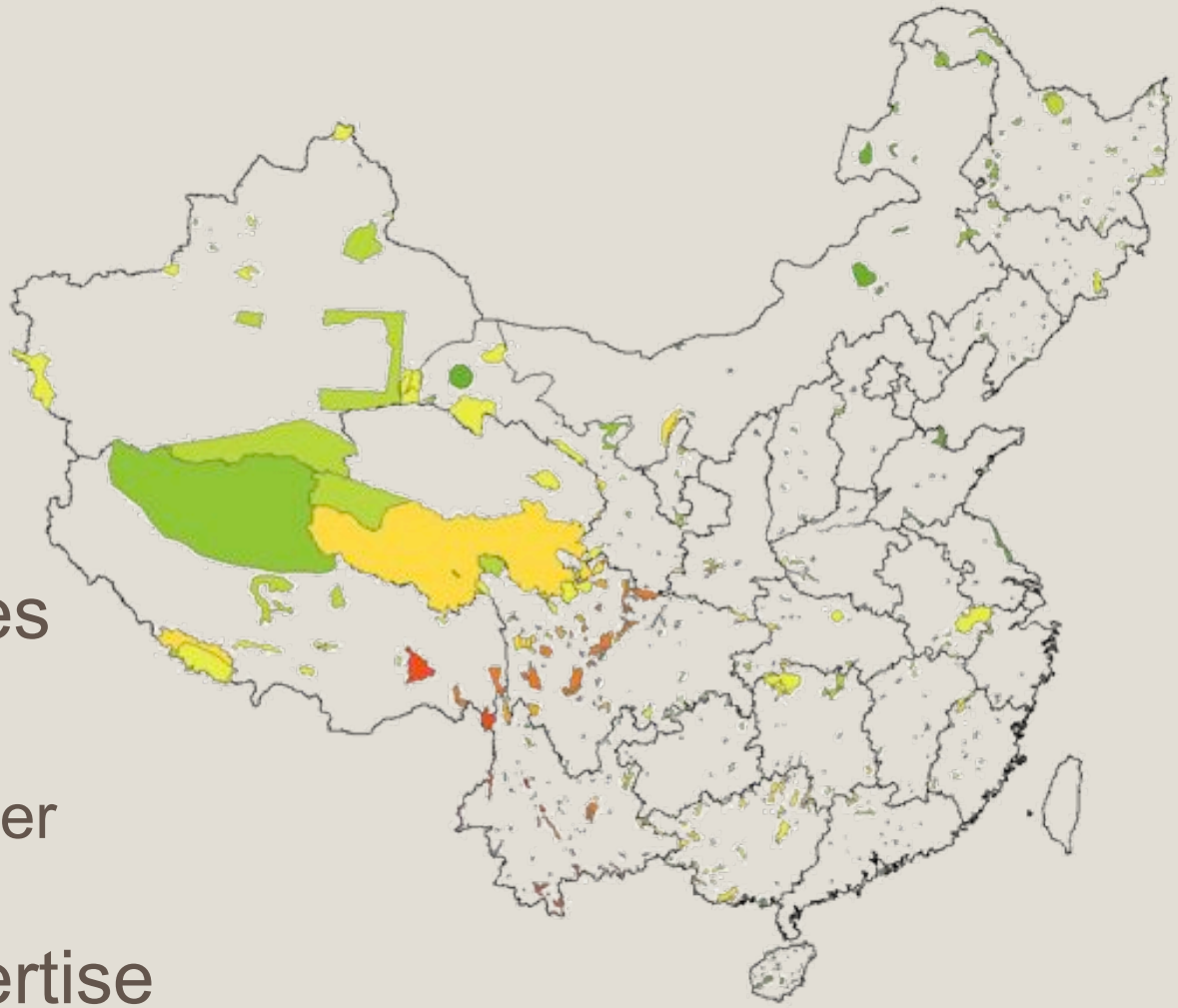
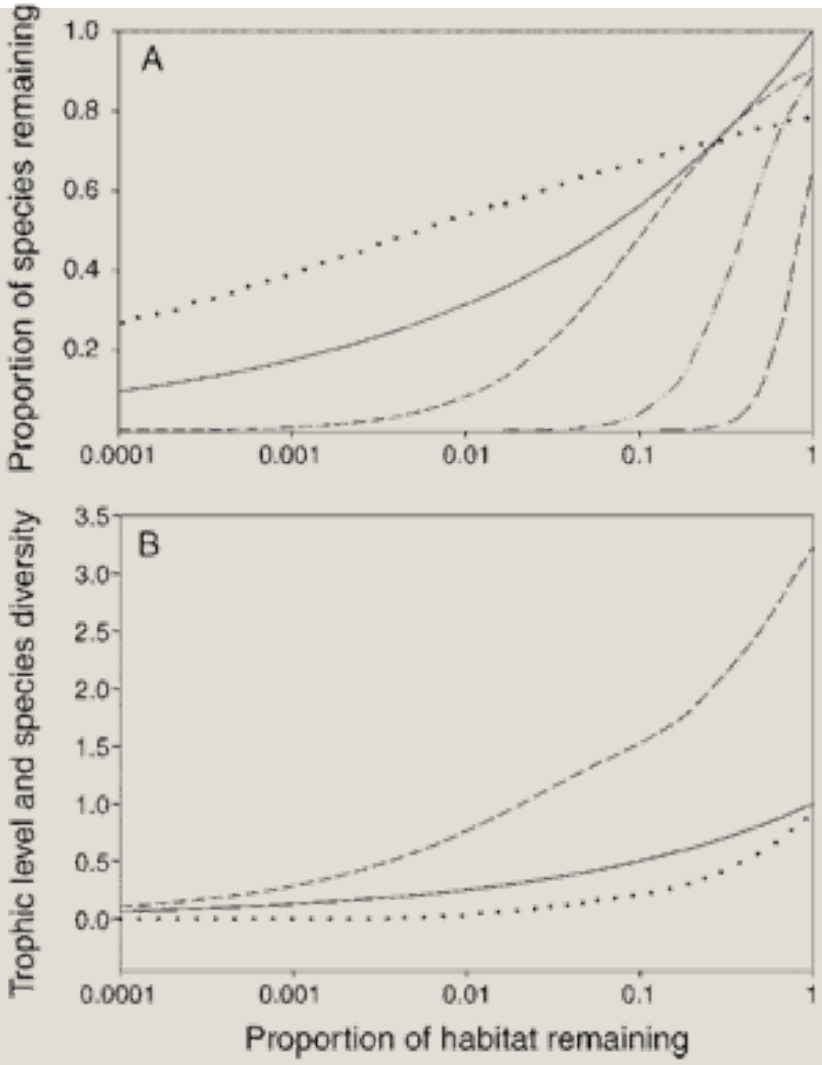
Conservation in China

- PA designation
  - 34 (1978)
  - 1,227 (2000)
  - 2,531 (2008)
  - >2,800 (2011)
  - (2139 ProtectedPlanet)
- *Ex situ* successes
  - Giant panda
  - Pere David's Deer
- Little *in situ* expertise



Loss of Species Diversity and Trophic Complexity



Dobson et al (2006) *Ecology*

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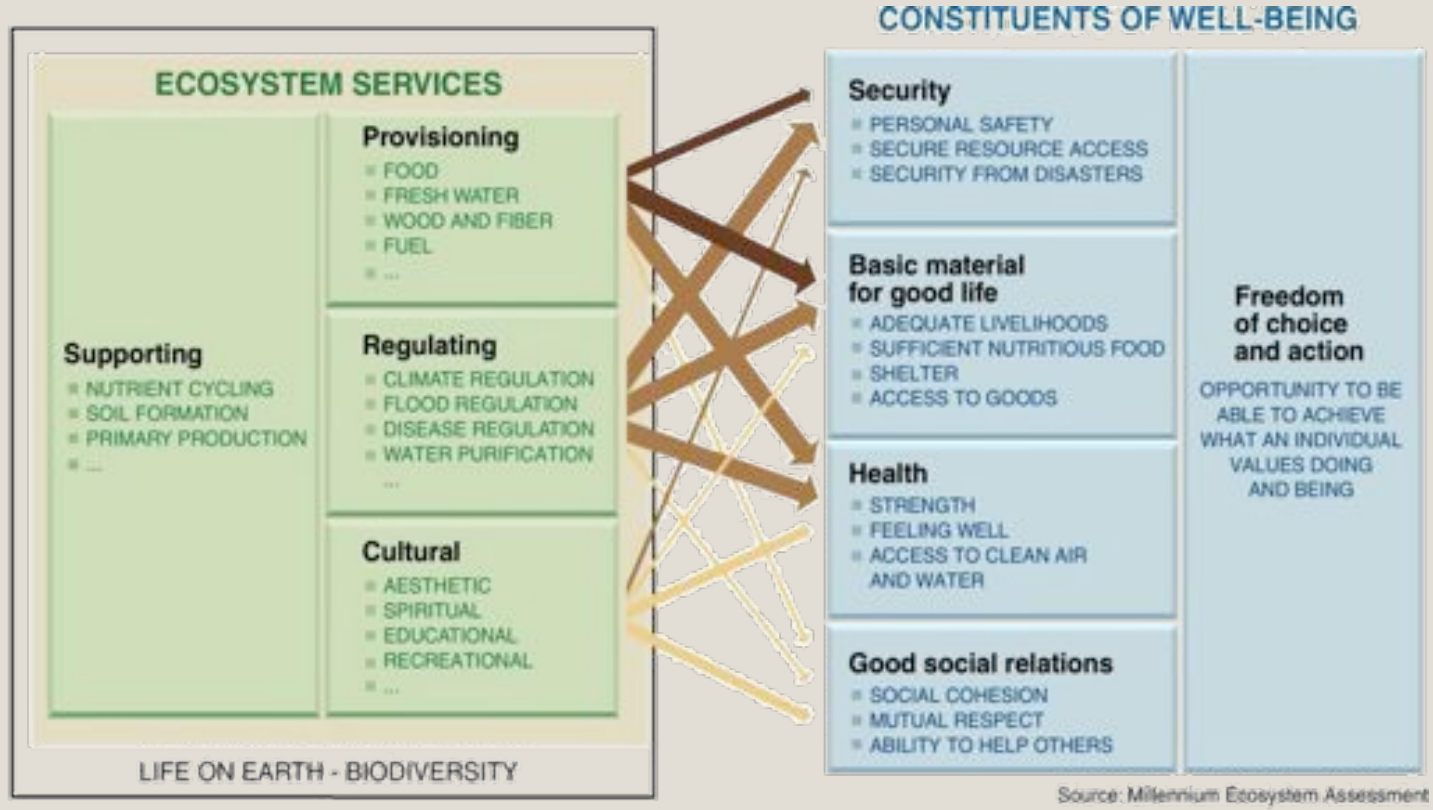
Money: The Root of All Evil?

- How do we value ecosystems so we protected them better?

Ecosystem Services and Human Wellbeing



MEA (2005). Millenium Ecosystem Assessment. Island Press, Washington, DC.

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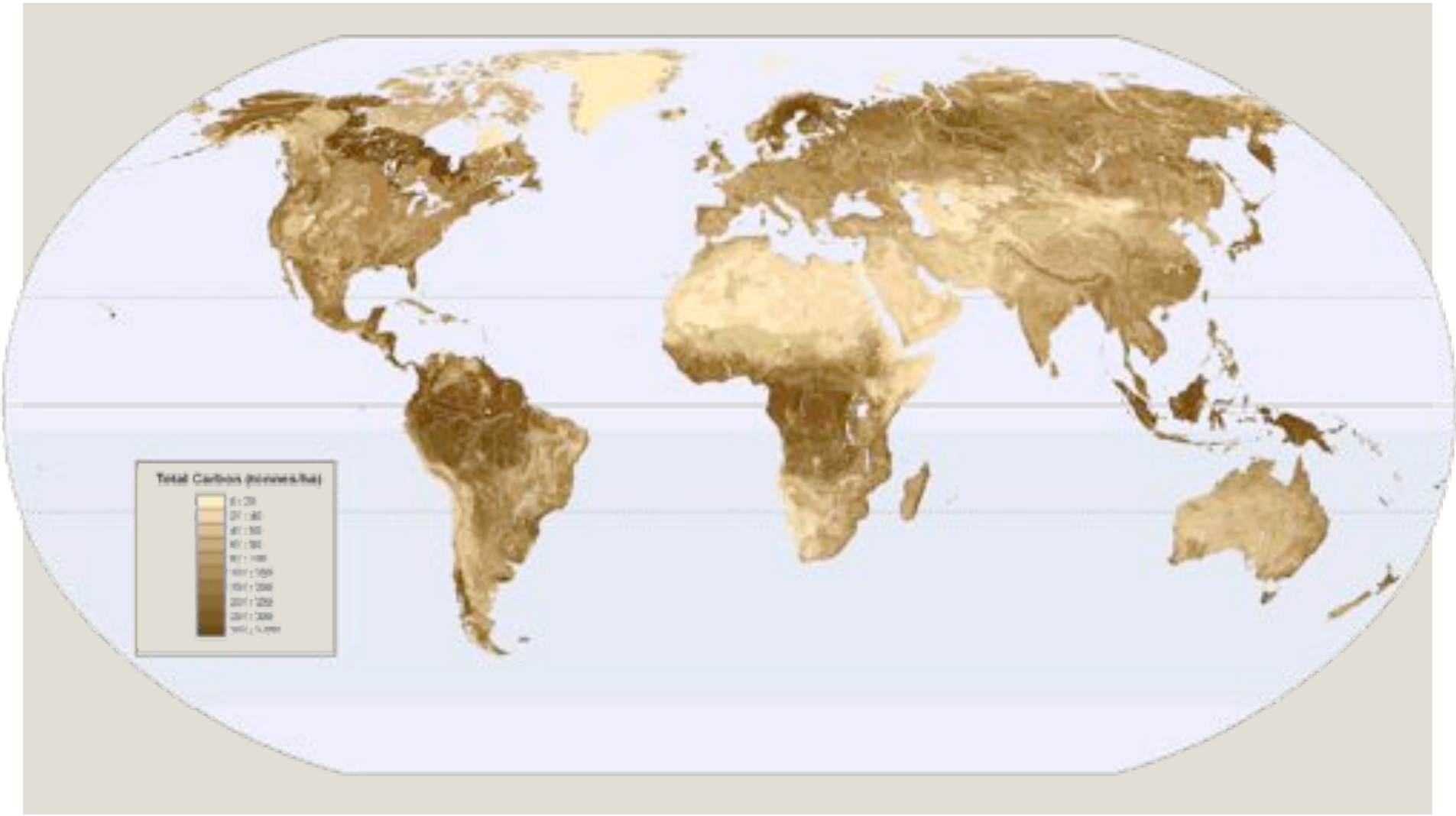
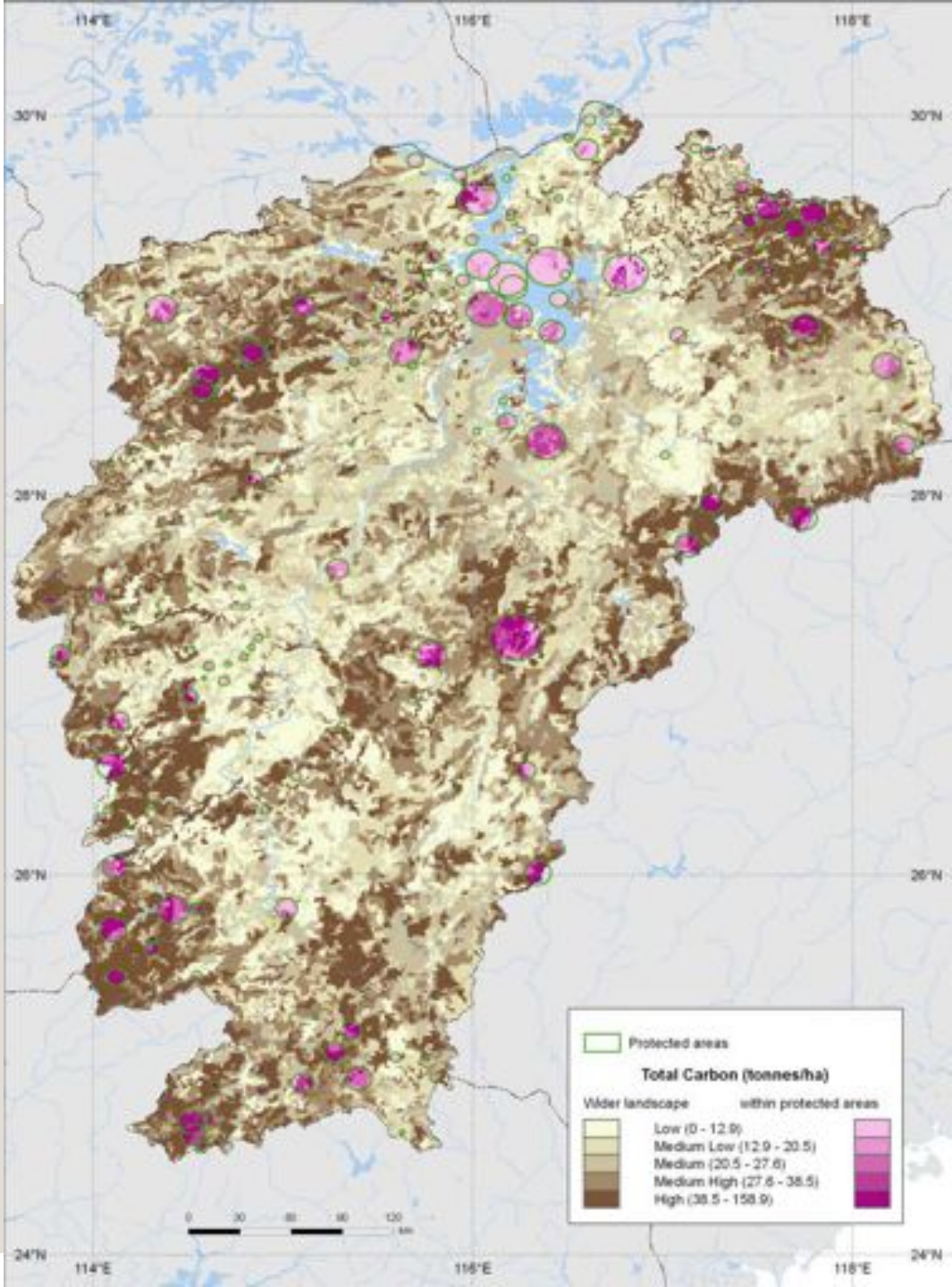
Global Carbon Stocks



Jiangxi Carbon in PAs

- 174 PAs
- 6.6% Province area
- 29 Mt Carbon (6.6% total)
- 10% High carbon areas in PAs
- 7.5% area important for vascular plant richness
- 7.4% area important for vertebrate diversity

UNEP-WCMC 2009



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Landscape Co-Benefits

A	Carbon Storage	Pollination	Recreation	Water Storage	Flood Control	Forage Production	Bio-diversity
Carbon	1						
Pol'n	0.04	1					
Rec'n	0.19	-0.01	1				
H20	0.58	0.02	0.27	1			
Flood	0.21	0.00	0.24	0.17	1		
Forage	-0.07	-0.05	-0.07	-0.12	0.04	1	
Biod'y	0.03	-0.01	0.12	0.10	0.02	-0.04	1
Averages	0.16	0.00	0.12	0.17	0.11	-0.05	0.04
Overall	0.08						

LEGEND	-0.2 - -0.1	-0.1 - 0	0 - 0.1	0.1 - 0.2	0.2 - 0.3	0.3 +

Central Coast ecoregion of California (Chan *et al*, 2006, *PLoS Biology*)

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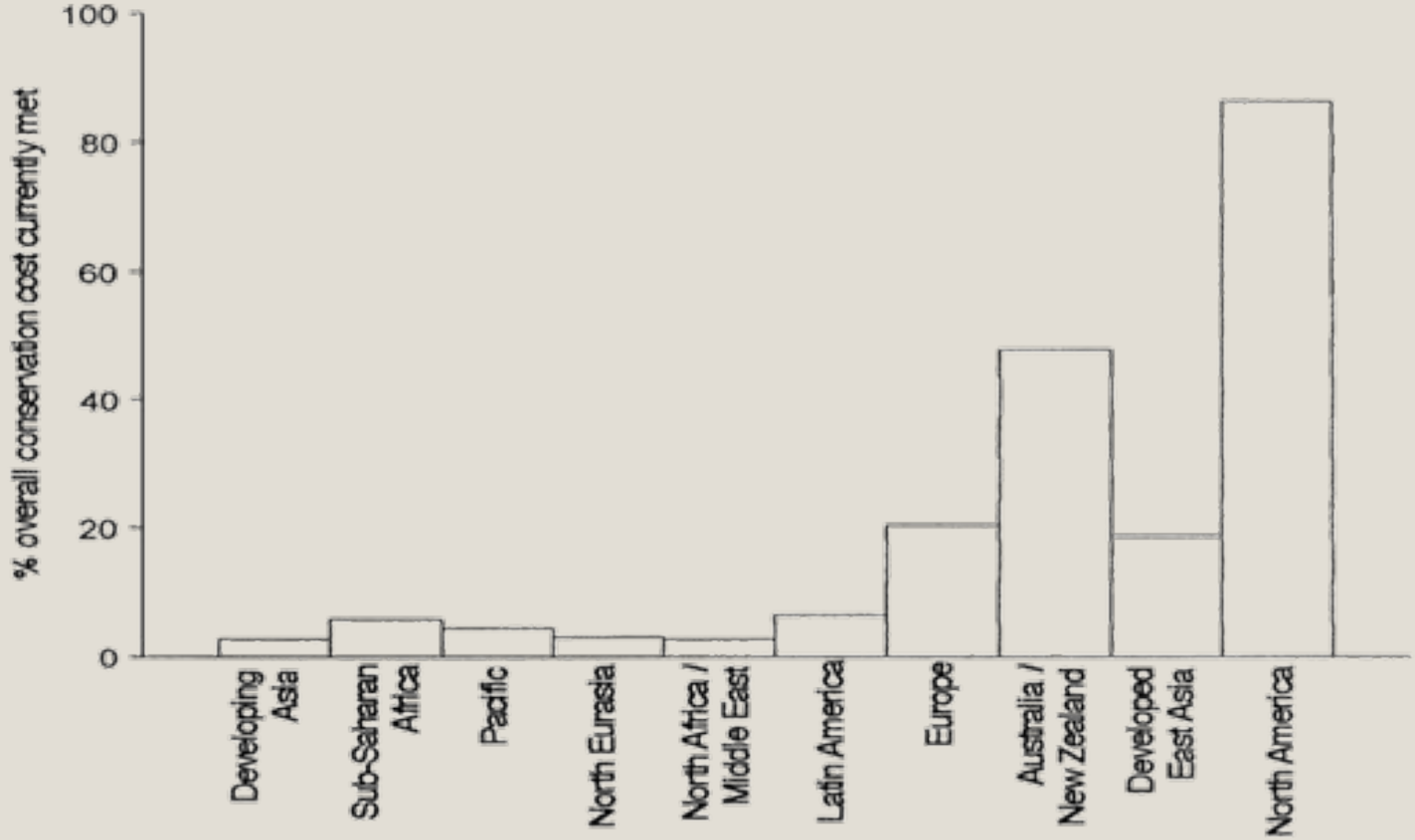
Cost of Effective Reserve Networks Being Met



Balmford A et al. PNAS 2003;100:1046-1050

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The Costs of Biodiversity (TEEB[1])

- Global spending US$7 – 10 billion per year
  - Mostly on PAs, though not increased in line with PA number
  - US$ 14 billion to effectively manage existing PAs
  - US$ 45 billion to increase PA coverage to (old) target levels
- Estimated cost to achieve (old) CBD targets:
  - US$ 10 – 50 billion per year
  - OECD countries should invest 0.3% GDP
    - ~US$ 120 billion
  - 10x increase in capacity by 2020

*Agricultural subsidies in EU, US and Japan: US$ 220 billion

[1]Source: The Economic of Ecosystems and Biodiversity (TEEB: www.teebweb.org)

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Building Capacity for Wild Cat Conservation in China

A UK Darwin Initiative Supported Project

- Strengthening China's capacity and expertise to monitor and manage felid biodiversity
- 2010 – 2013
- Protected Area focus

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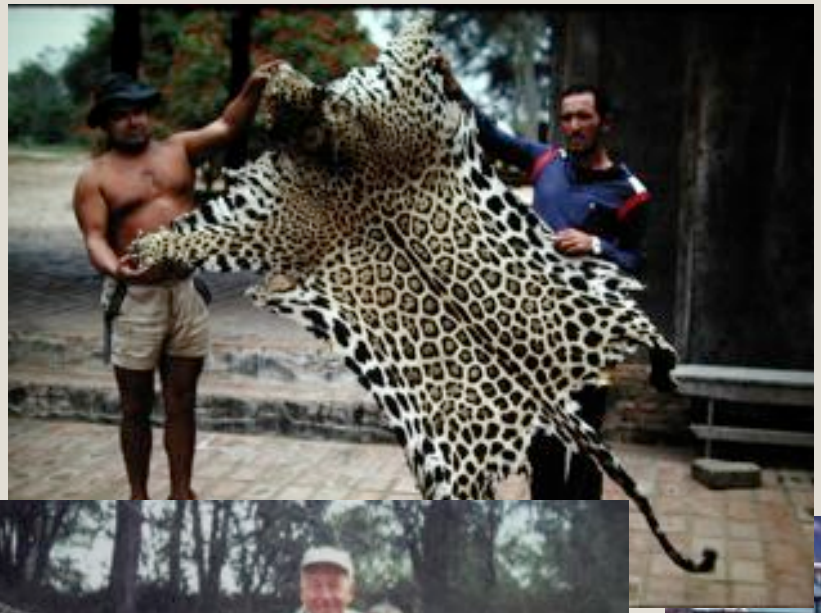
Focus on Felids: Why Cats?



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Focus on Felids: Why Cats?

Ibn Bahktishu, Manafi' al-Hayawan (The uses of animals), 11th Century

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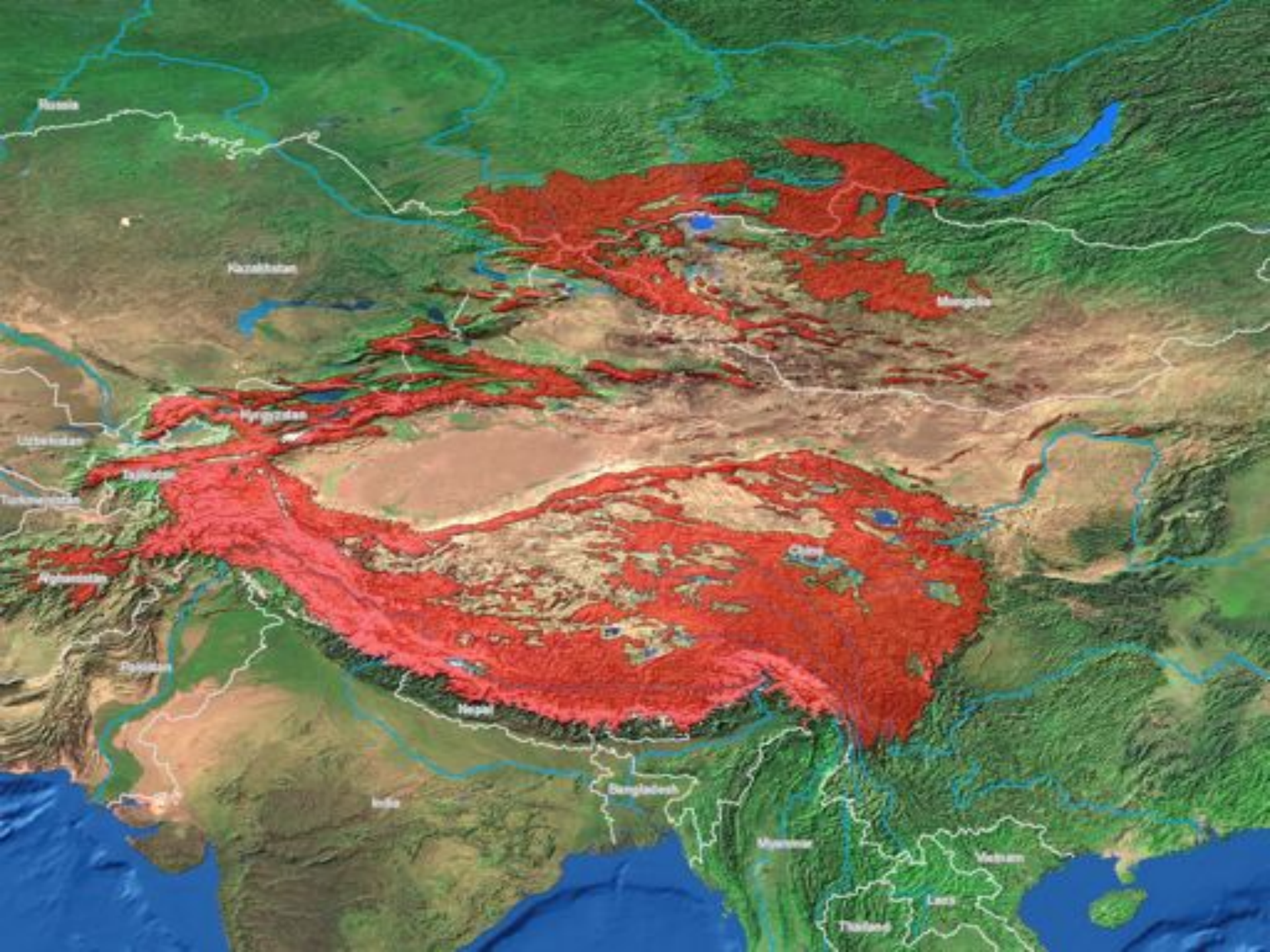
Focus on Felids: Why Cats?


Russia
Kazakhstan
Mongolia
Uzbekistan
Afghanistan
Pakistan
Nepal
India
Bangladesh
Myanmar
Vietnam
Laos
Thailand

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Focus on Felids: Why Cats?

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Focus on Felids: Why Cats?

- Umbrella species
- Top predators
  - Functional food-web dynamics
  - Indicators of healthy ecosystems
- Ecosystem services (ESS)
  - Prey population regulators
  - Disease regulation
  - Direct benefit
  - Cultural significance
- Conflict
- Wide-ranging
  - Transboundary conservation

Amur Leopard ©Andrew Harrington

© Andy Rouse

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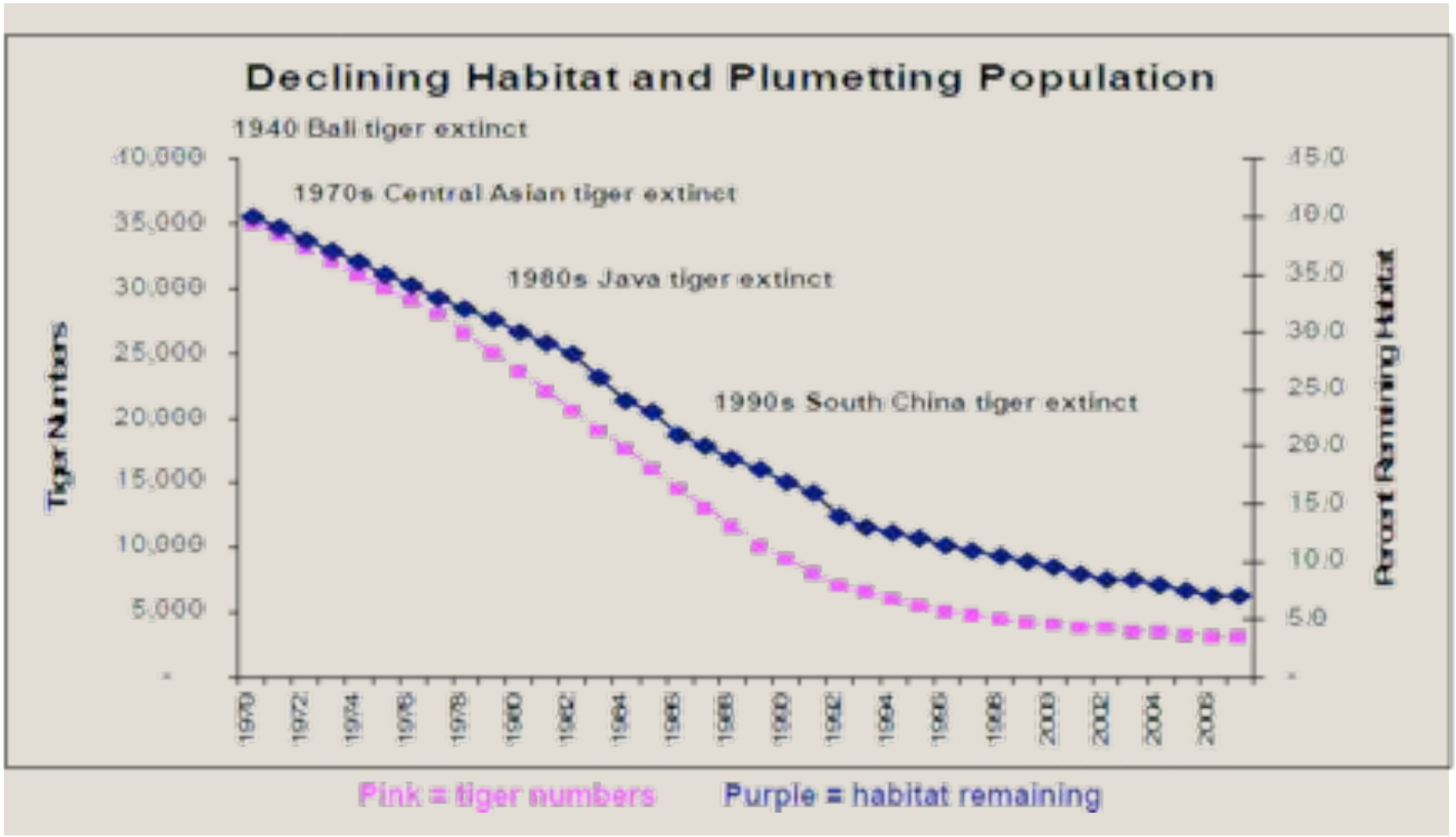
Tiger Habitat and Population



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Multiple Benefits of Tigers

- Cultural Services
- CO_2
- Disease regulation
- Poverty
- Natural Hazard Reg
- Watershed protection
- Food Security
- Agricultural Services

Modelling Tiger Populations

- PA Areas (tiger recovery regions) WDPA 2010
  - Mean: 374.5 km^2; SD = 450.4 km^2
- Tiger range areas (low prey model) Tillson et al, 2006
  - Mean: 78.2 km^2; SD = 56.2 km^2
- ~ 4 – 5 tigers per PA (on average)
- PVA – extinction after 3-4 generations
  - not accounting for spatial separation

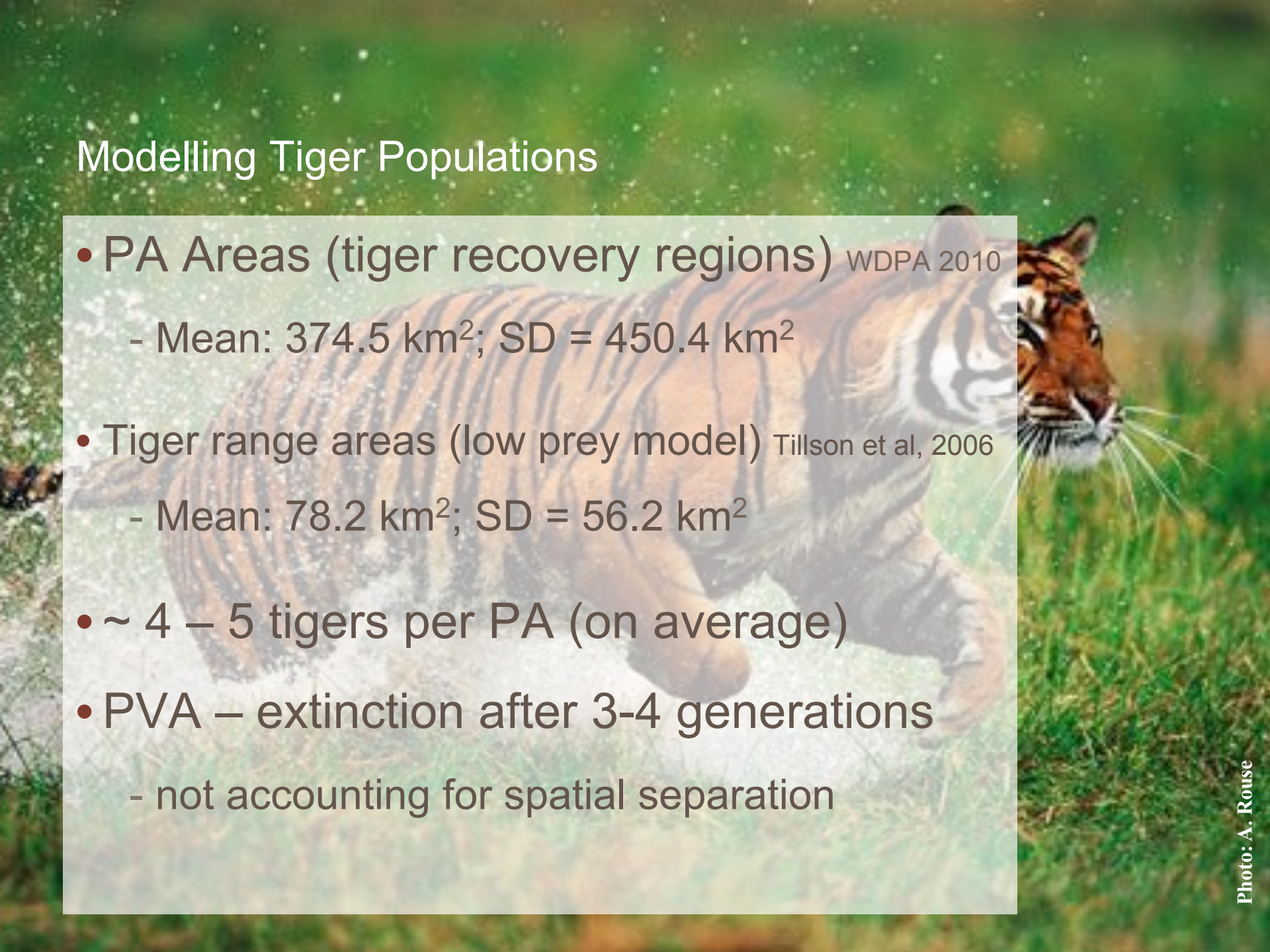

Photo: A. Rouse

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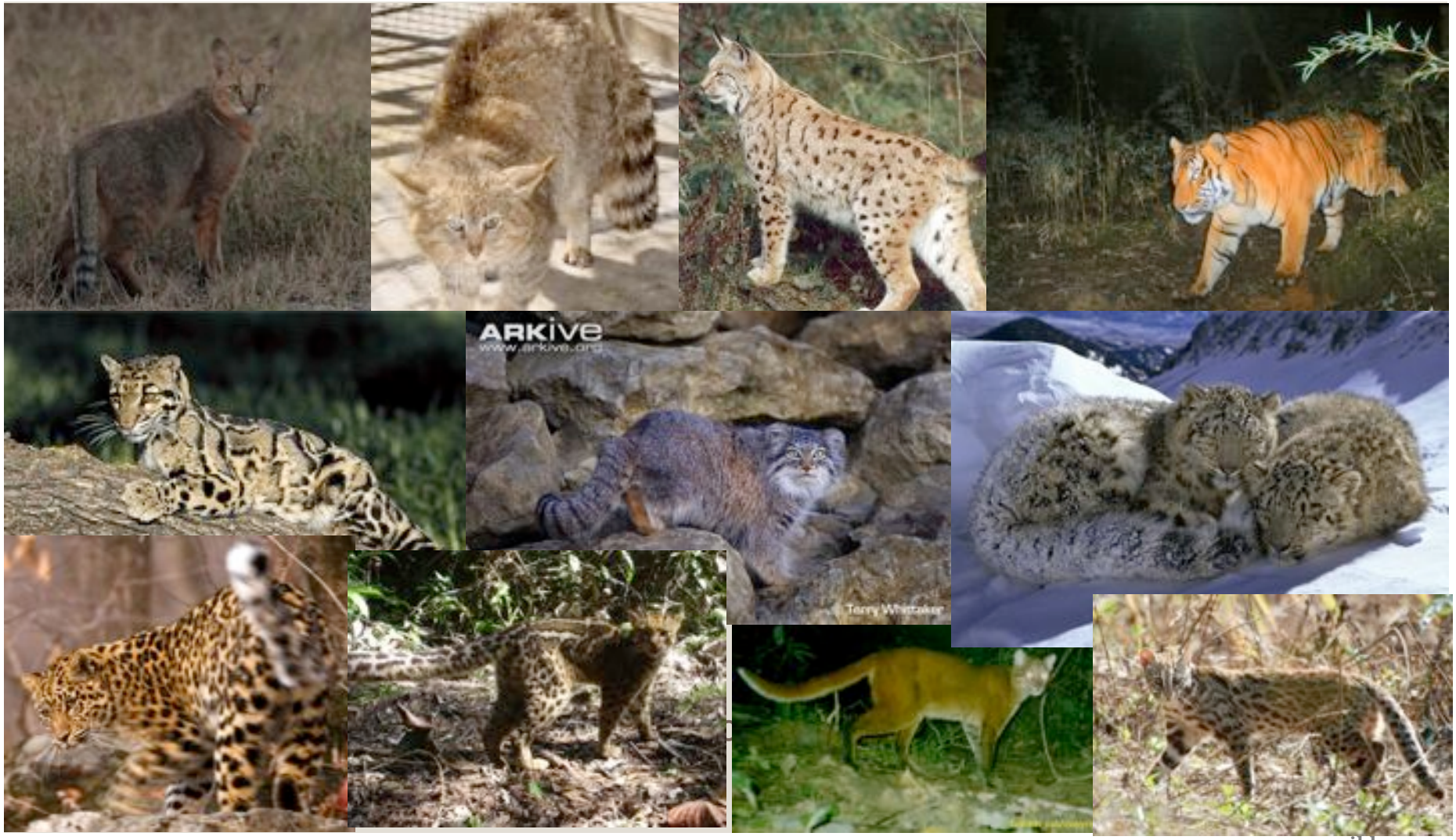
Wild Felids in China



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Training to Build Capacity

- Protected Areas (and beyond)
  - Field staff & managers
- Provincial and National Analysts
- Training based on existing courses:
  - Diploma in International Conservation (WildCRU)
  - MSc Wildlife Conservation and Management (WI)
- Practical skills, underpinned by relevant theoretical knowledge
- Trainee progression.

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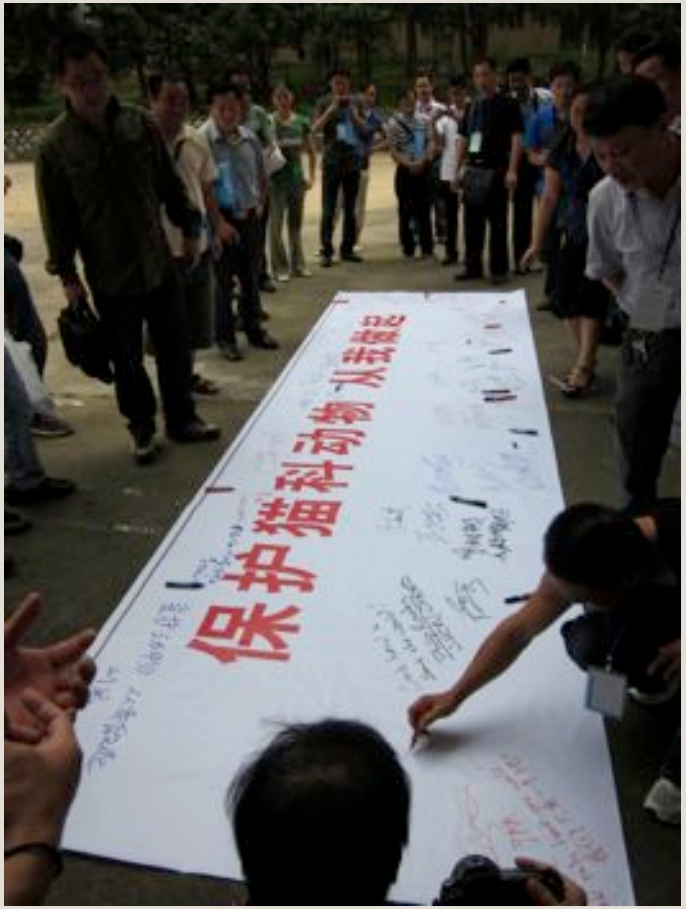
Project Deliverables

- Cat Specialist Group of China
  - China Zoological Society
- Skilled Trainees across China
  - Skills exchange (e.g. QQ Network)
- Baseline status information for indicators (e.g. wild felids)
- Effective Monitoring Programmes Initiated



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Project Legacy

- Engaged and trained workforce, dedicated to biodiversity conservation and management
- Continuation and support for training
- Next generation scientists
- Emergent species action plans
- Continued effective monitoring
- Emergent scientific data streams

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Parabiologists – Citizen Science+

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Parabiologists – Citizen Science+

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Regional, national and international linkage

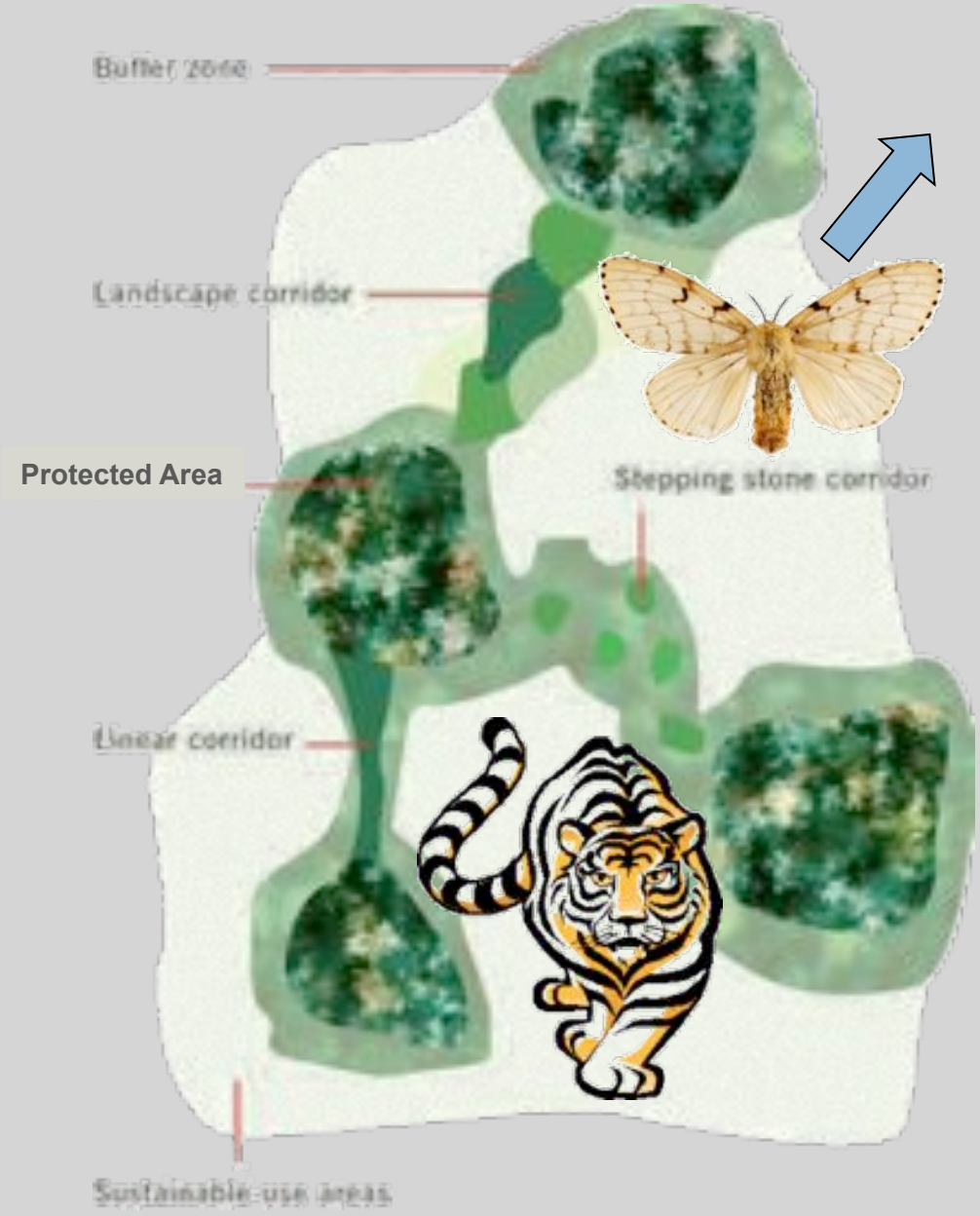
China (for example)

Protected Area
- Staff base
- Skills
- Monitoring
- Primary data
- Research

Buffers & Corridors
- Communities
- TEK
- Engagement
- Training

SUAs
- Communities
- TEK
- Engagement

Effort / Expense



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Breaking down the process

Protected Area
- Staff base [{N}|{Spatial}]
- Skills [{Class}|{Spatial}]
- [{effect}|{use}]
- ring [Indicator {class}|{N}]
- data [{error}|{spatial}]
- ch [{class}|{quality}]

f{x,y…}

Corridors
- Communities [{class}|{N}|{Spatial}]
- ass}|{quality}|{use}]
- ment [{class}|{N}|{cost}]
- [{effect}|{use}]

f{x,y…}

e Matrix")
- nities [{class}|{N}|{Spatial}]
- ass}|{quality}|{use}]
- Engagement [{class}|{N}|{cost}]

f{PA}

f{Buff | Corr}

f{SUA}

Analysis
PA [{N}|{Spatial}]
Provincial Govt. [f{N}]
National Govt.[f{N}]
Academics [{Output}]

Evaluation
Intervention
Amendments

Strategy
Conservation
Management

f{A|B…}

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Conflict – Conservation's Ugly Twin

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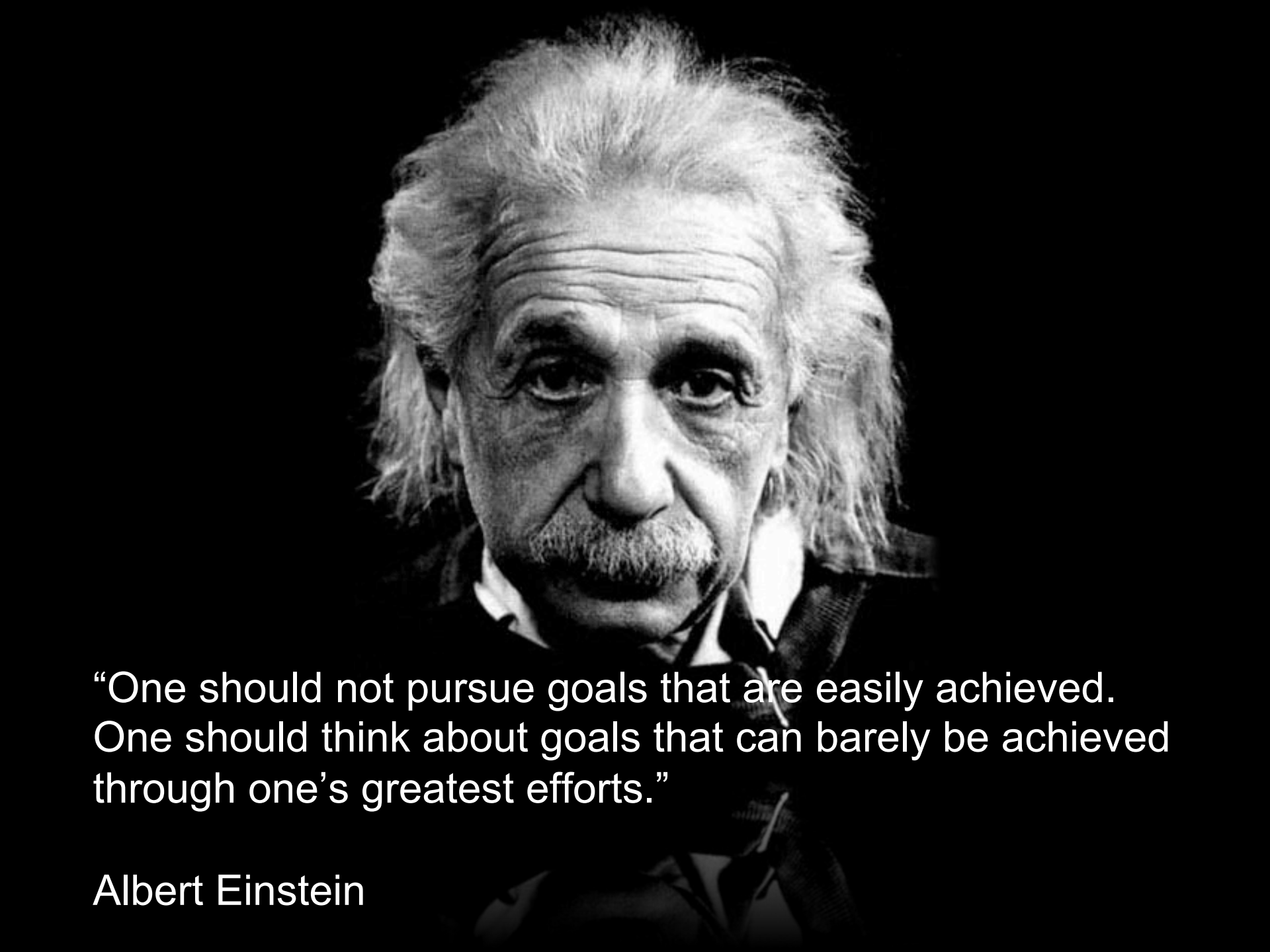
Be Careful What You Wish For…

- Goals to restore natural ecosystem functions
- Top predators as essential components of ES
- We need plans to deal with conflict


“One should not pursue goals that are easily achieved. One should think about goals that can barely be achieved through one’s greatest efforts.”
Albert Einstein