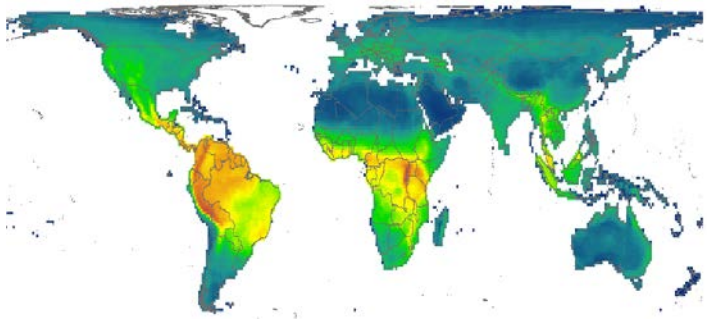
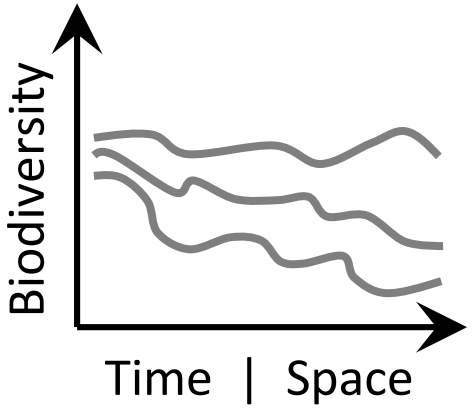
MOL

MAP OF LIFE

A dynamic Map of Life: monitoring species distributions





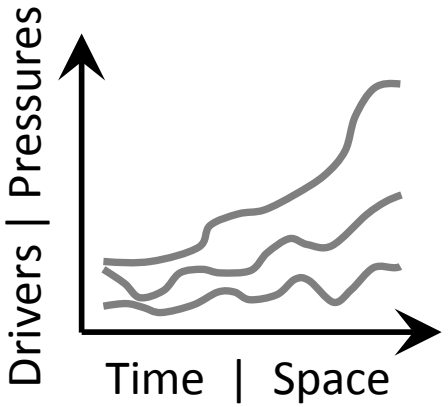
Walter Jetz
Yale University

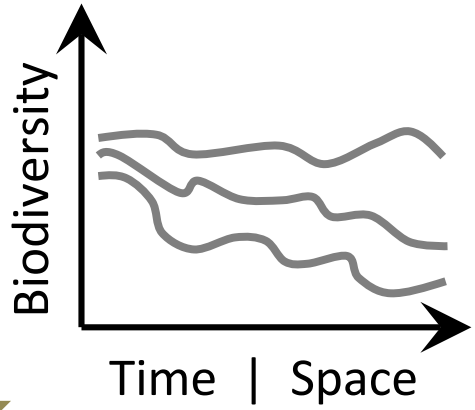
Intergovernmental Platform for Biodiversity & Ecosystem Services

Task Force on Knowledge & Data

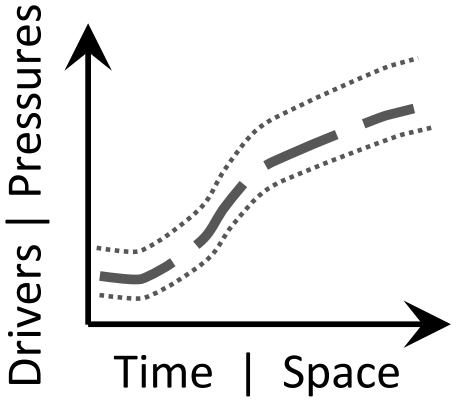
Convention on Biological Diversity

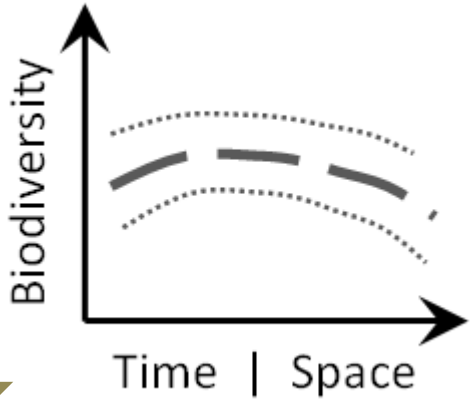
Data Monitoring





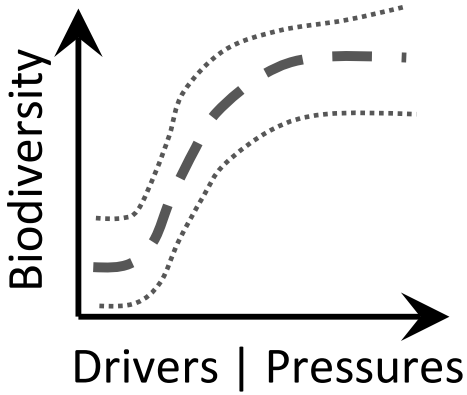
Indicators Metrics

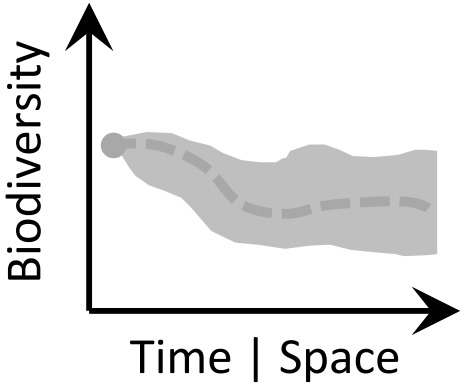




Response

Projection (Future)





From: IPBES Guide on Assessments (Walter Jetz, Belinda Reyers, Sheila Vergara, et al. 2015)

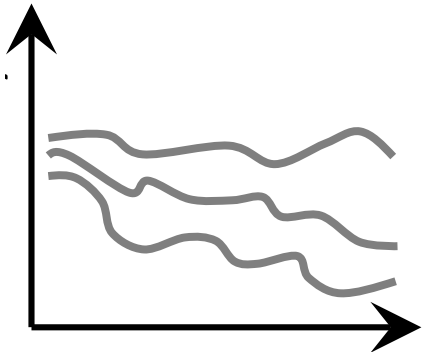
Data suited for monitoring is …

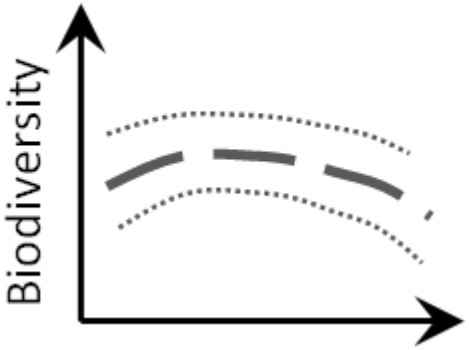
Not mobilized

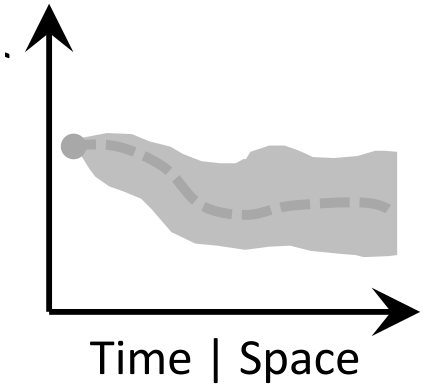
Spatially, temporally coarse

Limited to only certain attributes

Geographically, environmentally, taxonomically biased







Species distributions – knowledge limits

Point occurrences

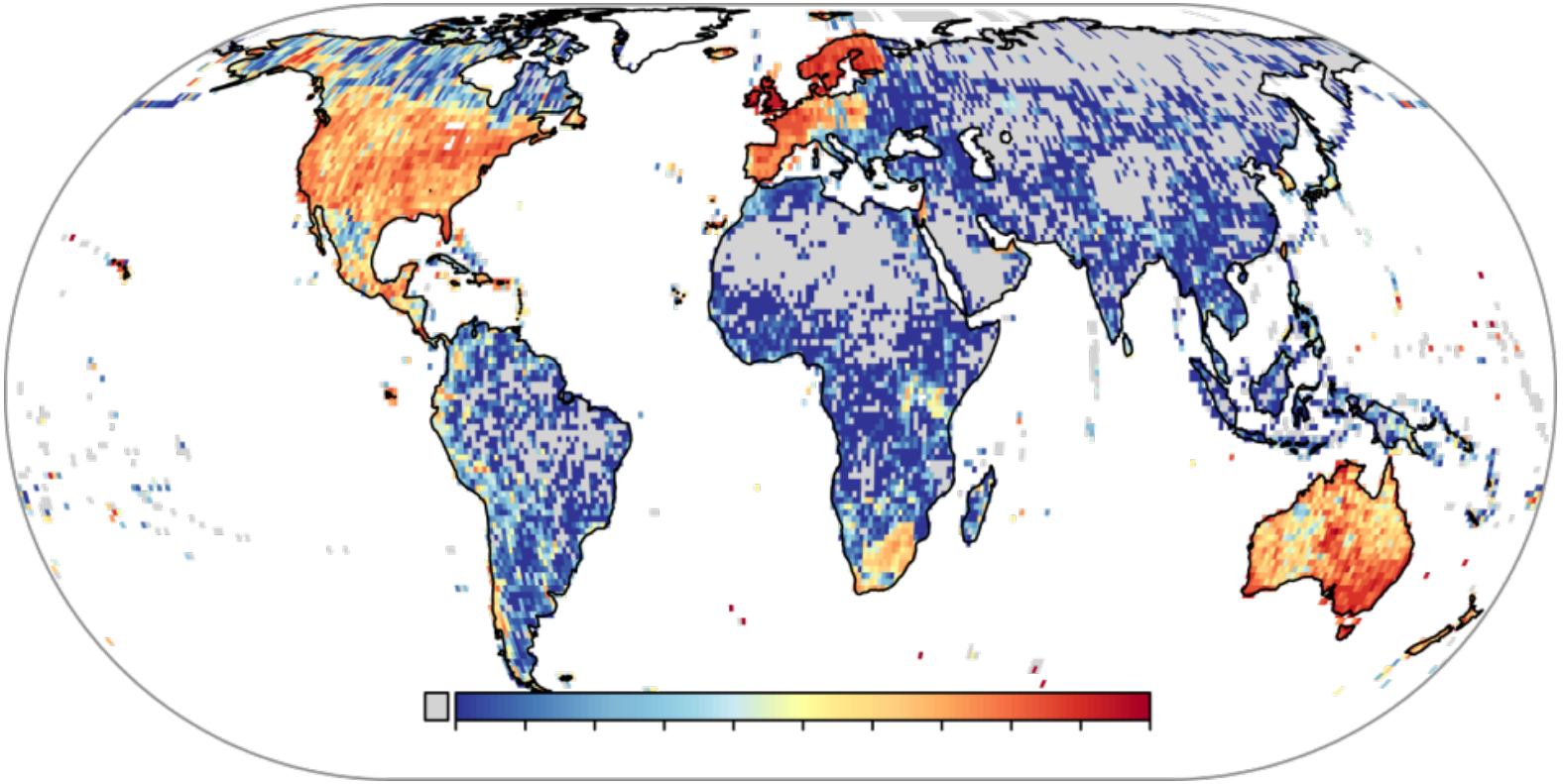
Harvest Mouse
(*Micromys minutus*)

Species distributions – knowledge limits

Point occurrences

Harvest Mouse
(*Micromys minutus*)

Sparse and biased:
Species Distributions



Inventory completeness (%)
Terrestrial vertebrates

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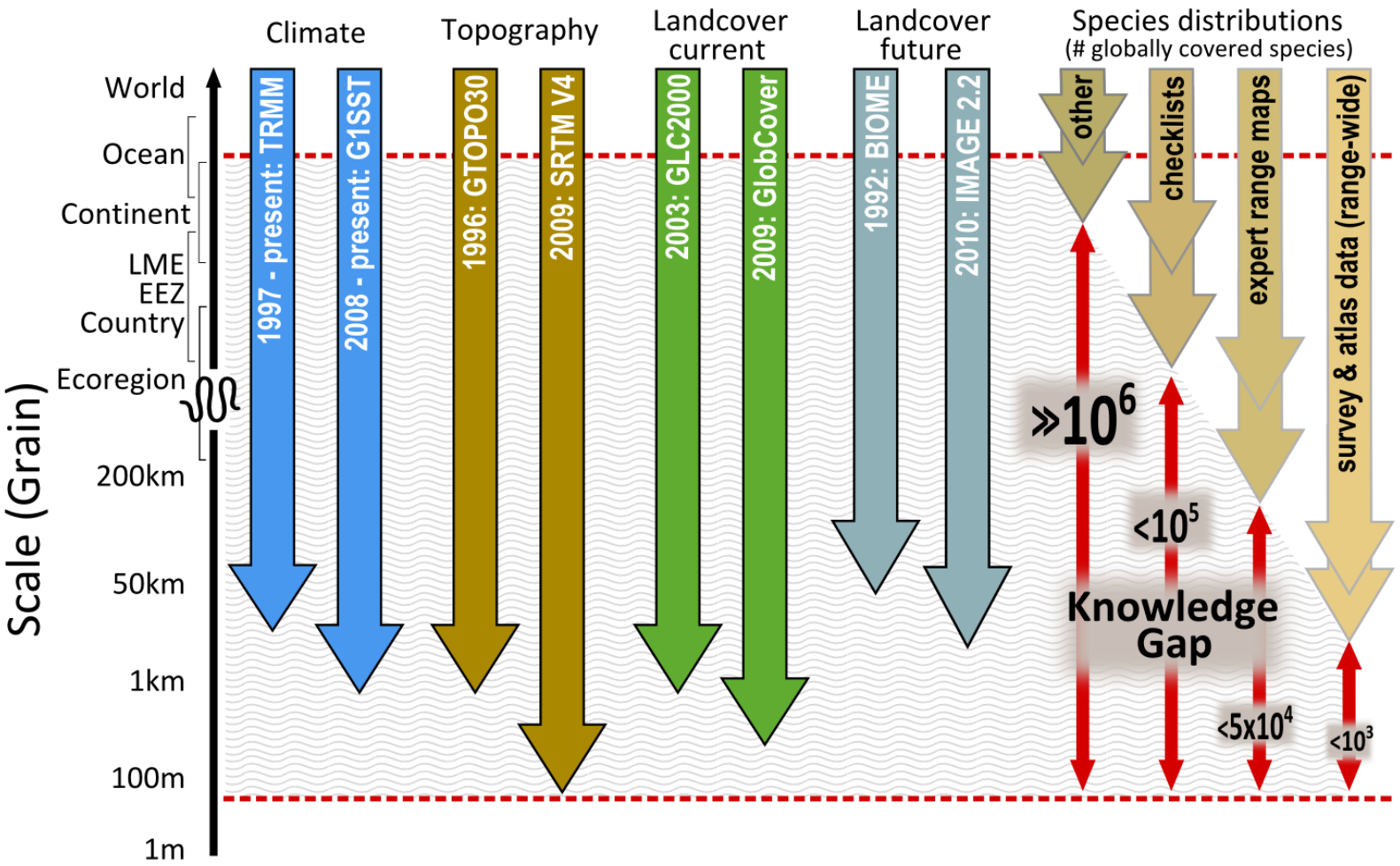
Meyer et al., 2015

Congo Peacock



Hurlbert and Jetz (2007)

Jetz, McPherson & Guralnick (2012)

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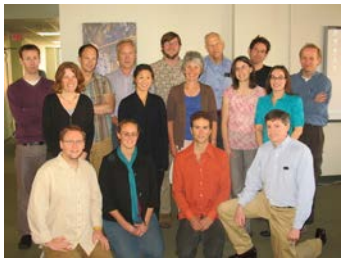
MAP OF LIFE

An online knowledgebase and workbench to dynamically integrate and use global biodiversity distribution information for science, assessment and monitoring



NSF

iPlant Collaborative™

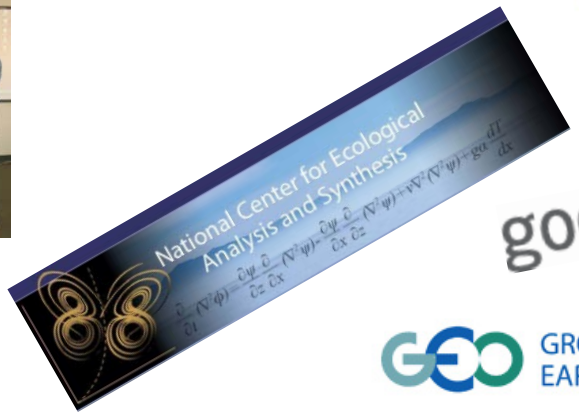
Yale

BiK F | Biodiversität und Klima Forschungszentrum
Biodiversity and Climate Research Centre

eol

SENCKENBERG
world of biodiversity

NASA



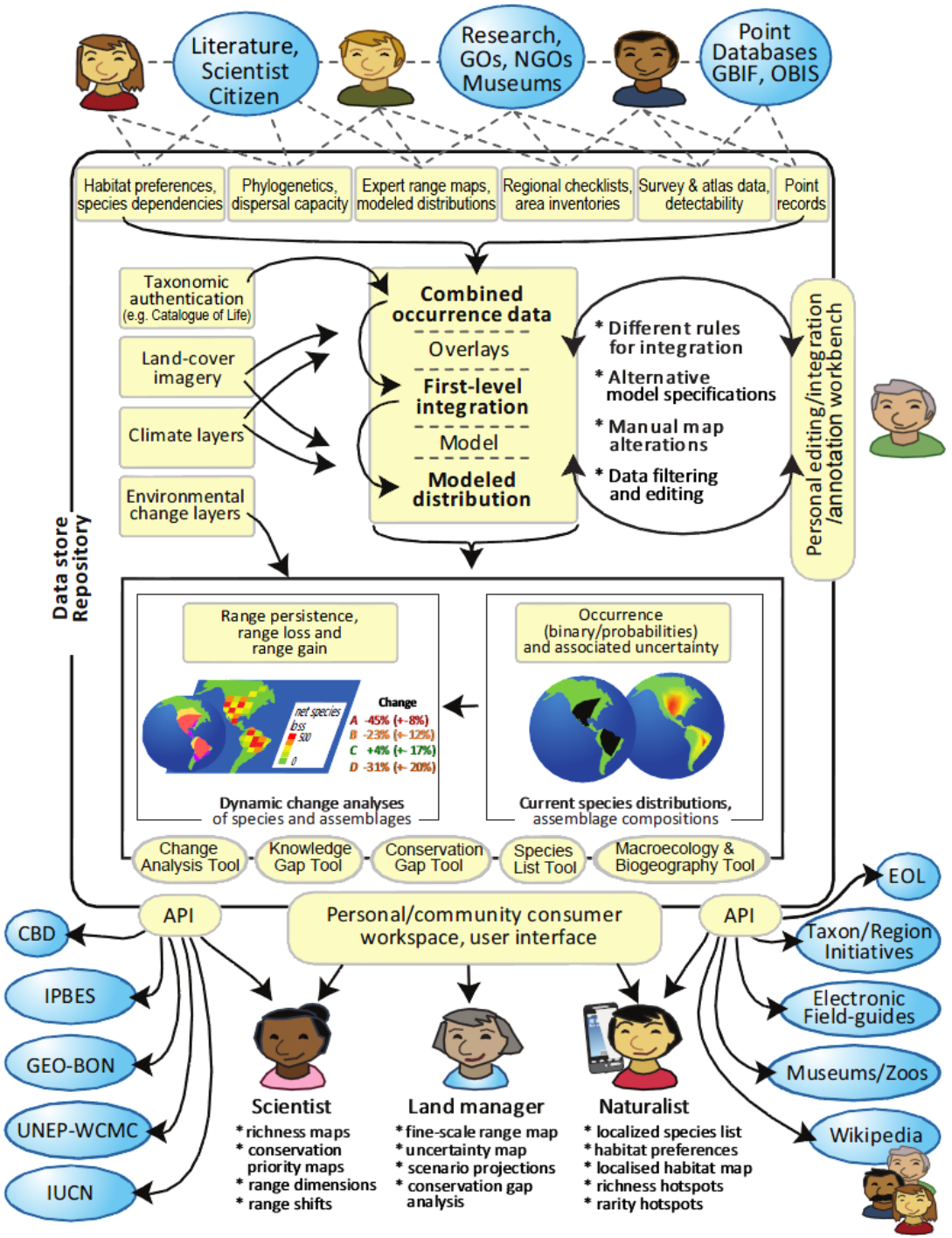
google.org

GEO GROUP ON EARTH OBSERVATIONS

Jetz et al. 2012, TREE

MOL
MAP OF LIFE

An online knowledgebase and workbench to dynamically integrate and use global biodiversity distribution information for science, assessment and monitoring



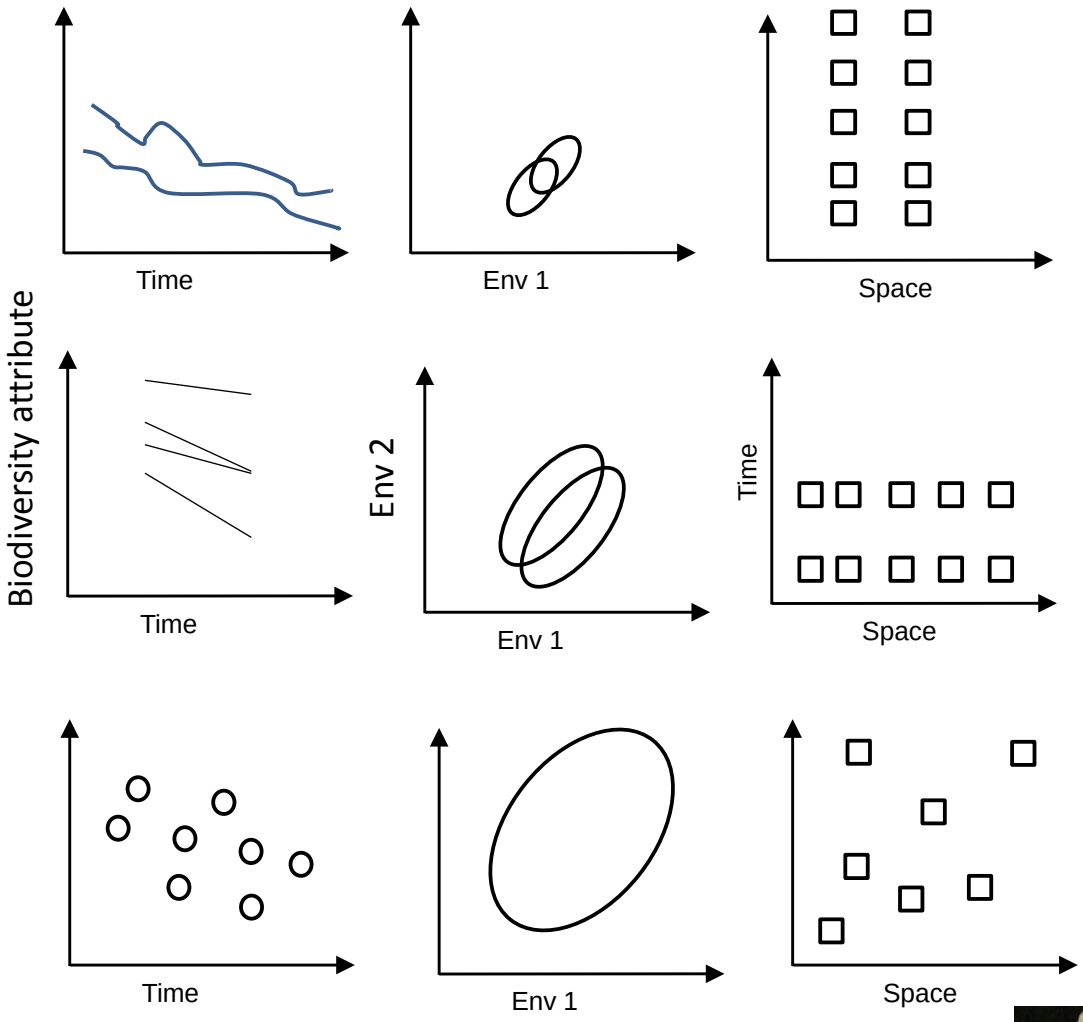
Jetz et al. 2012, TREE

Sample-based Biodiversity Monitoring

1) Few locations, many time points

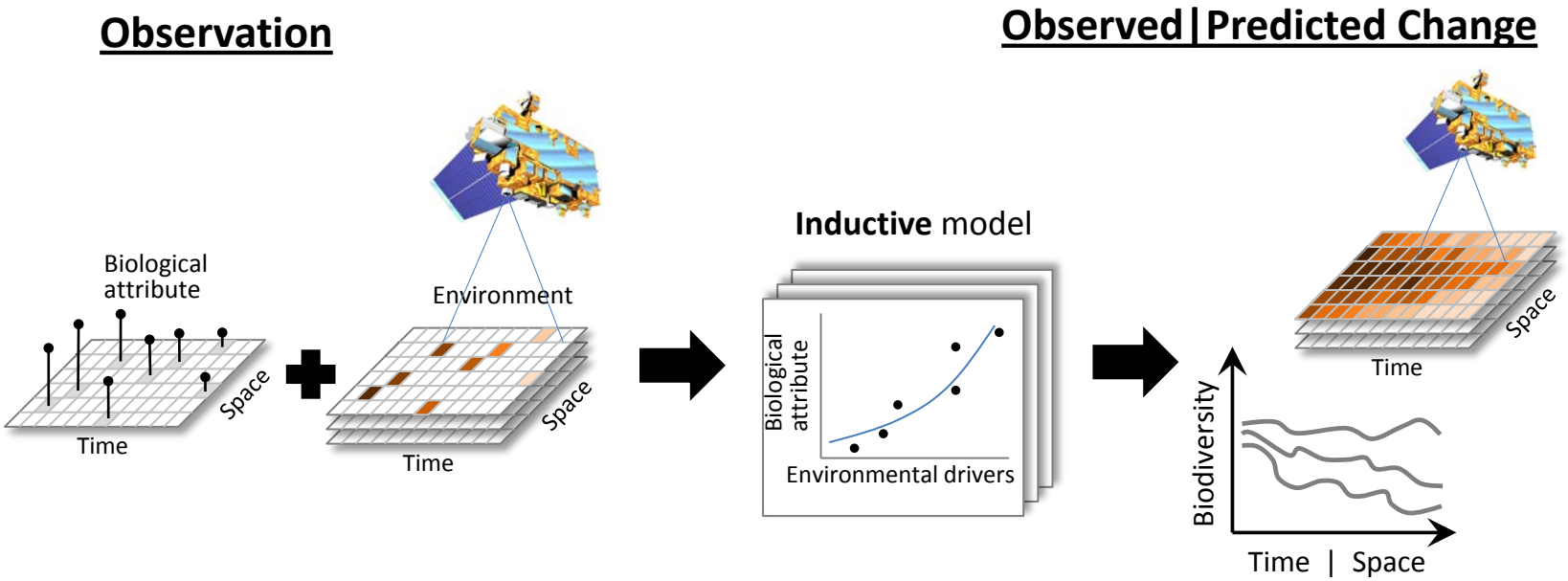
2) Many locations, few time points

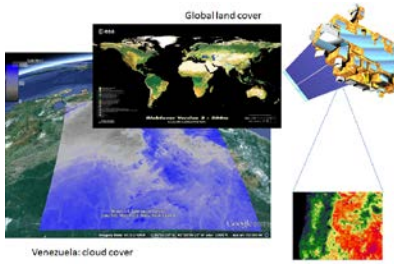
3) Spatiotemporally stratified (or opportunistic) samples



Jetz & Ferrier, in prep.

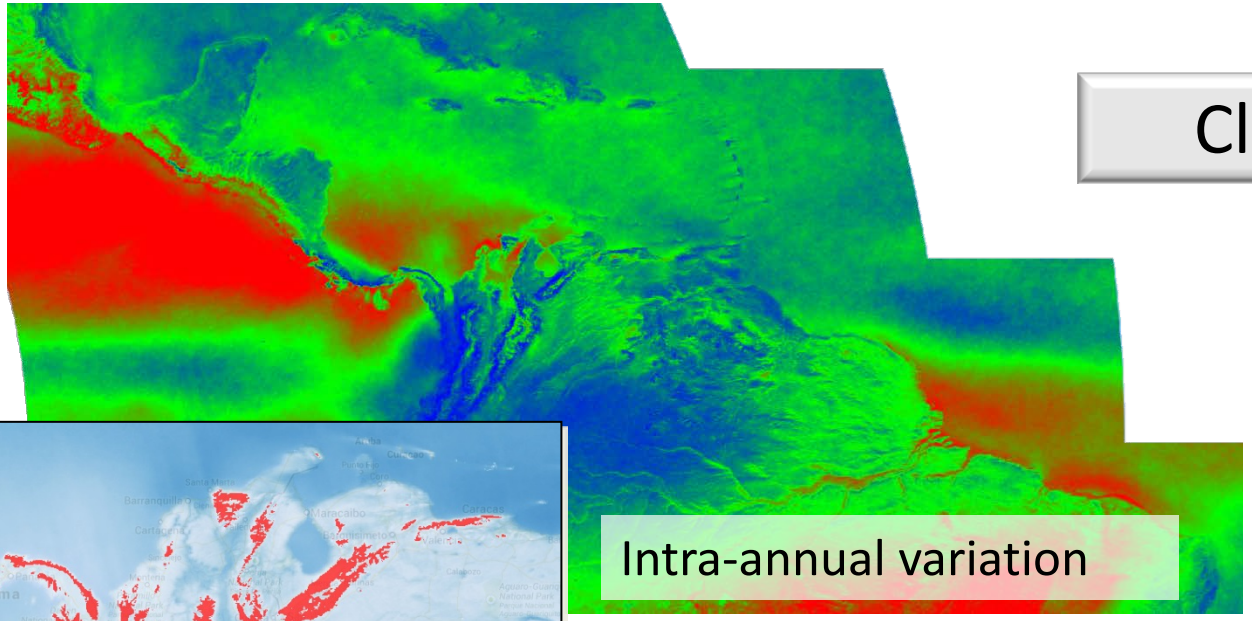
Sample-based Biodiversity Monitoring



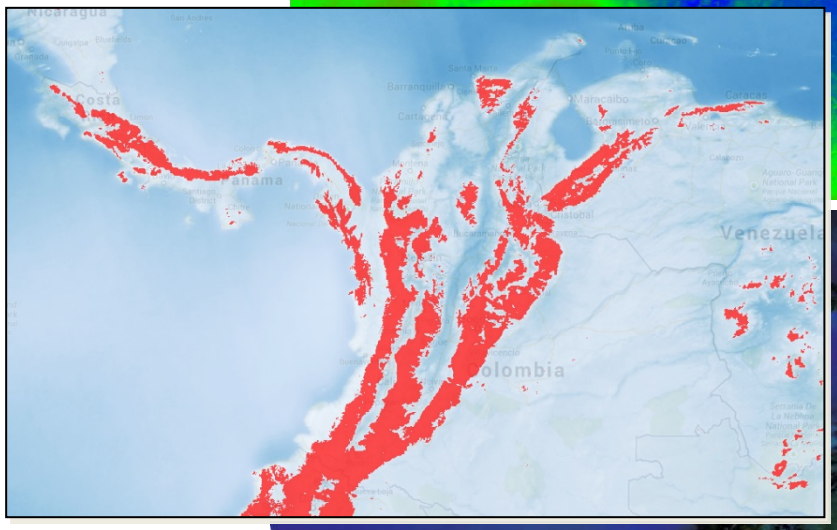


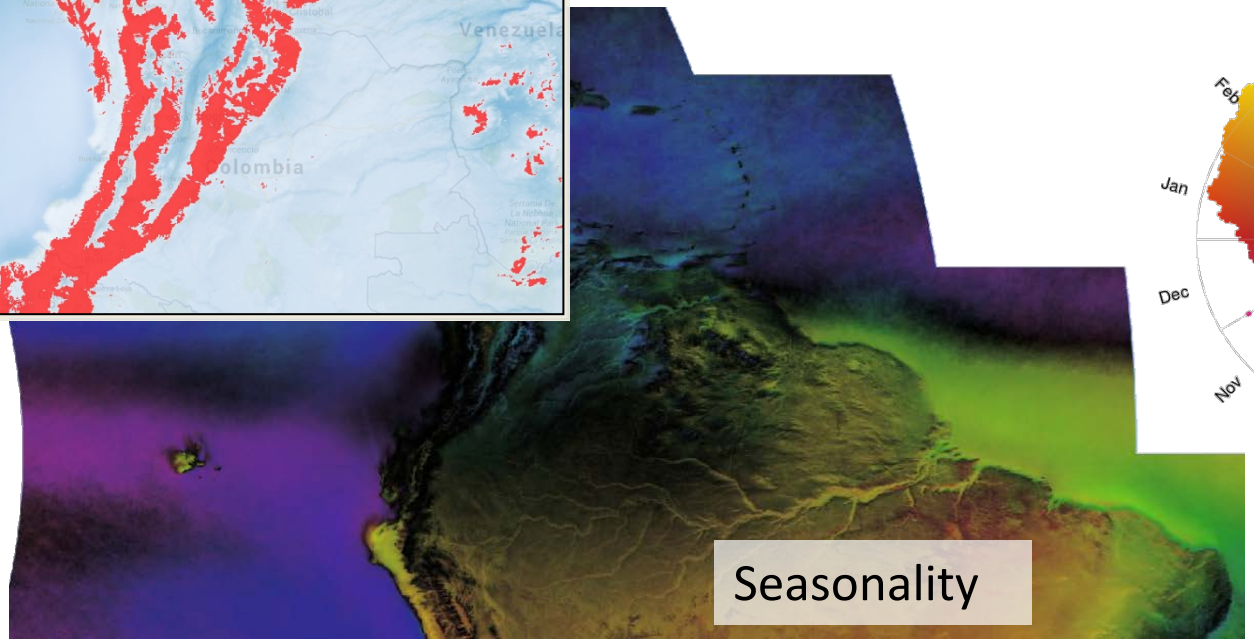
Climate: Spatial accuracy, structure

Clouds

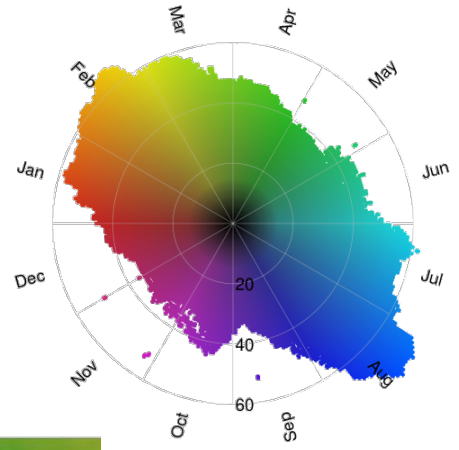


Intra-annual variation





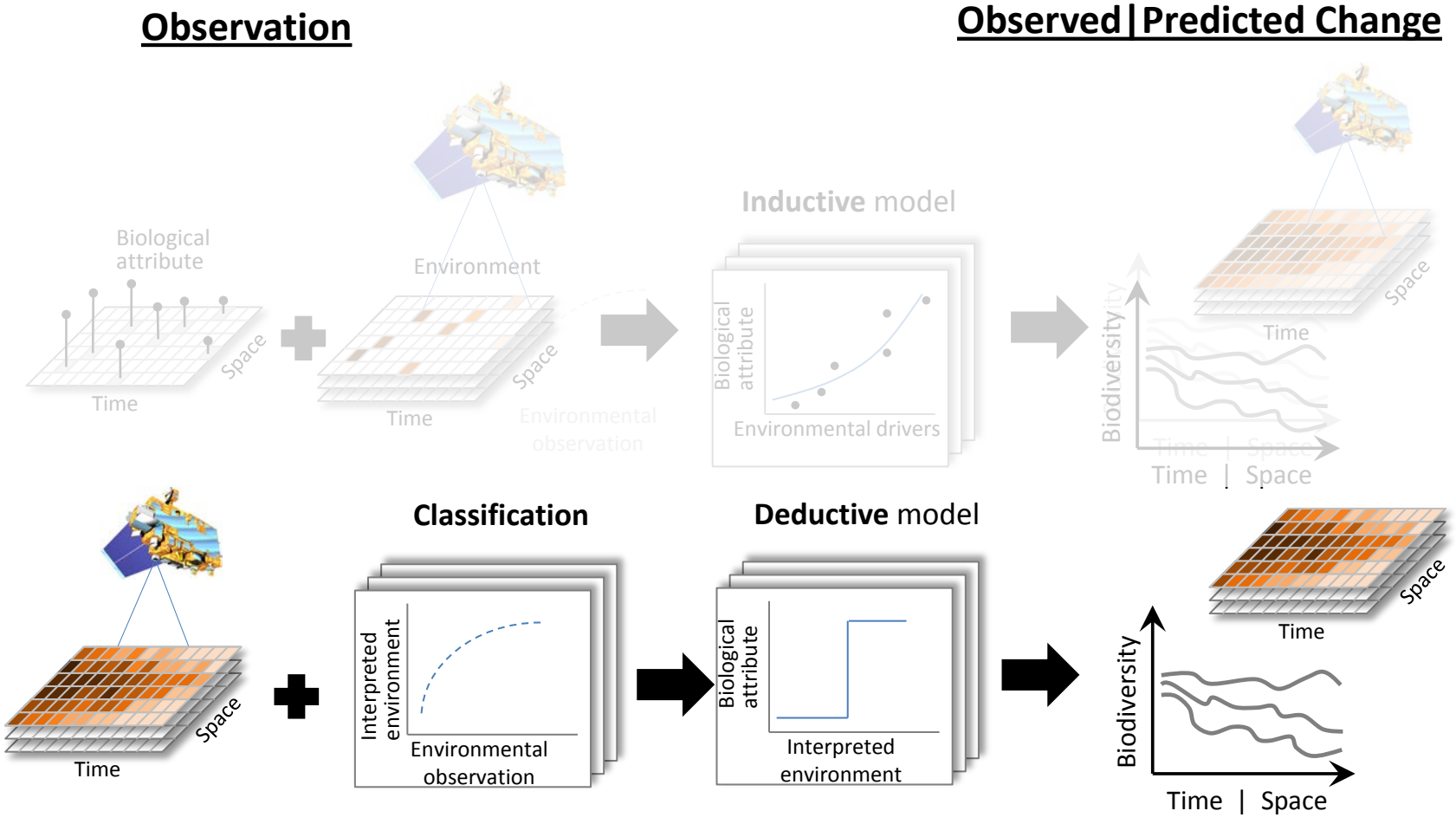
Seasonality



Based on MOD09

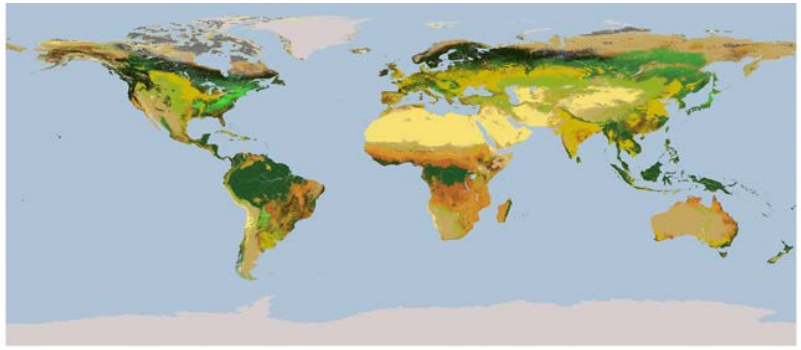
Wilson & Jetz (in revision)

Range-based Biodiversity Monitoring

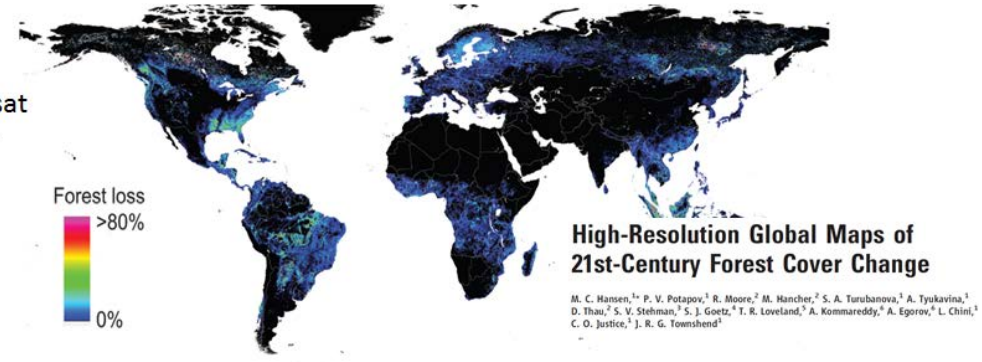


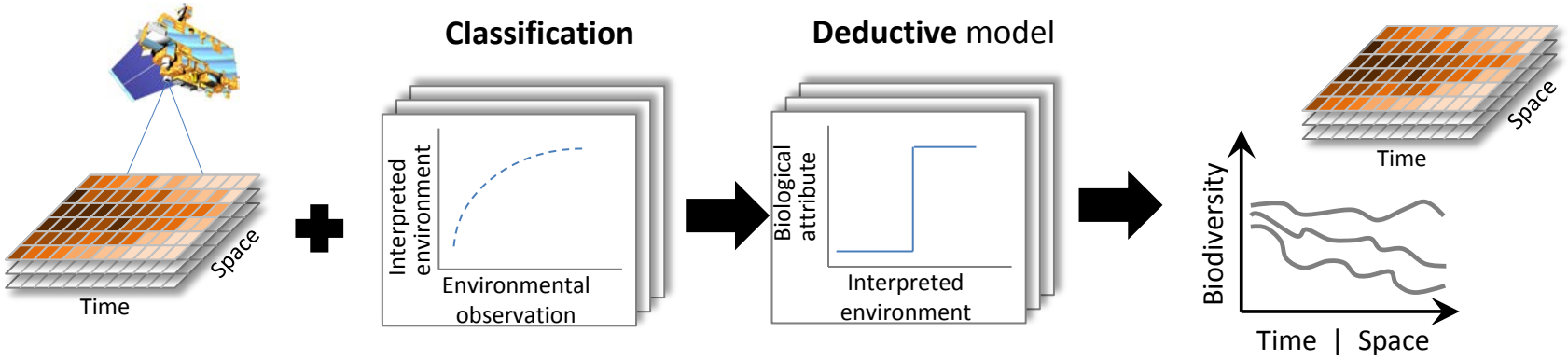
Range-based Biodiversity Monitoring

1km MODIS
Land cover



30m Landsat
Tree cover





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MAP OF LIFE

Species Info | Map a Species | Species Lists by Location | About MOL | News | Help

Overview | Habitat Distribution | Habitat Change | Reserve Coverage | Info

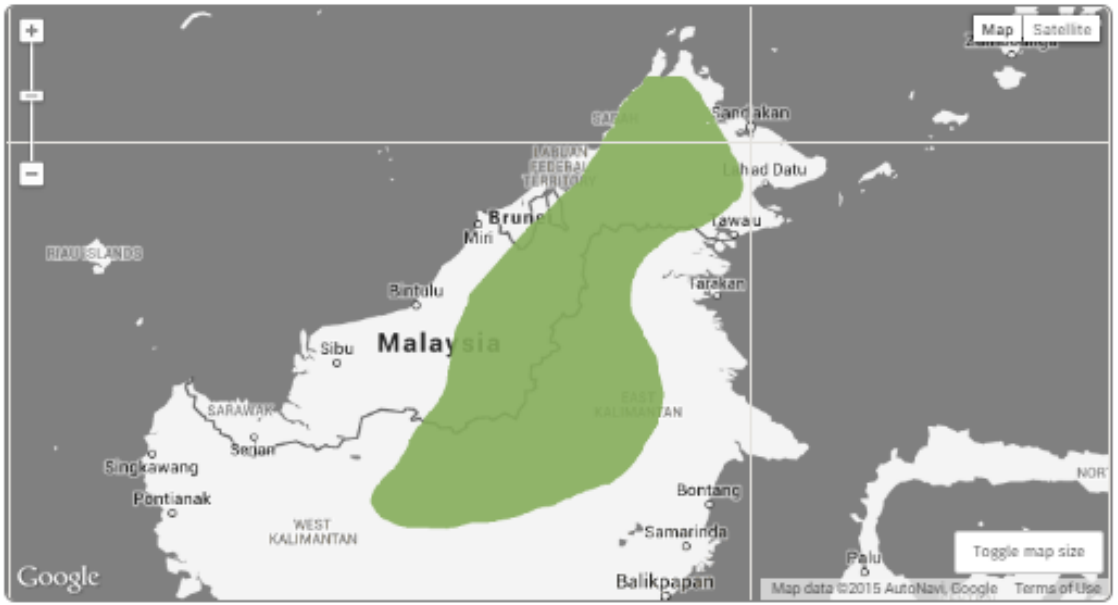
Select a species | Pick random | Birds

Bornean Stubtail
Urosphena whiteheadi

Learn more

Update

Records outside suitable range | Records in suitable range | Suitable range



Habitat Associations

ON | OFF

Elevation ON OFF
900 - 2600 meters

Tree cover: ON OFF
75 - 100%

Landcover ON OFF

Woodlands: Forests | Woody Savannas

Cultivated: Cropland | Cropland Mosaics

Species in Reserves

Pre-Release

Explore habitat suitability and reserve gaps for a set of species pre-released at the 2014 World Parks Congress

MOL
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Overview | Habitat Distribution | Habitat Change | Reserve Coverage | Info

Select a species | Pick random | Birds

Bornean Stubtail
Urosphena whiteheadi

Learn more

Update

Habitat Associations ON OFF

Elevation ON OFF
900 - 2600 meters

Tree cover: ON OFF
75 - 100%

Landcover ON OFF

Woodlands
Forests | Woody Savannas

Cultivated
Cropland | Cropland Mosaics

Shrublands
Open | Closed

Barren Urban
Barren | Urban

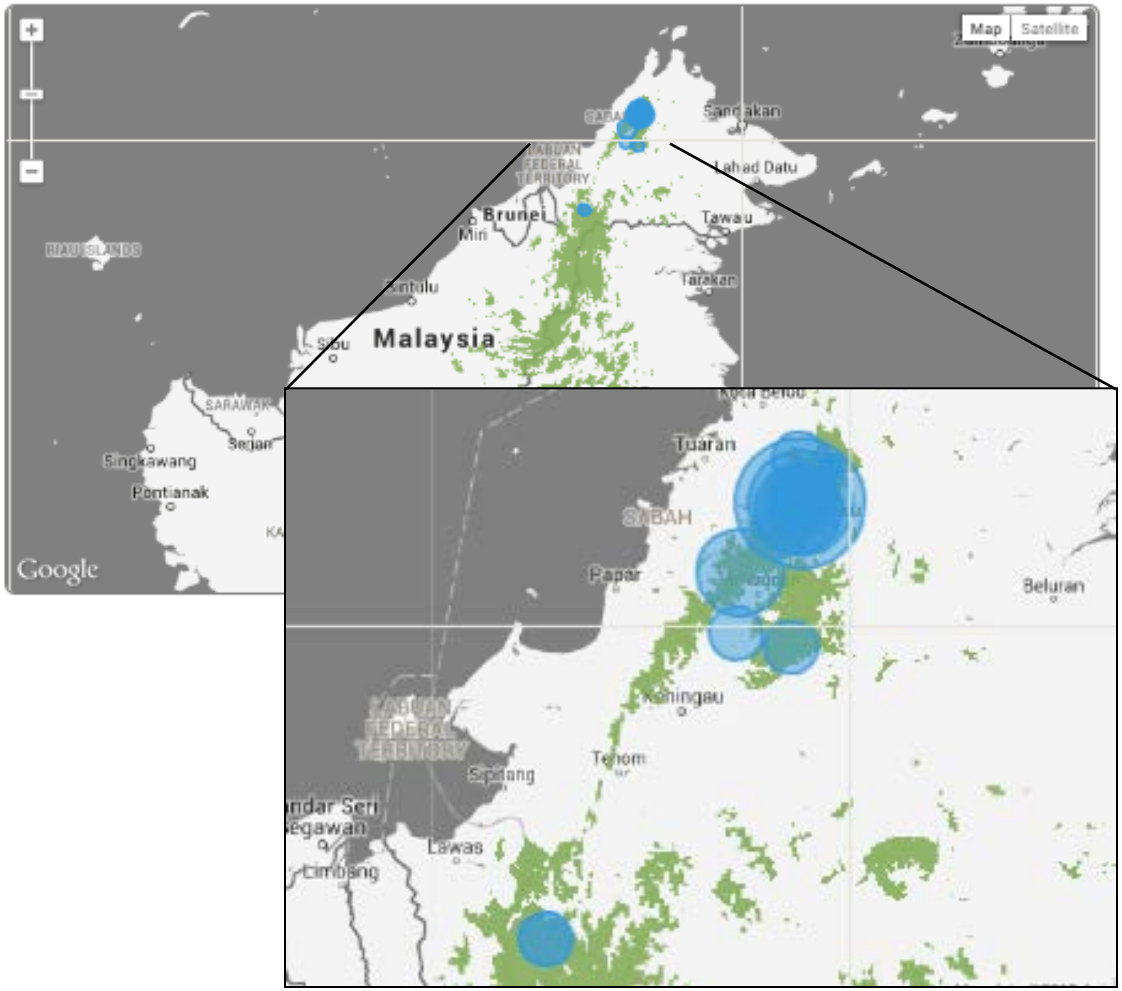
Herbaceous
Savannas | Grasslands

Water
Wetlands | Water Bodies

Geographic distribution

Range size	47,919 km² Suitable	218,276 km² Total

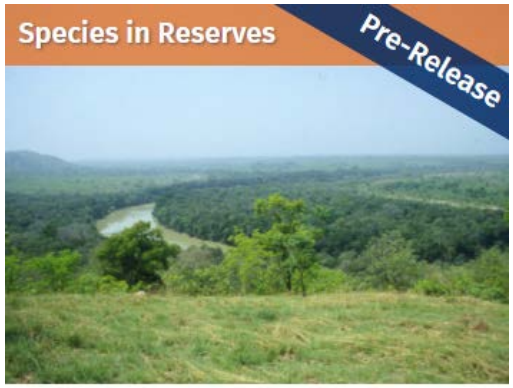
Records outside suitable range | Records in suitable range | Suitable range



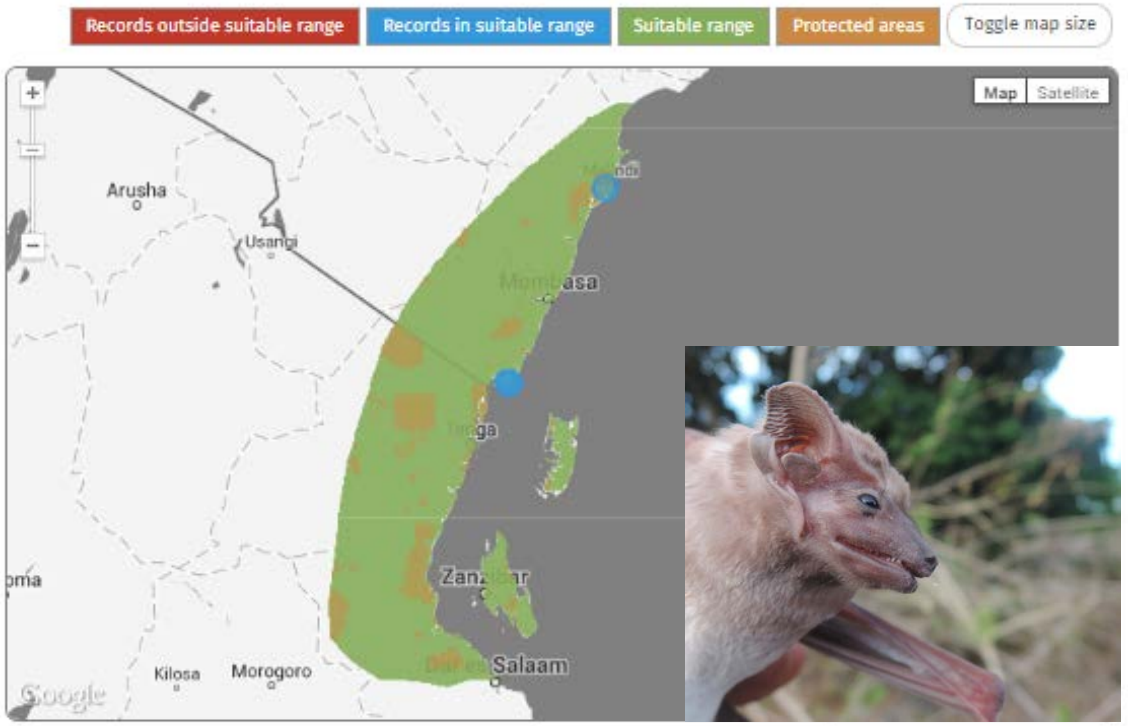
Hildegarde's Tomb Bat

Taphozous hildegardea

Vulnerable



Explore habitat suitability and reserve gaps for a set of species



Geographic distribution

Range size	44,769 km² Total

Protected area target

Maximum Protected Area Coverage

Suitable habitat ON OFF

	Any size	Larger than 10 km²
Strict Parks	5	3
All parks	121	52
All parks area	5,356 km²	5,121 km²
Target area	17,009.1 km²	
Target realized	32.1%	

Minimum reserve size:

Hildegarde's Tomb Bat

Taphozous hildegardea

Vulnerable

Habitat Associations

Elevation ON OFF
0 - 8000 meters

Tree cover: ON OFF
75 - 100%

Landcover ON OFF

Woodlands: Forests | Woody Savannas

Cultivated: Cropland | Cropland Mosaics

Shrublands: Open | Closed

Barren Urban: Barren | Urban

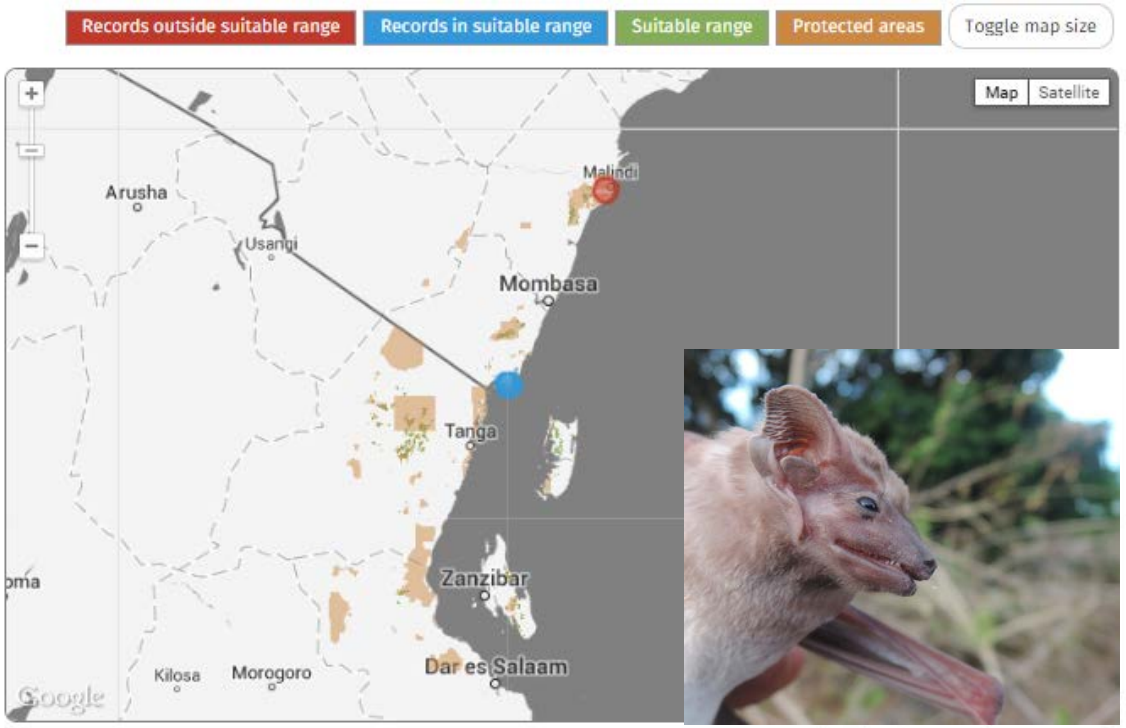
Herbaceous: Savannas | Grasslands

Water: Wetlands | Water Bodies

Geographic distribution

Range size	669 km² Suitable	44,769 km² Total
Map improvement	83 % (43 % - 95 %)	4 Validation points

Suitable range suggests different protected area target achievement!



Maximum Protected Area Coverage

Suitable habitat ON OFF

	Any size	Larger than 10 km²
Strict Parks	3	2
All parks	43	13
All parks area	426 km²	328 km²
Target area	669.0 km²	
Target realized	63.6 %	

Minimum reserve size:

Hildegarde's Tomb Bat

Taphozous hildegardea

Vulnerable

Habitat Associations

Elevation ON OFF
0 - 8000 meters

Tree cover: ON OFF
50 - 100%

Landcover ON OFF

Woodlands: Forests | Woody Savannas

Cultivated: Cropland | Cropland Mosaics

Shrublands: Open | Closed

Barren Urban: Barren | Urban

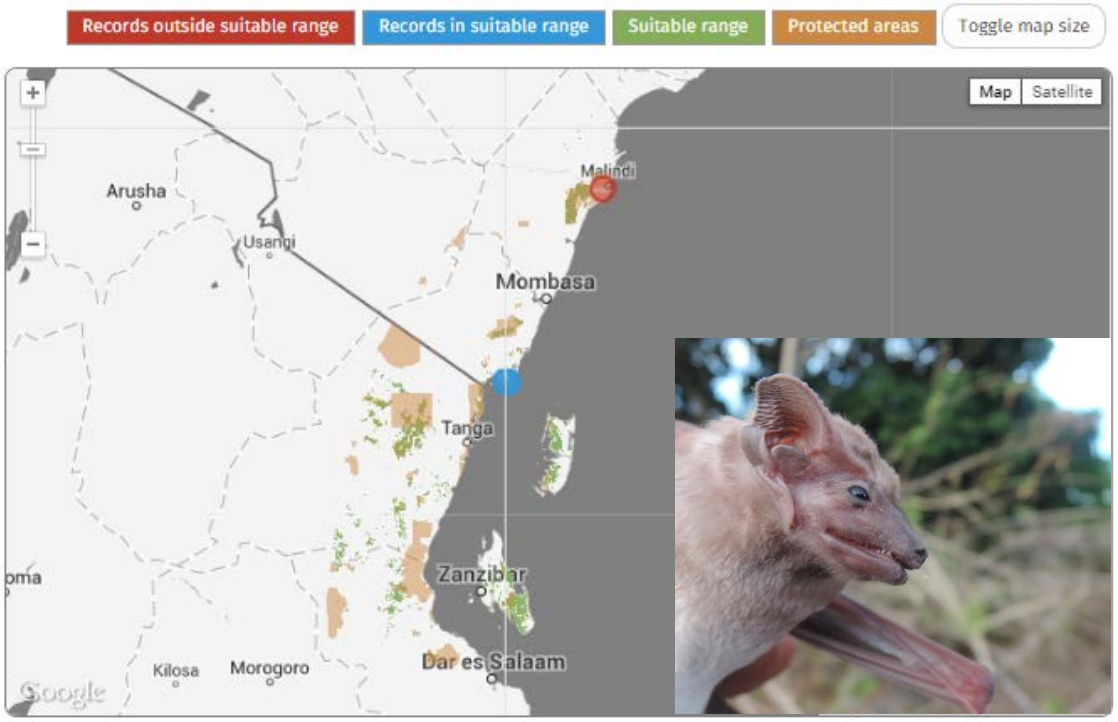
Herbaceous: Savannas | Grasslands

Water: Wetlands | Water Bodies

Geographic distribution

Range size	2,877 km² Suitable	44,769 km² Total
Map improvement	74 % (34 % - 86 %)	4 Validation points

Suitable range suggests different protected area target achievement!



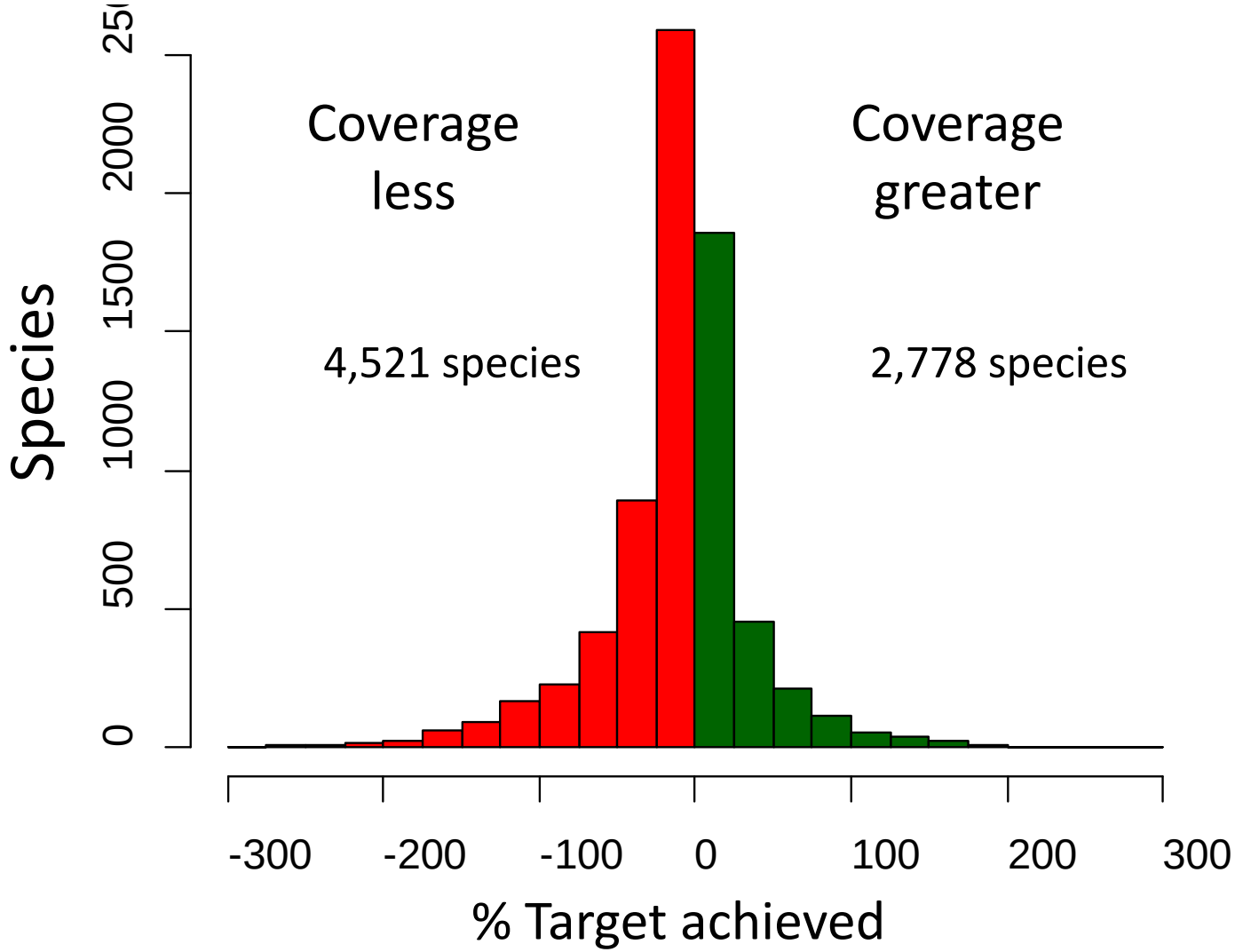
Maximum Protected Area Coverage

Suitable habitat ON OFF

	Any size	Larger than 10 km²
Strict Parks	3	2
All parks	62	24
All parks area	1,061 km²	921 km²
Target area	2,380.6 km²	
Target realized	44.6 %	

Minimum reserve size:

Accounting for habitat suitability can flip assumed protection achievement



Jetz et al. MS

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Overview | Habitat Distribution | Habitat Change | Reserve Coverage | Info

Taphozous hildegardeae | Pick random | Mammals

Hildegarde's
Tomb Bat
Taphozous hildegardeae

Learn more | Update

Habitat Associations ON OFF

Elevation ON OFF
0 - 8000 meters

Tree cover: ON OFF
75 - 100%

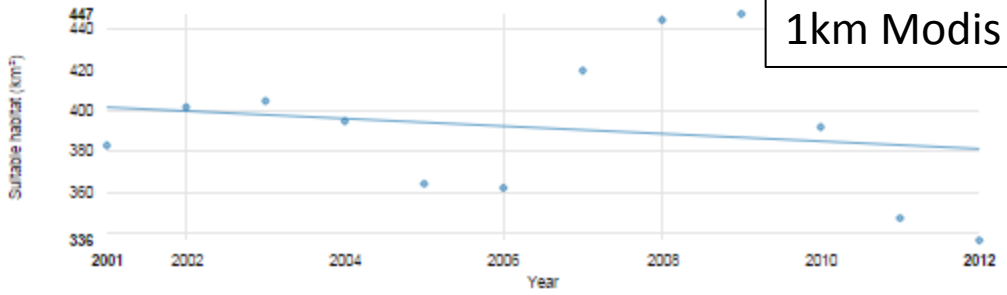
Landcover ON OFF

Woodlands: Forests | Woody Savannas
Cultivated: Cropland | Cropland Mosaics
Shrublands: Open | Closed
Barren Urban: Barren | Urban
Herbaceous: Savannas | Grasslands
Water: Wetlands | Water Bodies

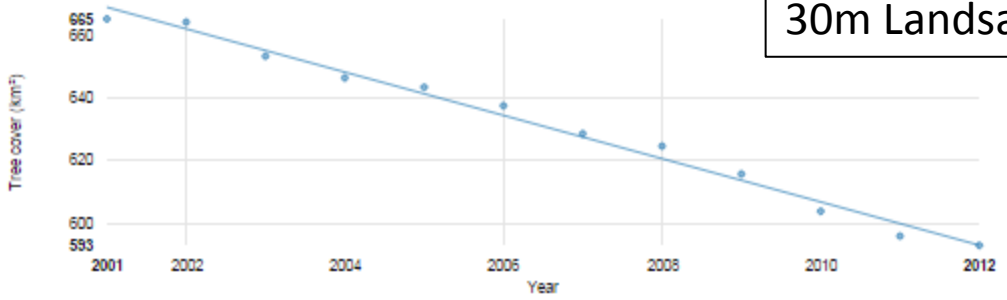
Suitable habitat change	-5%
Human population change	22%
Tree cover change	-11%

Toggle charts: Suitable Habitat | Tree Cover | Human Population

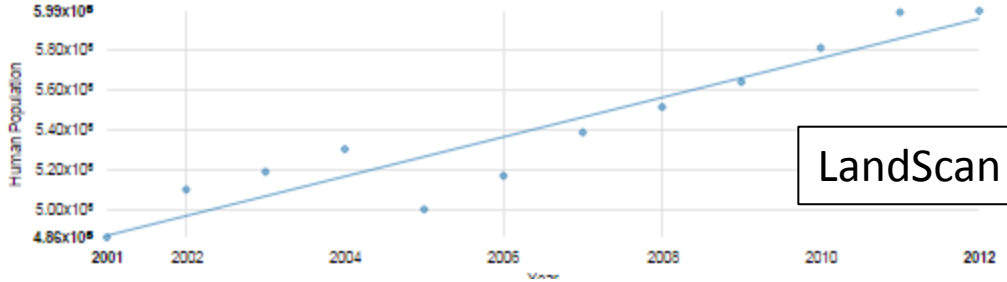
1km Modis



30m Landsat



LandScan



Promise of remote sensing

Promise of citizen science

MOL MAP OF LIFE

Species Info | Map a Species | Species Lists by Location | About MOL | News | Help

Description | Range Map | Habitat Analysis | Protection Status

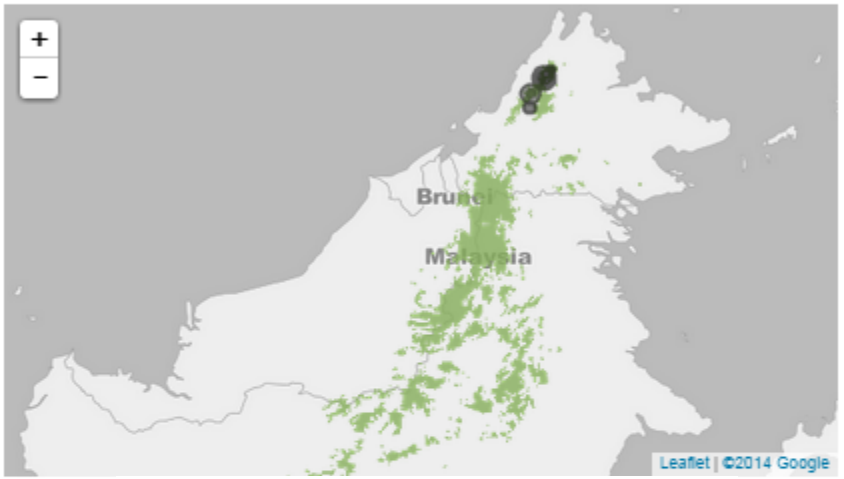
Bornean Stubtail

Urosphena whiteheadi

Class: Aves

Order: Passeriformes

Urosphena whiteheadi | Pick random | Birds



Use the environmental filters below to refine the species distribution.

Elevation: ON OFF 900 - 2600 meters

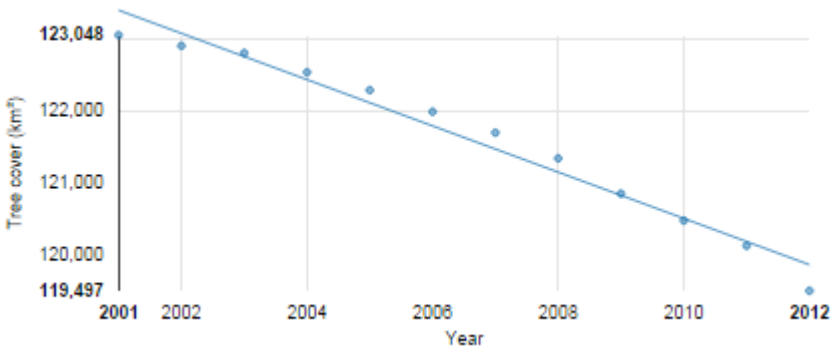
Tree cover: ON OFF 60 - 100%

ON OFF Select habitat types

Forests	Cropland
Closed Shrublands	Urban and Built-up
Open Shrublands	Cropland/Natural Vegetation Mosaics
Woody Savannas	Snow and Ice Barren
Savannas	Barren
Grasslands	Water Bodies
Permanent Wetlands	

Validation points in refined range 85

Total validation points available 86



Expert range size 124,806 km²

Refined range size 41,418 km²

Global biodiversity monitoring

Observation

Observed|Predicted Change

Inductive model

I.

II.

Time | Space

III.

Classification

Deductive model

Thanks!

Time | Space