Asia Regional Engagement Meeting and Symposium on Open Science and Data Use

Data Use for International Platforms for Policies

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Co-chair, Asia-Pacific Observation Network (APBON)

22-24 November 2022
Chulalongkorn University, Bangkok

KU

APBON Asia Pacific Biodiversity Observation Network

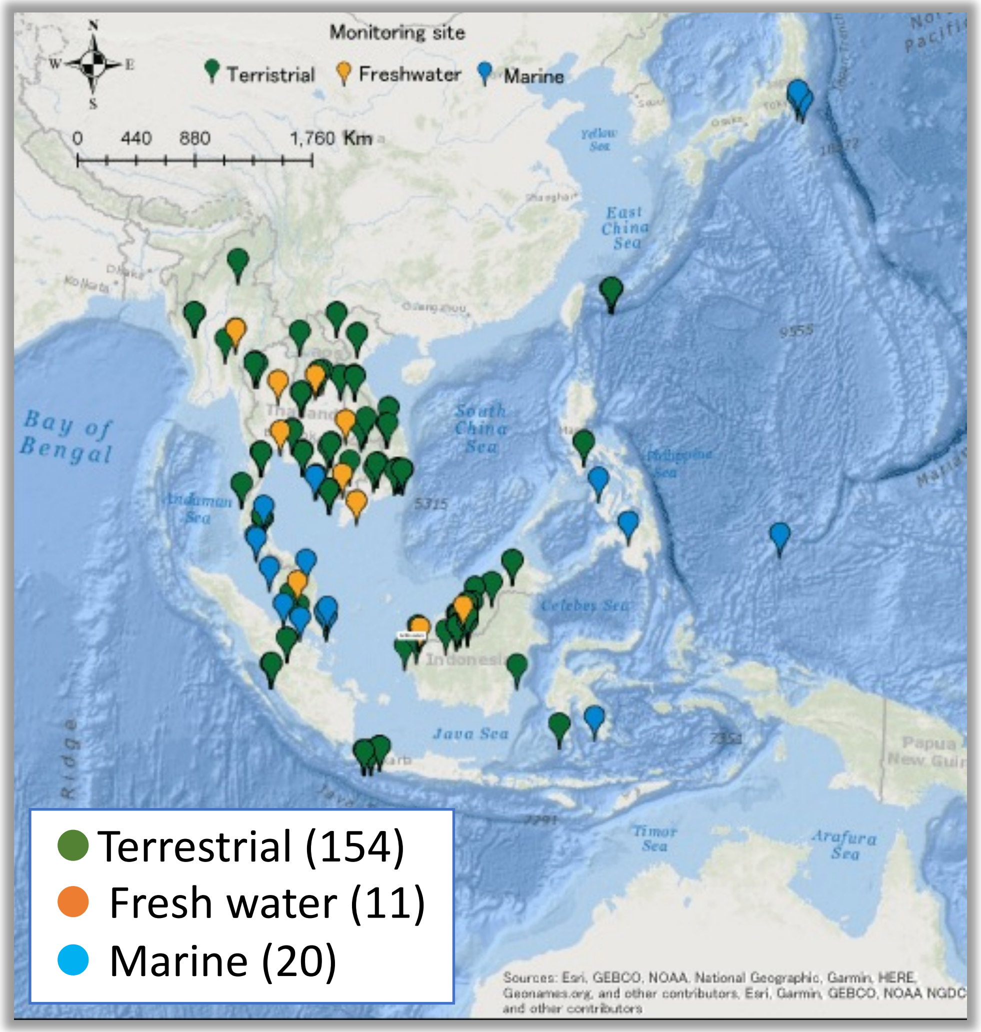
http://www.esabii.biodic.go.jp/ap-bon/index.html

What is APBON?

supported by the Ministry of the Environment Japan

APBON (est. in 2009) is **a network for observations and assessment of biodiversity, and a platform for science-policy engagement**.

Mission: to increase exchange of knowledge and know-how between institutions and researchers concerning biodiversity science research in the Asia-Pacific (AP) region and thereby contribute to evidence-based decision-making and policy-making.



Hiroyuki Muraoka
Gifu University, National Institute for Environmental Studies

Runi Sylvester Pungga
International Affairs Division, Forest Depa

Yongyut Trisurat
Kasetsart University

Networking and facilitating

Assessments
- IPBES regional assessment
- ASEAN Biodiversity Outlook
- National Biodiversity Outlooks

Biodiversity data platform
ABCDNet, GBIF, OBIS, IUCN

Research & funds
Future Earth

Monitoring networks
ILTER-EAP, GOOS, **ForestGEO**, **KBAs**

APBON highlights

Monitoring biodiversity

- Mapping tropical tree species and forest cover change
- Sudden red tine in Hokkaido (2021)
- Mapping protected areas in the Hindu Kush Himalaya
- Evaluating impacts of hydropower dams and climate change on fish species diversity in the Mekong
- Investigating African swine fever infection in wild boars in Malaysia (2022)

Conservation

- OECMs/KBAs
- Improved community fishery governance in Cambodia
- Mapping "Ecologically and Biologically Significant Areas" in the oceans

Mobilizing biodiversity data

"APBON Books" Ed. Yahara. (Springer, 2012, 2014, 2016)

APBON development and networking

Year	GEO/GEOSS Symposia	GEO BON	AP BON Meetings	National BONs	CBD COPs	IPBES
2009	3rd GEOSS AP (Kyoto, February)		1st AP BON (July, Japan) 2nd AP BON (December, Japan)	Japan BON (May)		
2010	4th GEOSS AP (a session, Bali, March)	GEO BON Meeting (February, USA)	3rd AP BON (CBD COP10 Preconference, March, Japan)		COP10 (Japan, Side-event)	
2011			4th AP BON (December, Japan)			
2012	5th GEOSS AP (Tokyo, April)	GEO BON Meeting (December, USA)	WCC of IUCN (September, Korea)	Korea BON, Nepal BON, Bangladesh BON	COP11 (India, Side-event)	
2013	6th GEOSS AP (Ahmedabad, February)		5th AP BON (November, ACB, Philippines)	Philippines BON		Plenary-1
2014	7th GEOSS AP (Tokyo, May)	IC and AB (June, Germany)	6th AP BON (October, NIER Korea)		COP12 (Korea, Side-event)	Plenary-2
2015	8th GEOSS AP (Beijing, September)	IC and AB (June, Germany)		Sino BON Indonesia BON		Plenary-3
2016	2016-2025 A New GEO Strategy Plan Initiated	All-Hands Meeting (July, Germany)	7th AP BON (ACB, Thailand) 8th AP BON (Taipei, Taiwan)	WCC of IUCN (September, USA)	COP13 (Mexico)	Plenary-4
2017	9th GEOSS AP (Tokyo, January), 10th GEOSS AP (Hanoi, September)	IC and AB (July, Germany)				Plenary-5
2018	11th GEOSS AP (October, Kyoto)	All-Hands Meeting (July, Beijing)	9th AP BON (Bangkok, February), 10th AP BON (Kuching, July)		COP14 (Egypt)	Plenary-6
2019	12th AOGEO (November, Canberra)		11th AP BON (KL, Malaysia)			Plenary-7
2020		Open Science Conference & All Hands Meeting			COP15 (China) (postponed)	Plenary-8 (tbc)
2021	13th AOGEO (March, Online) 4th AOGEO WS (July) 14th AOGEO (Nov. Online)		12th APBON (Online) 13th APBON (Online)		COP15 (China)	Plenary-8 (June)

14th APBON in Japan 2023

Participants from…
Japan, Thailand, Malaysia, China, Republic of Korea, Indonesia, Nepal, Cambodia, Myanmar, Vietnam, Philippines, USA, ASEAN Centre for Biodiversity, ICIMOD

APBON Work Plan to 2030 and Plan for 2023-2025

Strengthening observations and proceeding data sharing

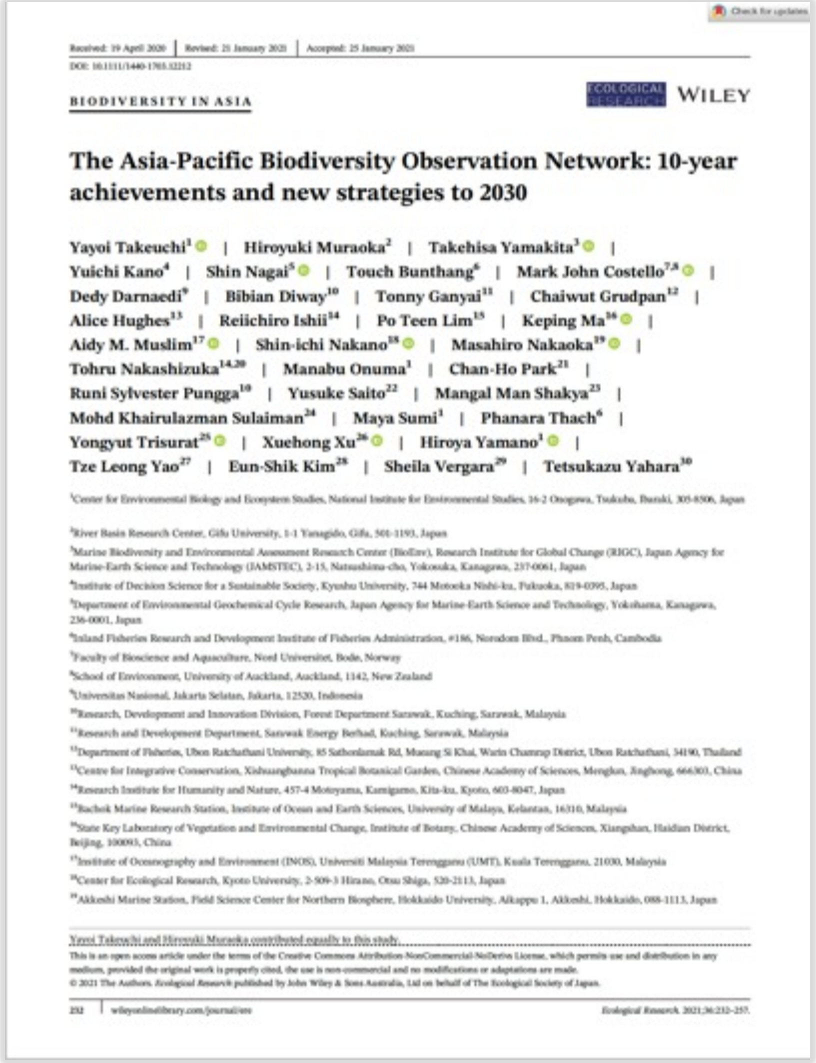
- **Continuing observations of biodiversity and ecosystems** for assessing status and changes under environmental changes
  - **Phenology and carbon** cycle as the interface of **biodiversity and climate change** issues
  - **eDNA and high throughput DNA sequencing** for species identification and monitoring
- Scaling-up of biodiversity observation is key
  - **High resolution satellite data** are key for biodiversity indicators and metrics
  - Verification and implementation of **Essential Biodiversity Variables** are key for continuous observations
  - **Master site concept** to enable multi-disciplinary and multi-platform observations.

Stakeholder engagement and capacity development

- **Governments**, **private sectors**, **citizens**, **youth networks** from the region and beyond APBON is expected
- **Development of networks within countries (→ National BONs)**, regional and global.
- Encouragement and support the education / training / meeting / workshop opportunity
- **Translating and digitizing data/knowledge in local language to English** for rescuing historical local data, and comprehensive, fair assessment and conservation of biodiversity and Nature's contribution to people (e.g., resources, cultures, etc.) in the Asia-Oceania region

Contribution to national, regional and global efforts

- **Sustainable Development Goals** (SDGs6, 12, 13, 14, 15)
- **CBD Post-2020 Global Biodiversity Framework**
- Taskforce on Nature-related Financial Disclosures (**TNFD**)
- **Nature-based Solution**s for climate change and biodiversity conservation



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BIODIVERSITY IN ASIA

ECOLOGICAL RESEARCH WILEY

The Asia-Pacific Biodiversity Observation Network: 10-year achievements and new strategies to 2030

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Yayoi Takeuchi and Hiroyuki Muraoka contributed equally to this study.

232 | wileyonlinelibrary.com/journal/ere *Ecological Research*. 2021;36:232–257.

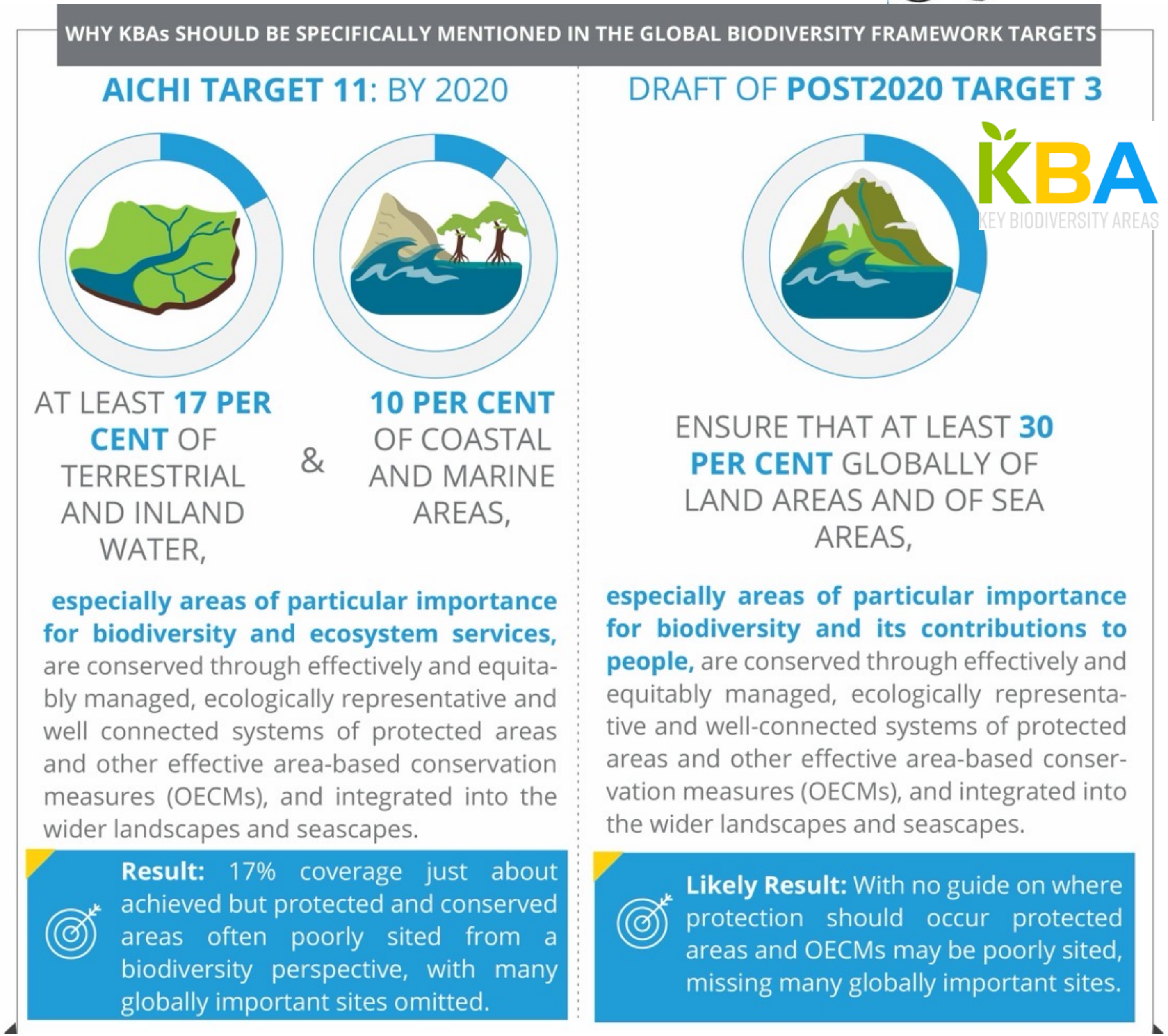
COP 15 in Montreal, Canada 5-17 Dec 2022

Convention on Biological Diversity

APBON Asia Pacific Biodiversity Observation Network

CBD Achi Target 11

- Yes 17% PAs achieved (when OECMs are included)
- BUT
  - Protected areas biased toward locations that were remote and less suitable for biodiversity
  - A percentage target on its own won't halt species extinction or loss of ecosystems and sites of ecological integrity



Examples: data use for conservation policies


Author's personal copy

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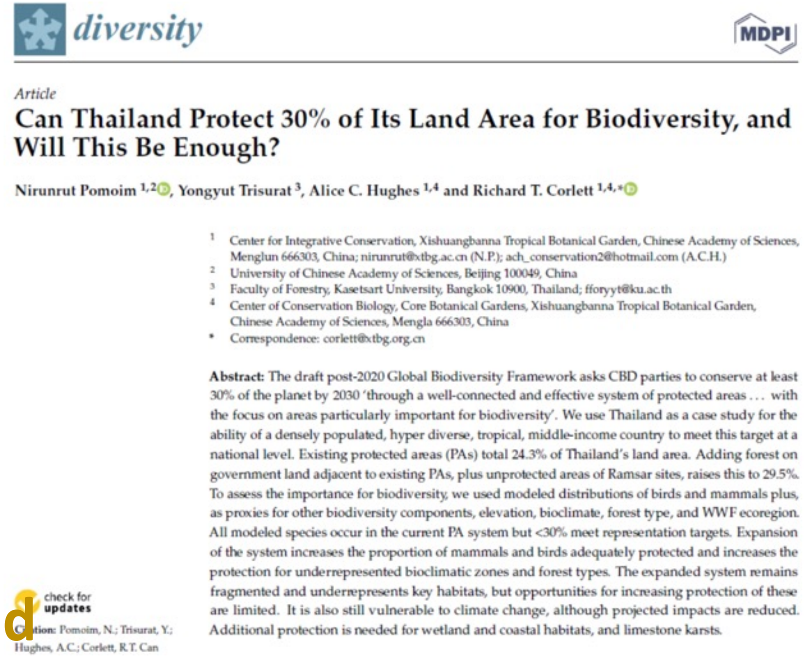
journal homepage: www.elsevier.de/jnc

Using species distribution modeling to set management priorities for mammals in northern Thailand

Yongyut Trisurat[a,b,*], Naris Bhumpakphan[b], David H. Reed[c], Budsabong Kanchanasaka[d]

1) Local – northern Thailand

2) National – Thailand


diversity

MDPI

Article

Can Thailand Protect 30% of Its Land Area for Biodiversity, and Will This Be Enough?

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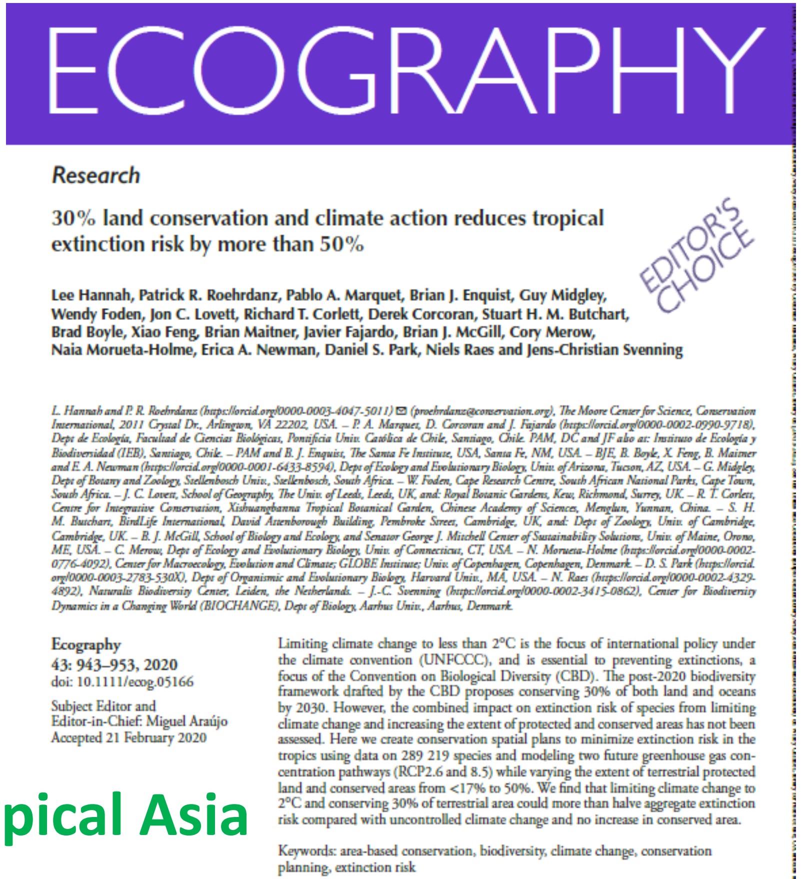
Abstract: The draft post-2020 Global Biodiversity Framework asks CBD parties to conserve at least 30% of the planet by 2030 'through a well-connected and effective system of protected areas . . . with the focus on areas particularly important for biodiversity'. We use Thailand as a case study for the ability of a densely populated, hyper diverse, tropical, middle-income country to meet this target at a national level. Existing protected areas (PAs) total 24.3% of Thailand's land area. Adding forest on government land adjacent to existing PAs, plus unprotected areas of Ramsar sites, raises this to 29.5%. To assess the importance for biodiversity, we used modeled distributions of birds and mammals plus, as proxies for other biodiversity components, elevation, bioclimate, forest type, and WWF ecoregion. All modeled species occur in the current PA system but <30% meet representation targets. Expansion of the system increases the proportion of mammals and birds adequately protected and increases the protection for underrepresented bioclimatic zones and forest types. The expanded system remains fragmented and underrepresents key habitats, but opportunities for increasing protection of these are limited. It is also still vulnerable to climate change, although projected impacts are reduced. Additional protection is needed for wetland and coastal habitats, and limestone karsts.


ECOGRAPHY

Research

30% land conservation and climate action reduces tropical extinction risk by more than 50%

EDITOR'S CHOICE

Lee Hannah, Patrick R. Roehrdanz, Pablo A. Marquet, Brian J. Enquist, Guy Midgley, Wendy Foden, Jon C. Lovett, Richard T. Corlett, Derek Corcoran, Stuart H. M. Butchart, Brad Boyle, Xiao Feng, Brian Maitner, Javier Fajardo, Brian J. McGill, Cory Merow, Naia Morueta-Holme, Erica A. Newman, Daniel S. Park, Niels Raes and Jens-Christian Svenning

Ecography
43: 943–953, 2020
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Subject Editor and Editor-in-Chief: Miguel Araújo
Accepted 21 February 2020

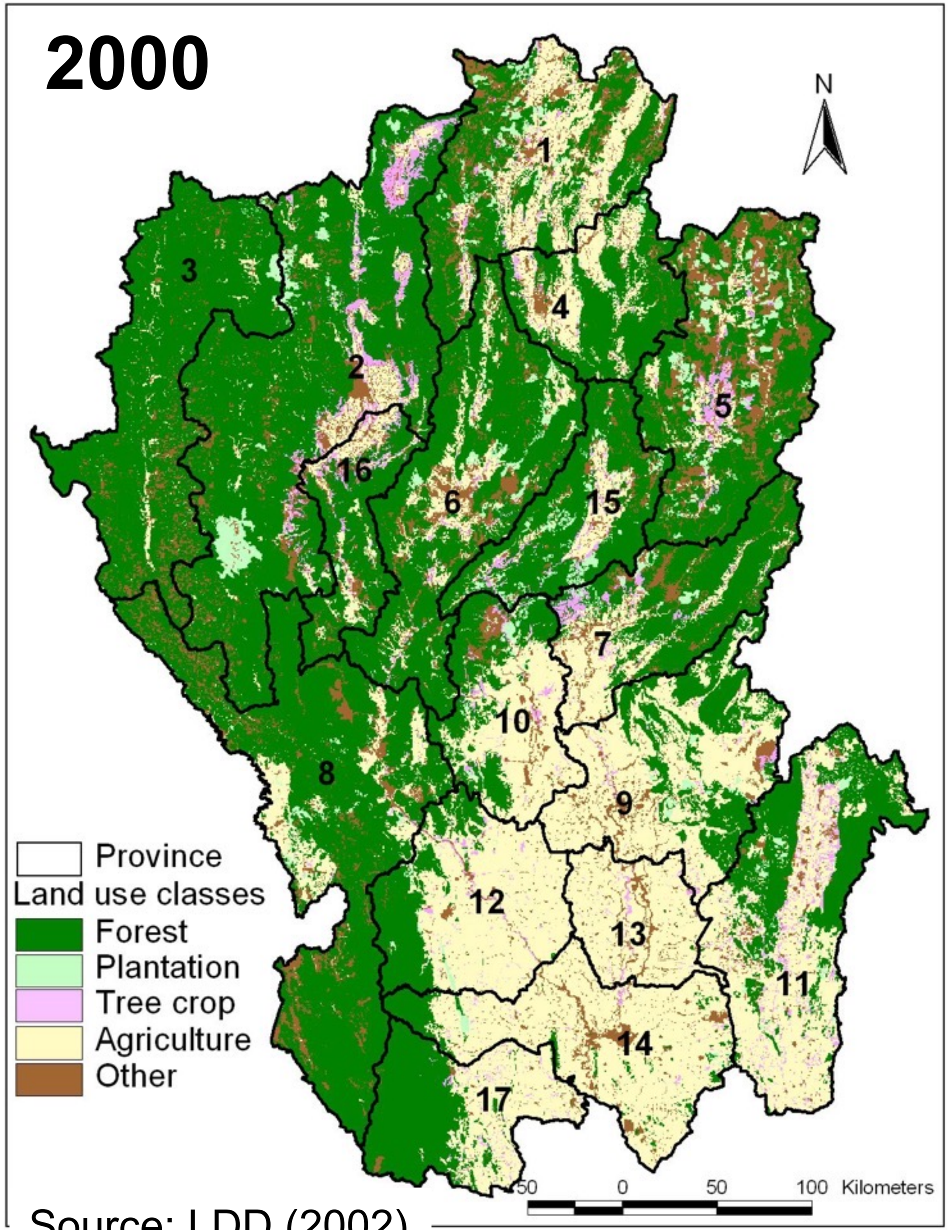
Limiting climate change to less than 2°C is the focus of international policy under the climate convention (UNFCCC), and is essential to preventing extinctions, a focus of the Convention on Biological Diversity (CBD). The post-2020 biodiversity framework drafted by the CBD proposes conserving 30% of both land and oceans by 2030. However, the combined impact on extinction risk of species from limiting climate change and increasing the extent of protected and conserved areas has not been assessed. Here we create conservation spatial plans to minimize extinction risk in the tropics using data on 289 219 species and modeling two future greenhouse gas concentration pathways (RCP2.6 and 8.5) while varying the extent of terrestrial protected land and conserved areas from <17% to 50%. We find that limiting climate change to 2°C and conserving 30% of terrestrial area could more than halve aggregate extinction risk compared with uncontrolled climate change and no increase in conserved area.

Keywords: area-based conservation, biodiversity, climate change, conservation planning, extinction risk

4) Digital Atlas of TH's Biodiversity

3) Regional – Tropical Asia

(1)



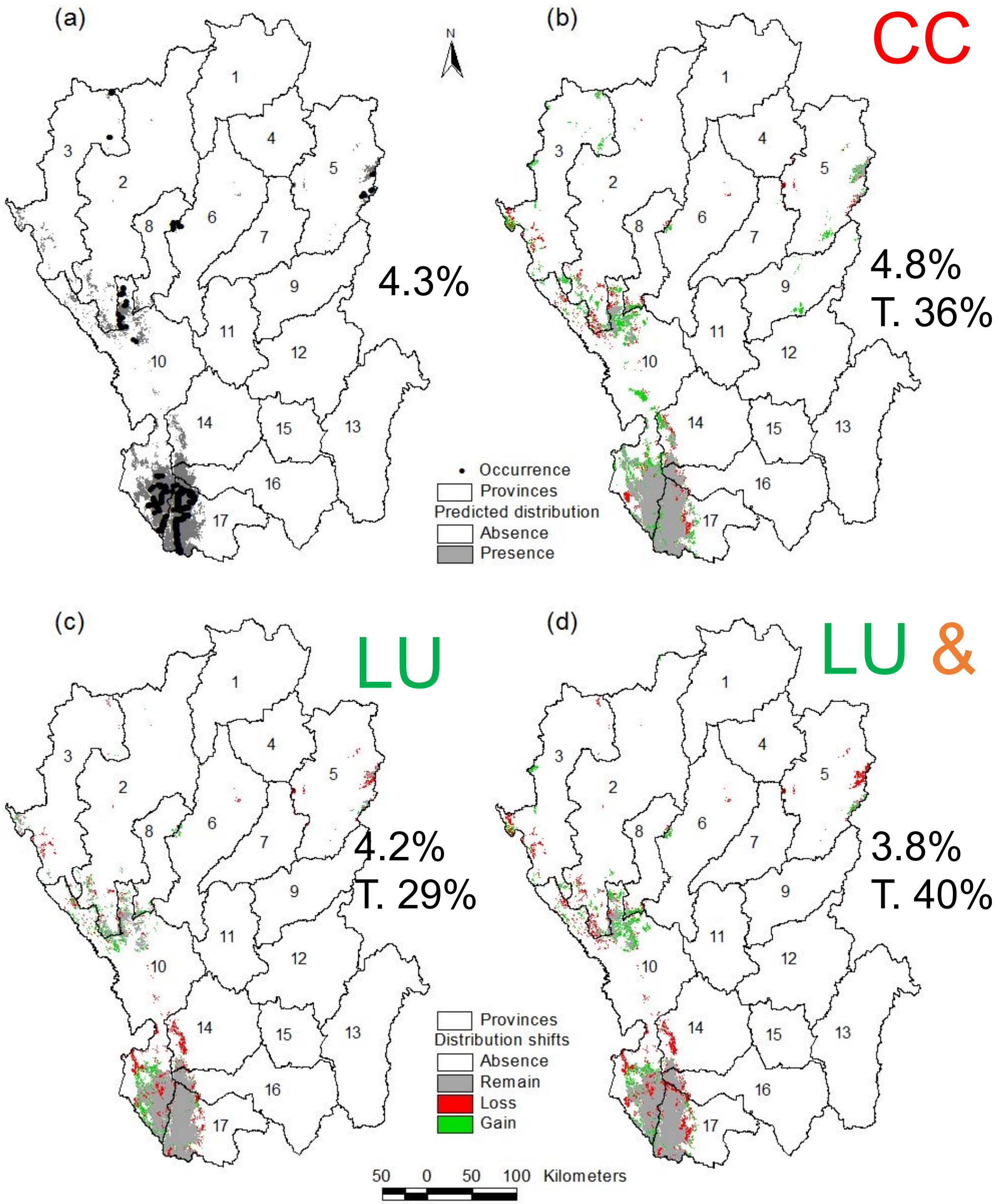
Source: LDD (2002)

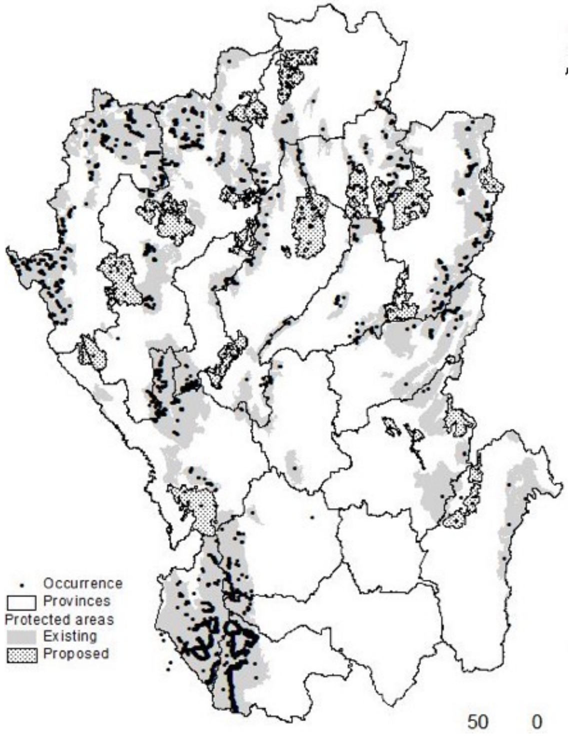
Northern Thailand

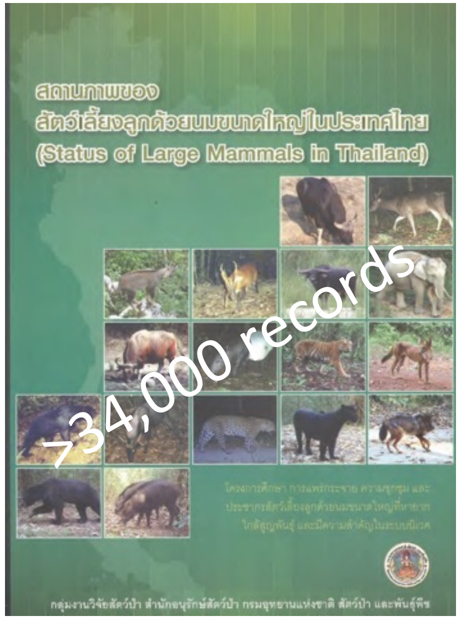
- Size: 172,277 km^2 (1/3)
- Forest cover
    - year 2002: 57%
    - Predicted in 2050: 50%
- PAs: 24%, planned 31.2%
- Climate

	Current	2050 (B2A scenario)
Mean T.	= 25.4 °C	= 27.1 °C
Max T	= 35.6 °C	= 38.0 °C
Min T.	= 13.4 °C	= 15.2 °C
Rainfall	= 1,232 mm	= 1,301 mm

Species Distribution Modeling for 17 mammals



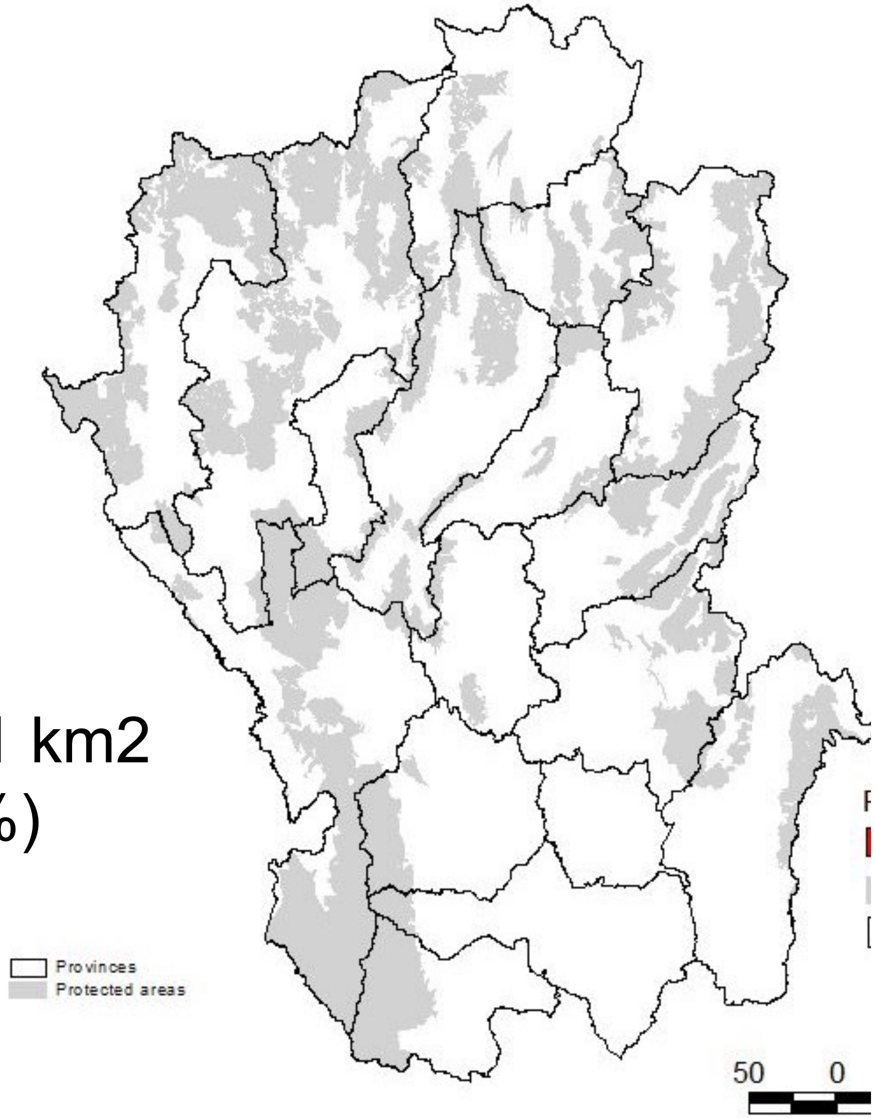




DNP, 2010

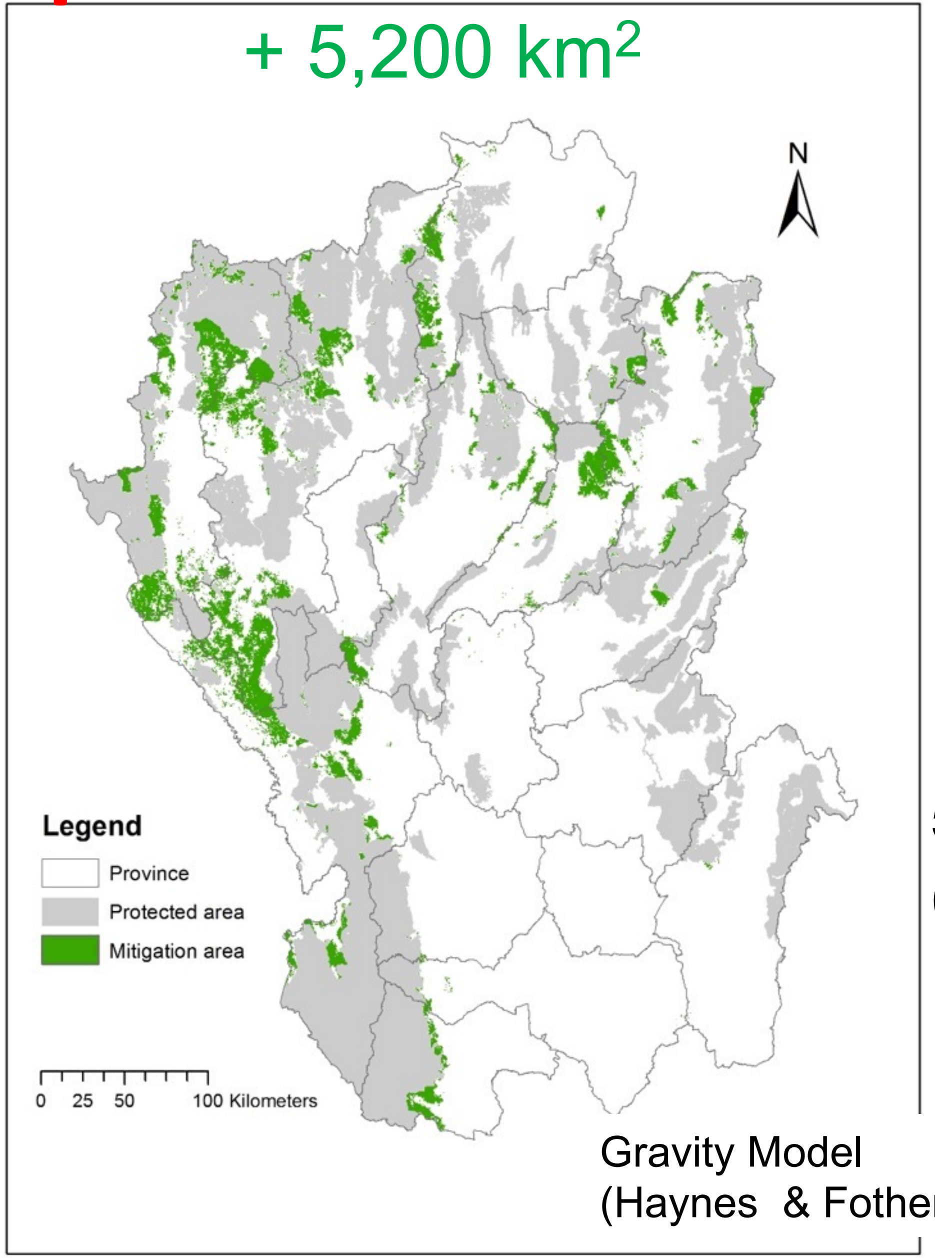
Priority areas for expansion

54,151 km2
(31.2%)



Trisur

+ 5,200 km^2

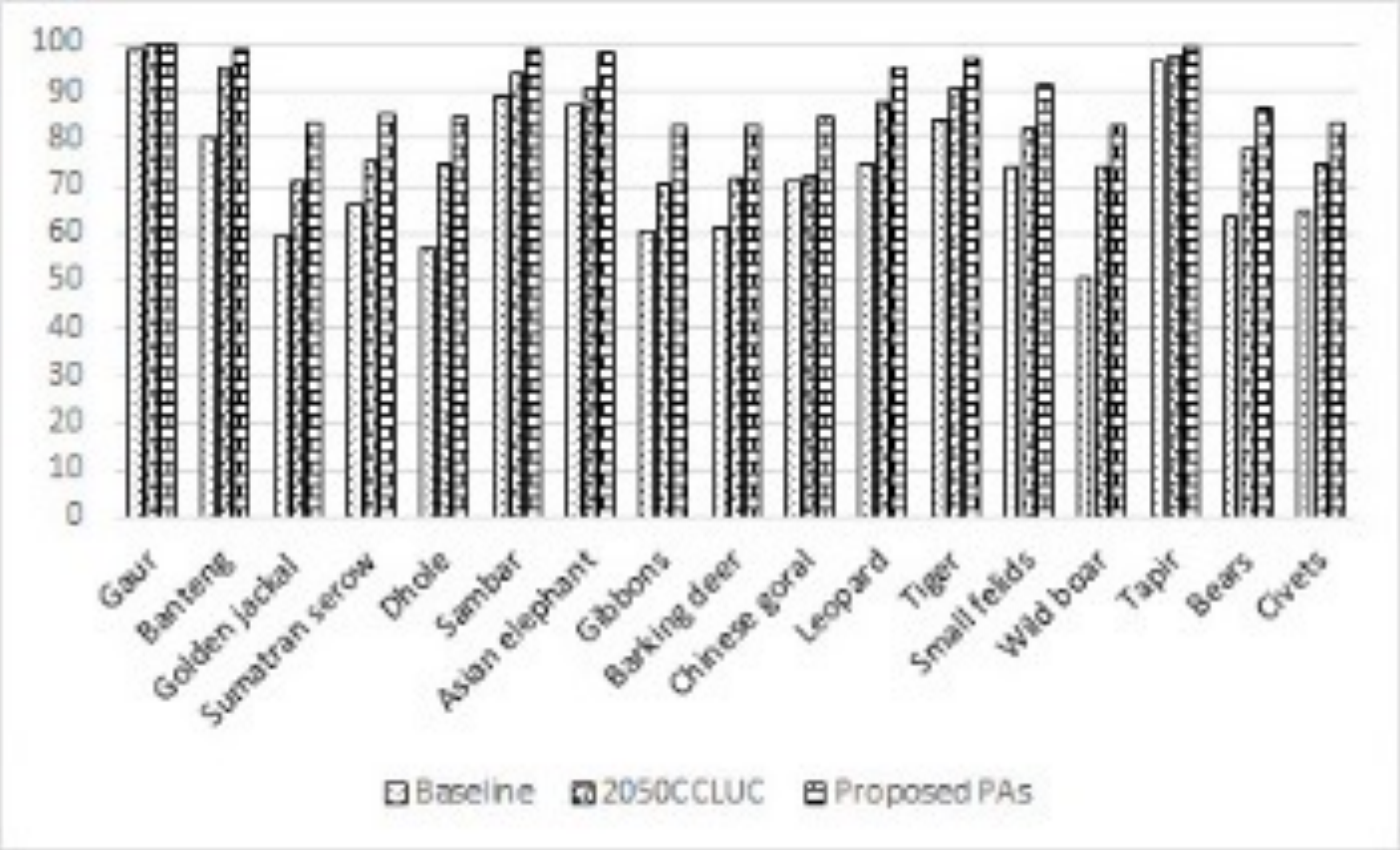


59,347 km2
(34.4%)

Gravity Model
(Haynes & Fotheringham, 1984)

Trisurat et al (2012)

Coping Capacity

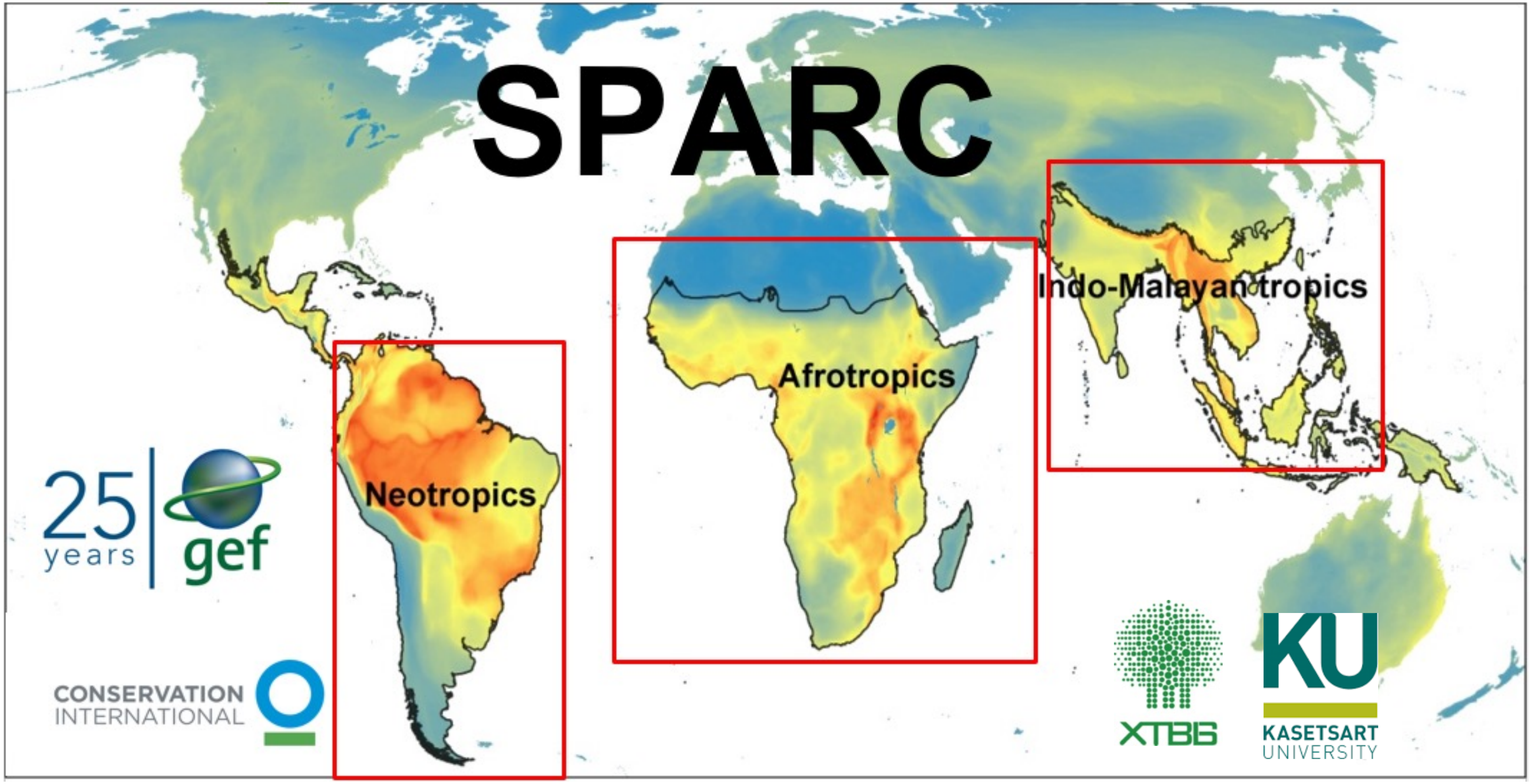


current - 73%; LU&CC 2050 - 82%; expansion - 90%

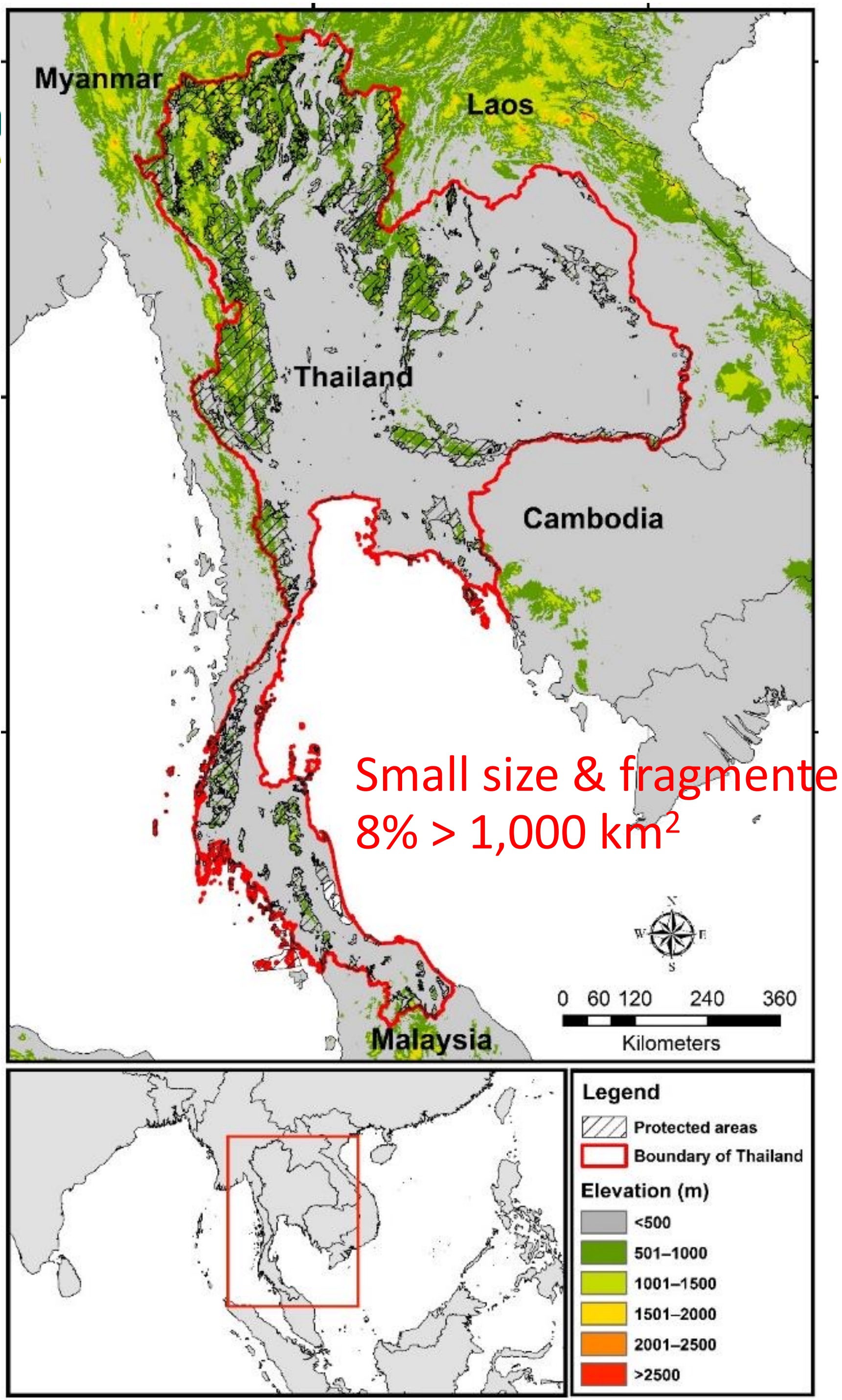
Trisurat et al (2012)

GEF Funded Project through CI

(2/3)



Spatial **P**lanning for **P**rotected **A**reas in **R**esponse to **C**limate Change



Small size & fragmented;
8% > 1,000 km^2

Can Thailand protect 30% of its land area for biodiversity and will this be enough?

- Forest area remaining 31.7%
- protected areas – planned 24%

Key Questions…….?

How can Thailand meet the proposed CBD area target of 30% by 2030?

Will the 30% be “well connected” and important for biodiversity?

How vulnerable will this 30% be to climate change?

Pomoim et al. (2021)

How to achieve 30% of protected areas?

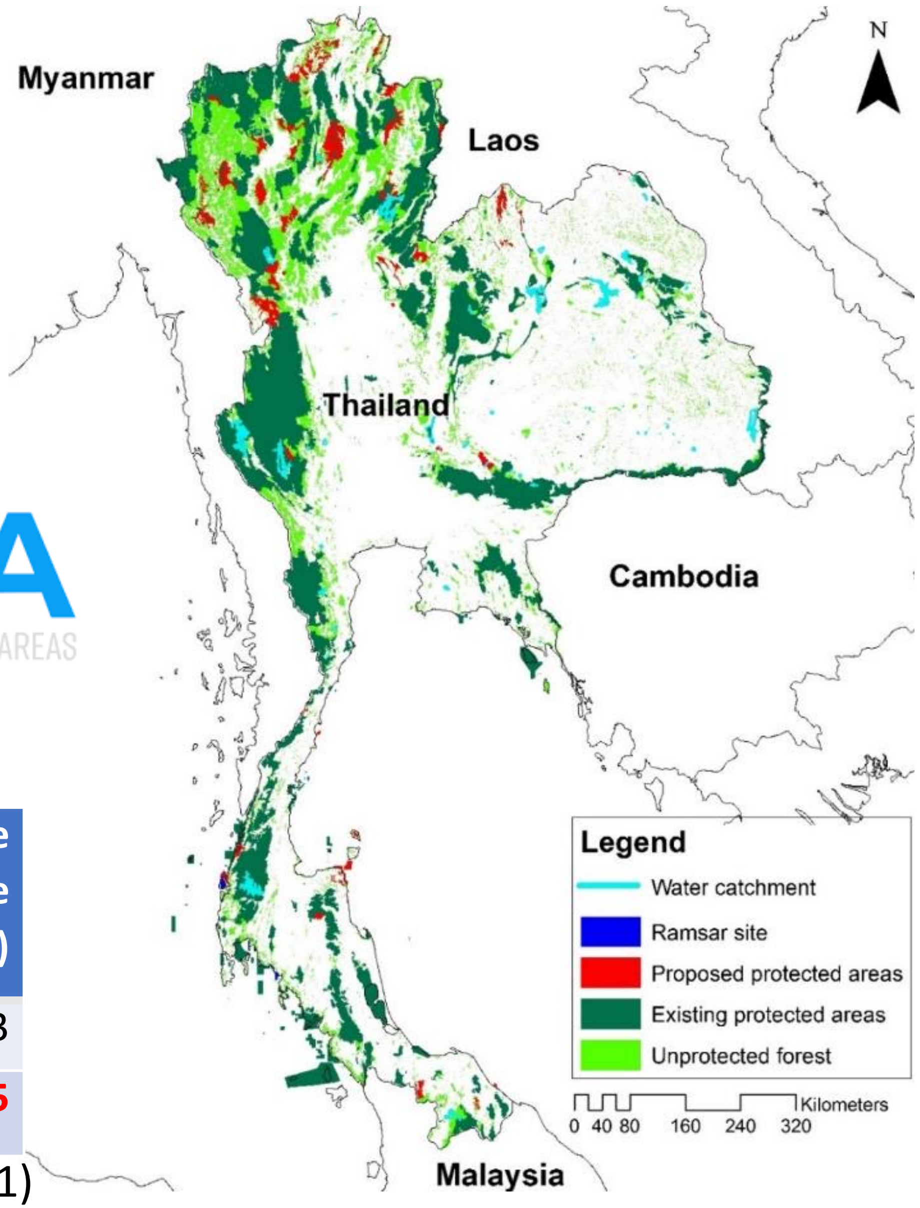
- The existing and already planned PAs - 24.3%
- Forest patches **>10 km²** adjacent to PAs cover **5.2%**
- Other effective area-based conservation measures (**OECMs**: Ramsar site, water catchment, KBAs) cover **0.04%**
- Smaller and isolated forest patches, may support viable species – **0.5%**

KBA
KEY BIODIVERSITY AREAS

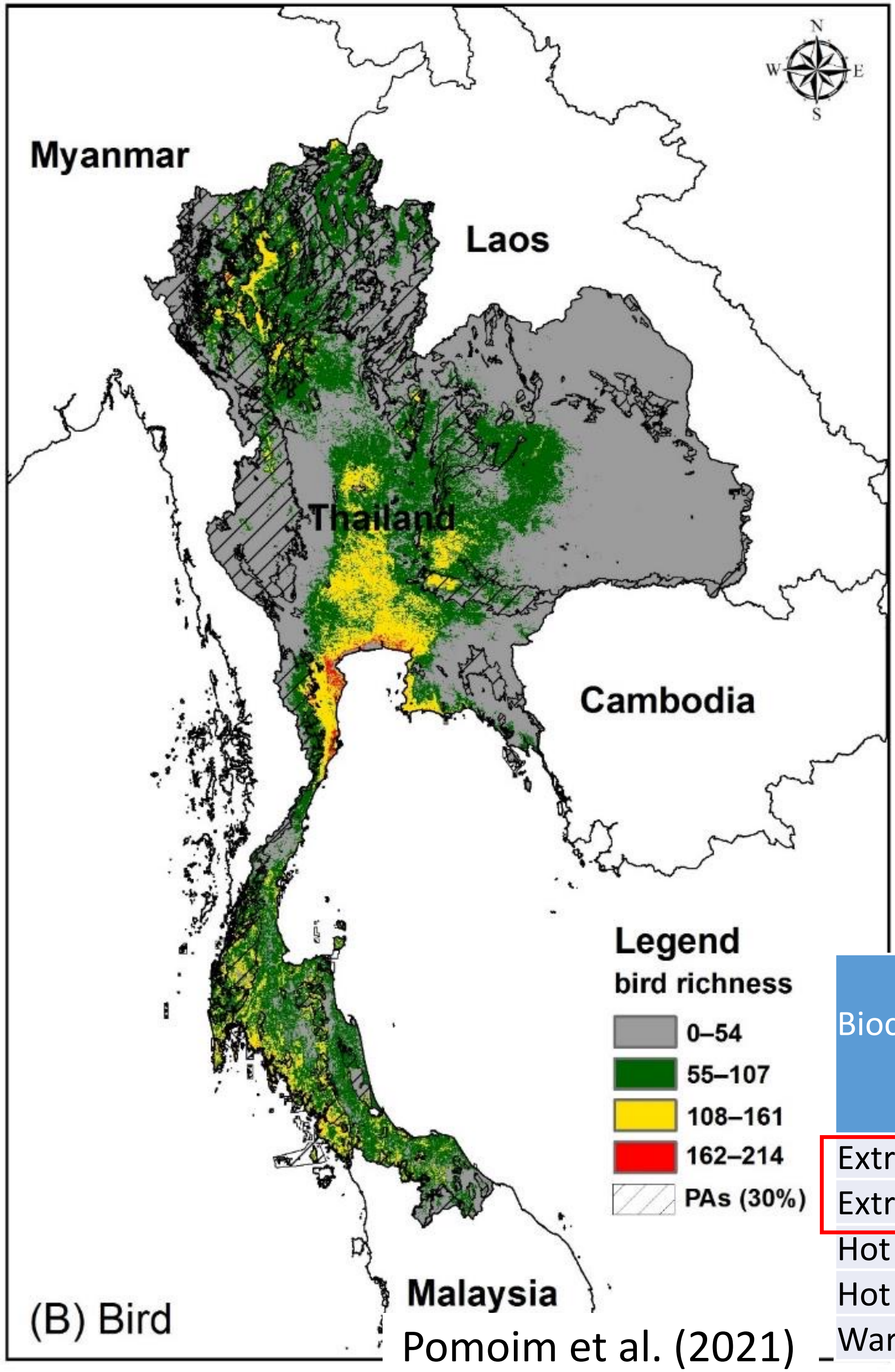
Increased patch size and well connected

Protected area	Number of patches				Mean area km²	Mean distance to nearest large patch (km)
	<100 km²	100-1000 km²	>1000 km²	total		
24.3%	570	80	20	670	188	14.3
29.5%	520	69	19	**608**	**251**	**12.5**

Pomoim et al. (2021)



Well protect biodiversity?



Pomoim et al. (2021)

Based on **SDMs of 702 bird and 80 mammal** species obtained from GBIF

Increase in adequately protected species

- **from 28% to 60% of mammals**
- **from 26% to 38% of birds**

Increase in the area of under-represented forest

- **Deciduous Dipterocarp Forest from 42% to 62%**
- **Mixed Deciduous Forest from 61% to 81%**

Bioclimatic zone	Total area of zone (km^2)	% of zone protected		% of total area protected		% of forest cover protected	
		24.3%	29.5%	24.3%	29.5%	24.3%	29.5%
Extremely Hot and Moist	262852	28.5	35	63.1	63.1	83.1	86.3
Extremely Hot and Xeric	200660	3.9	6	6.6	8.2	69.9	80.2
Hot and Mesic	43791	72.2	83.4	26.6	25	92.4	93.7
Hot and Dry	5818	76.5	88.8	3.7	3.5	93.2	93.6
Warm Temperate and Mesic	83	91.6	97.6	0.1	0.1	100	98.8

SE Asia Tropics Conservation Priorities under Climate Change

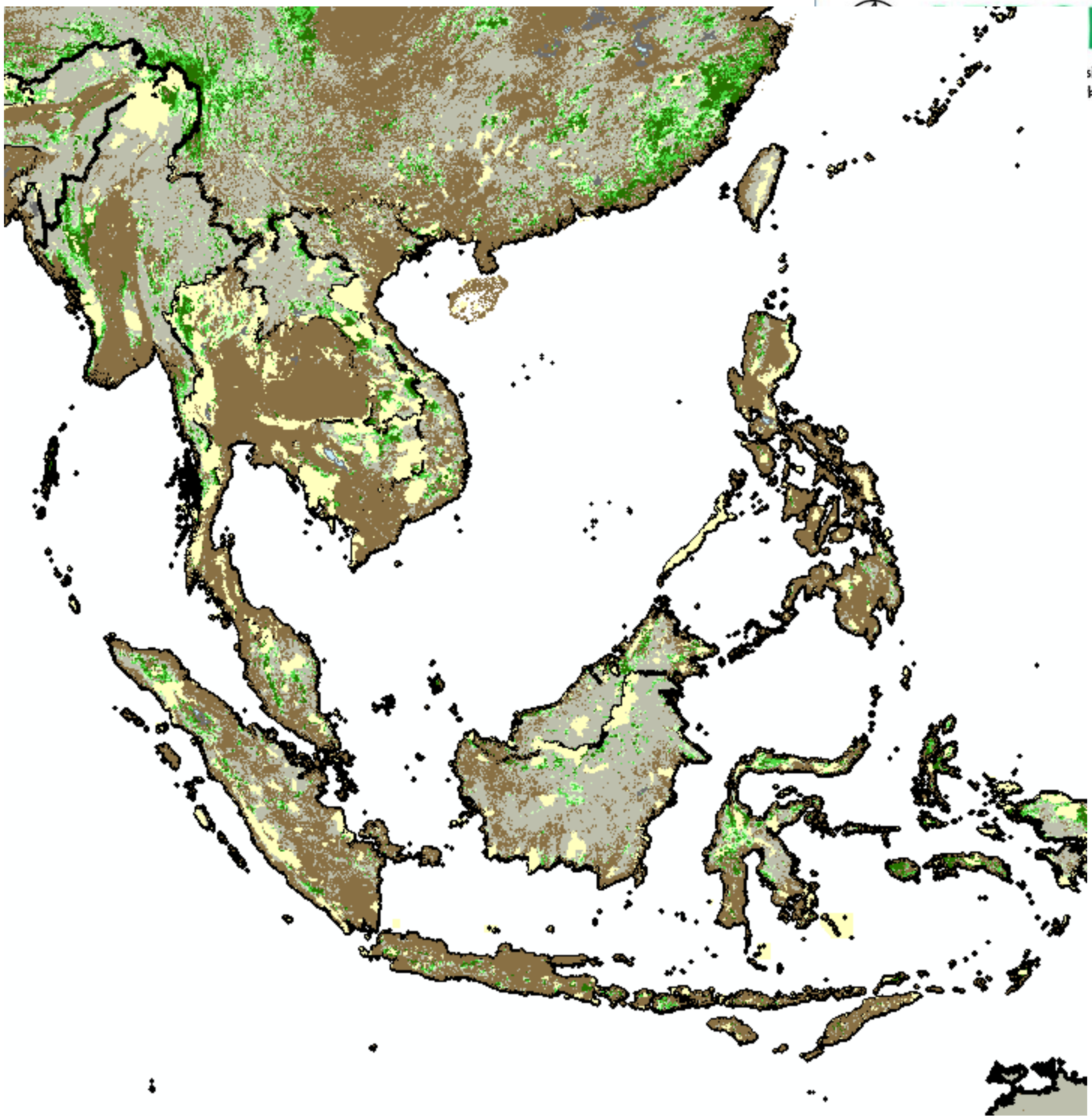
Asia-wide Analysis:

SDM for 80,000 Plants and 30,000 Vertebrates (GBIF and BIEN)

Greater Priority

Protected Areas

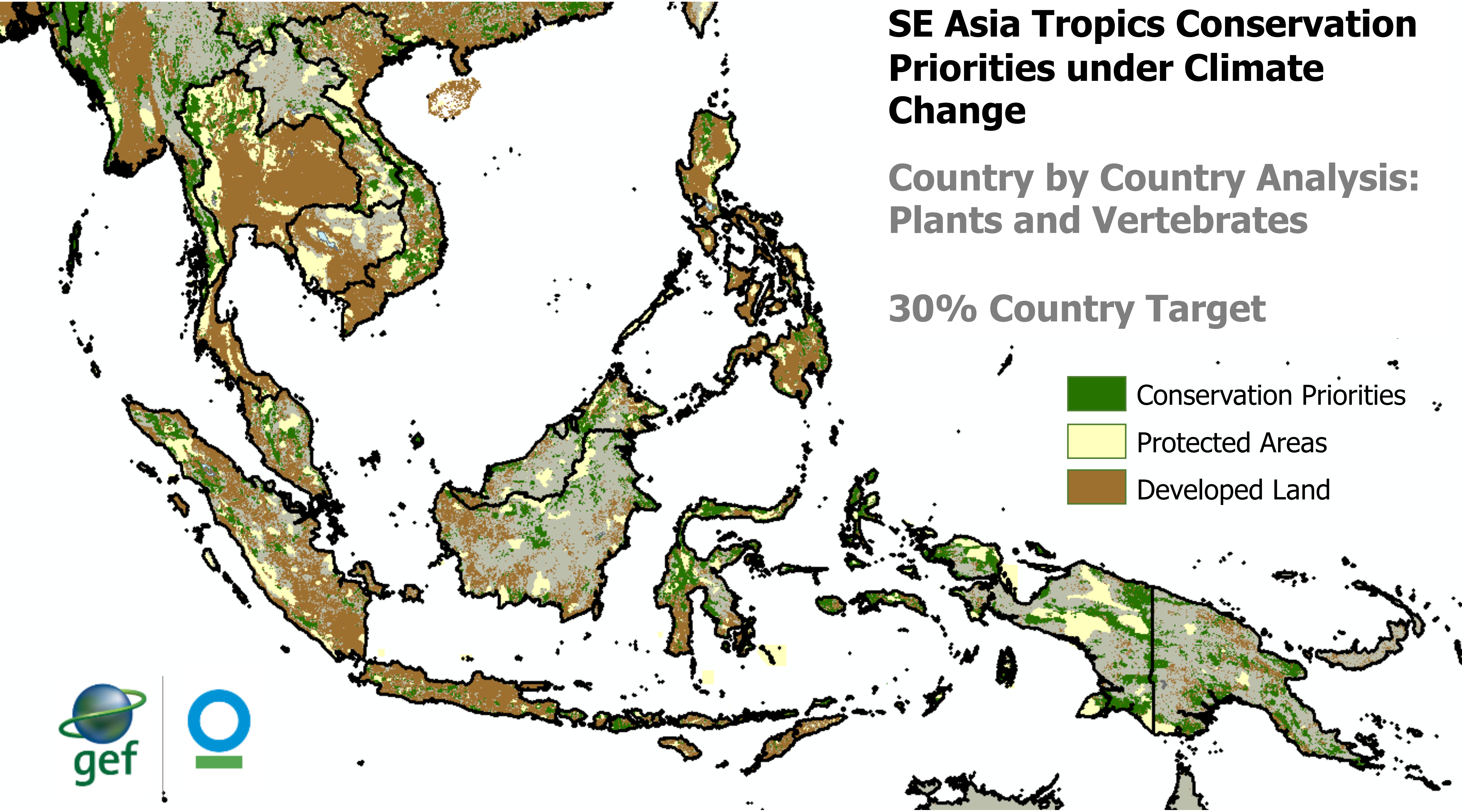
Developed Land

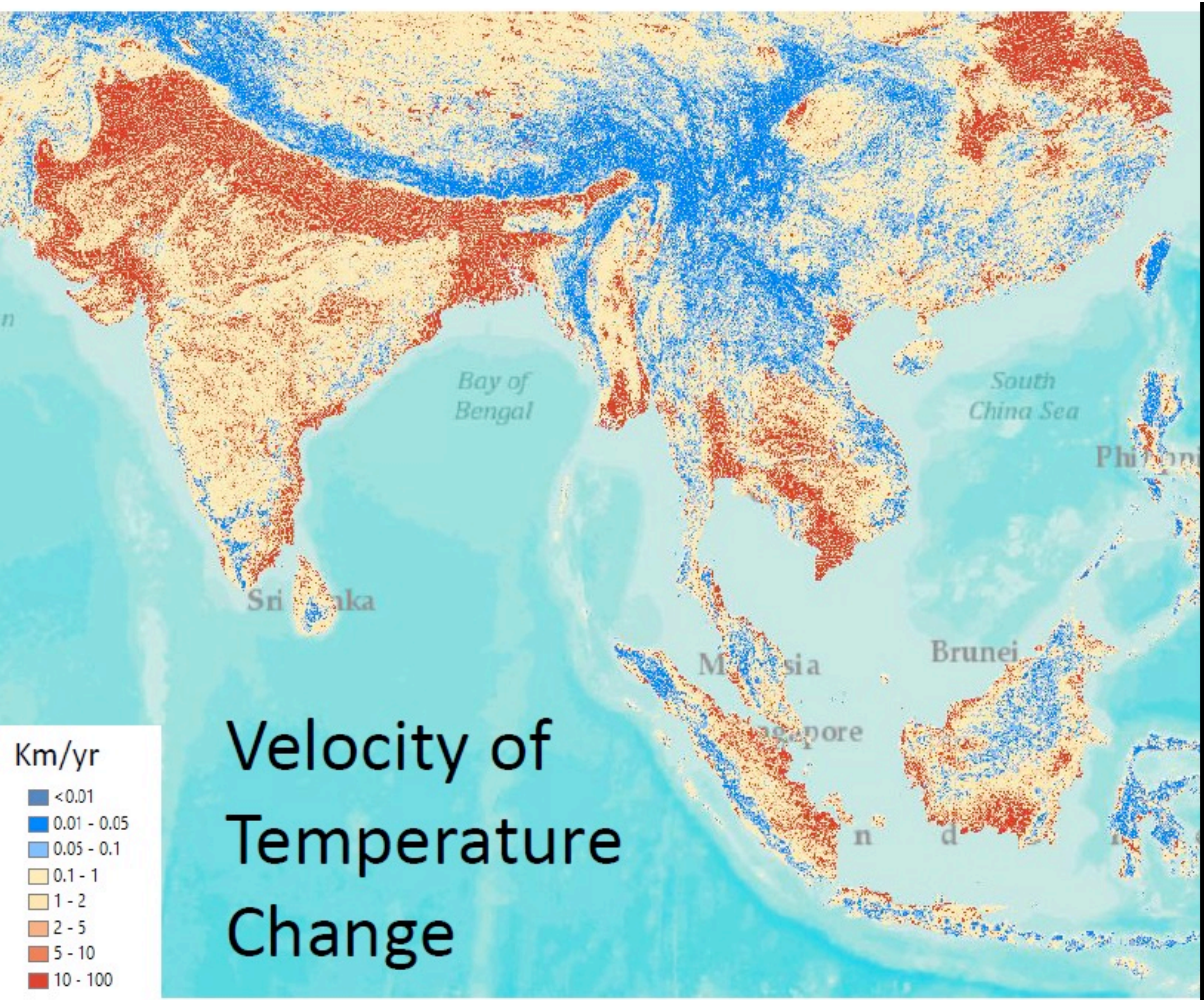


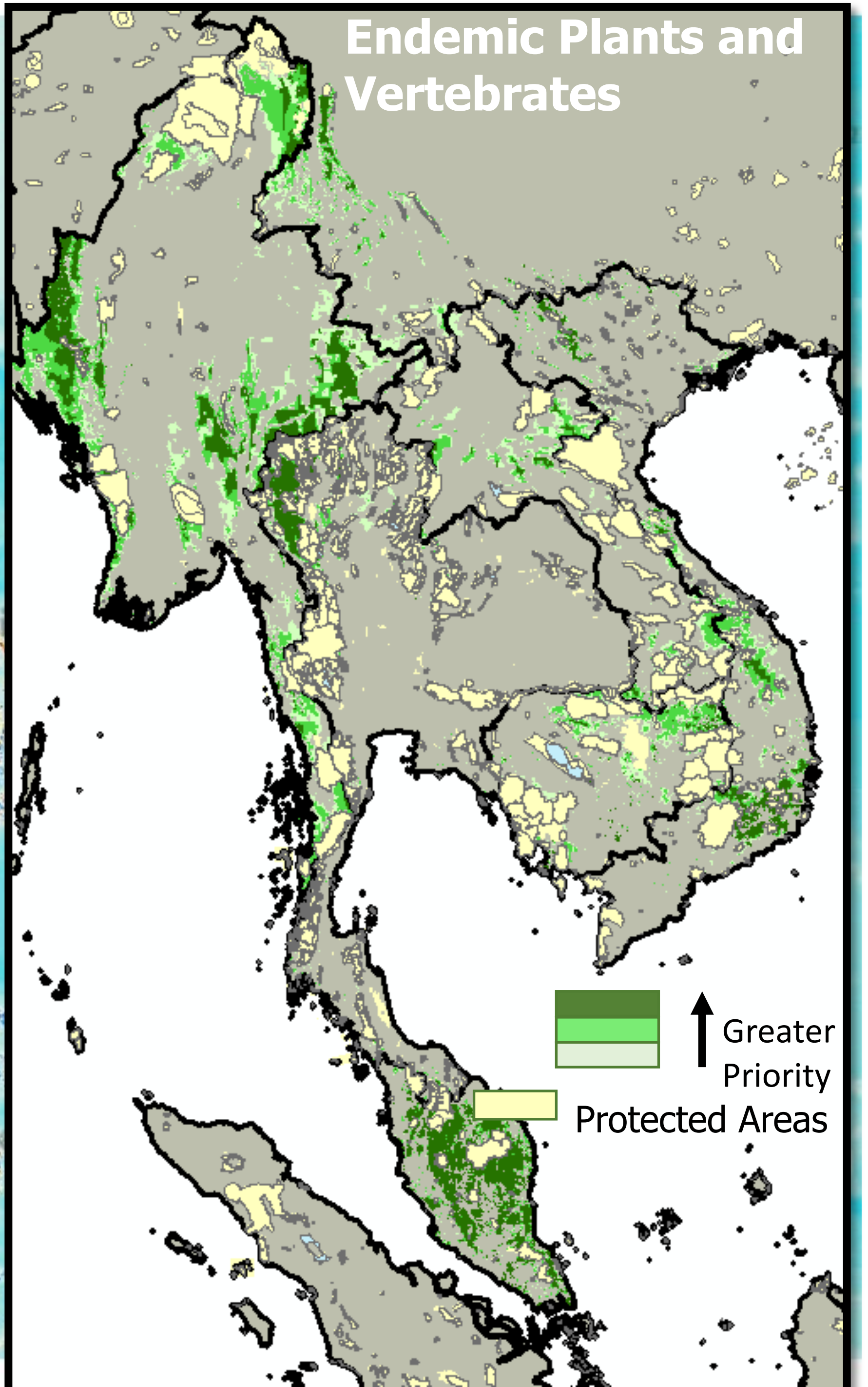
SE Asia Tropics Conservation Priorities under Climate Change

Country by Country Analysis: Plants and Vertebrates

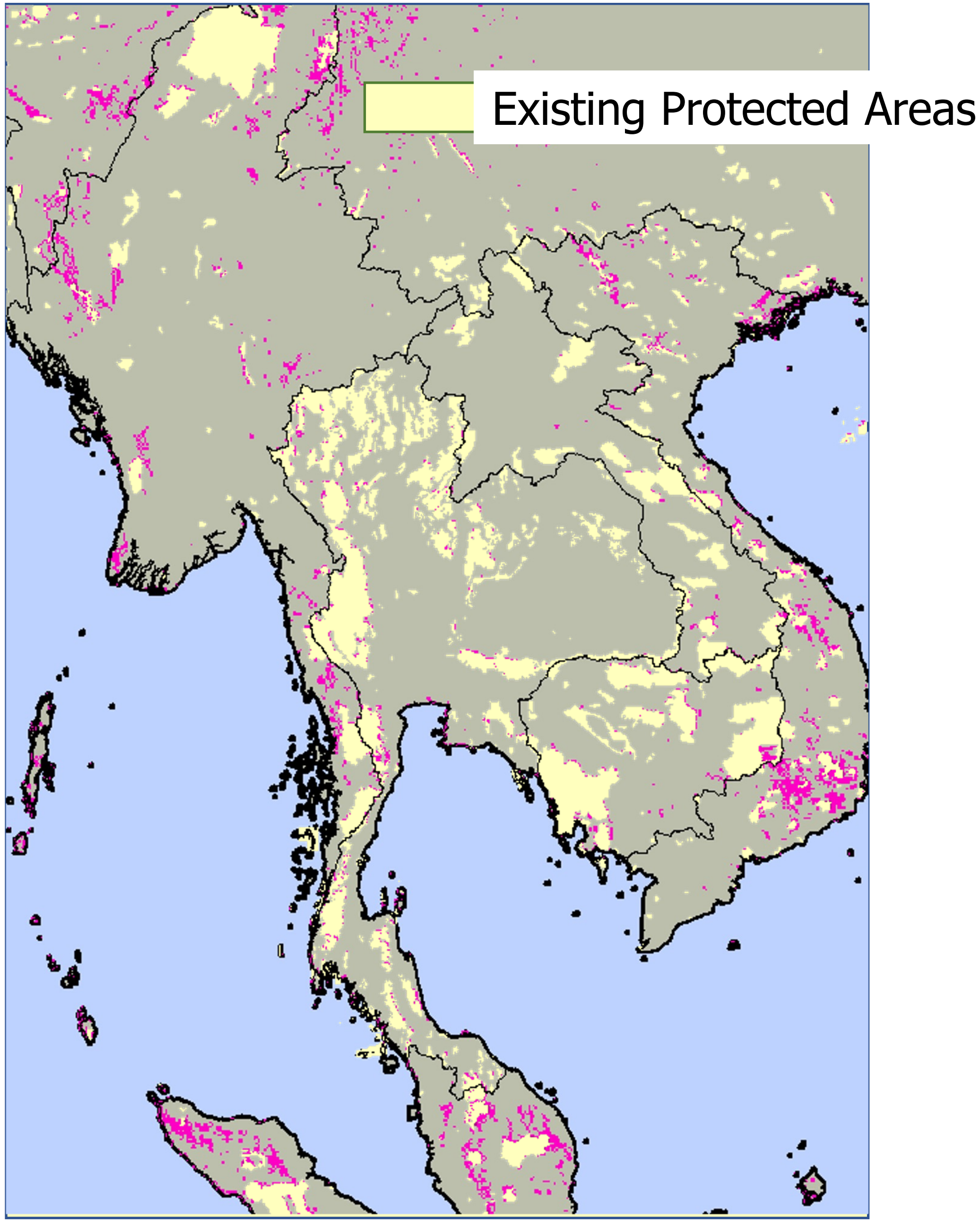
30% Country Target




Velocity of Temperature Change
Km/yr
<0.01
0.01 - 0.05
0.05 - 0.1
0.1 - 1
1 - 2
2 - 5
5 - 10
10 - 100
Bay of Bengal
South China Sea
Brunei


Endemic Plants and Vertebrates
Greater Priority
Protected Areas

Network Flow Priorities



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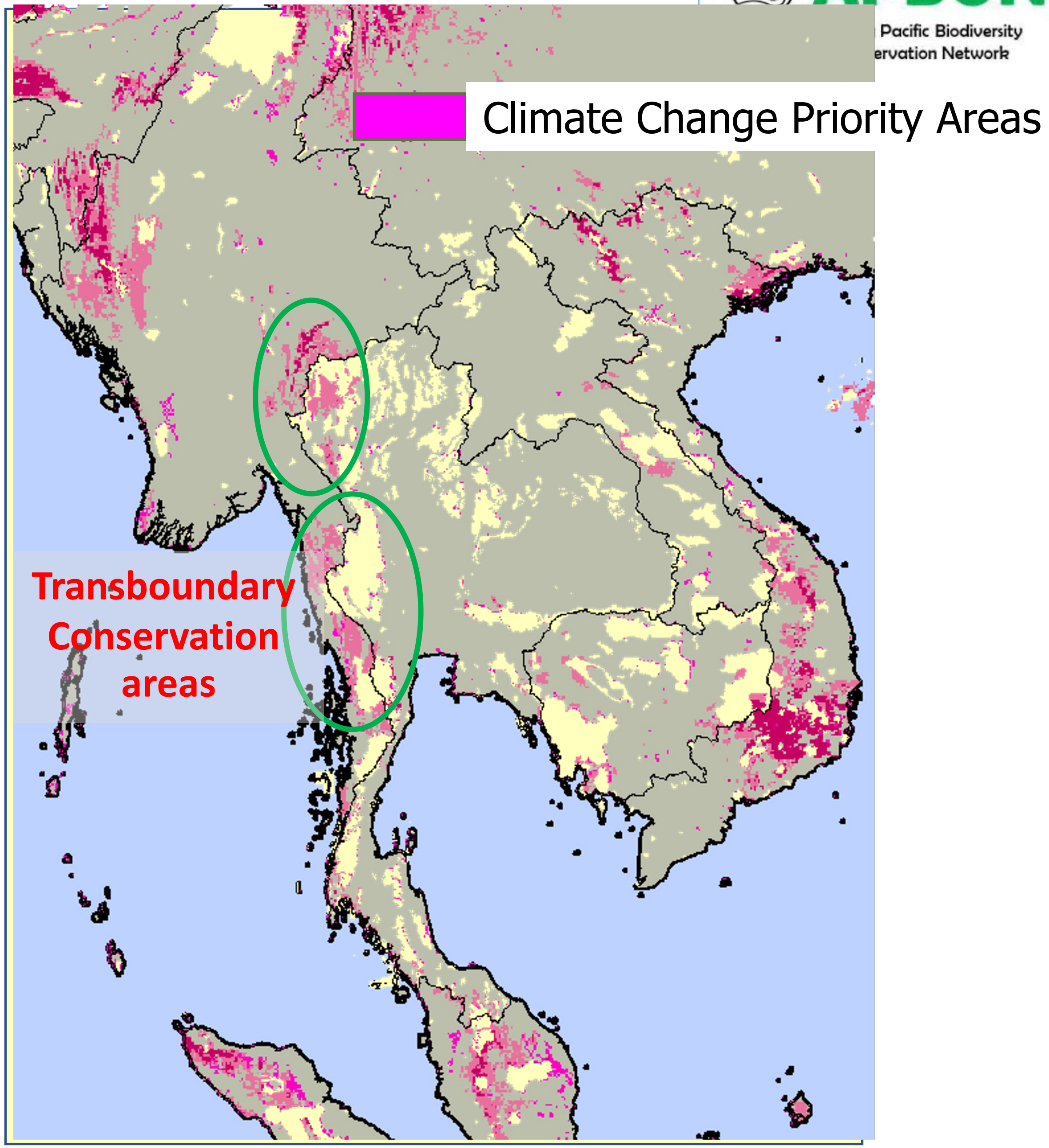
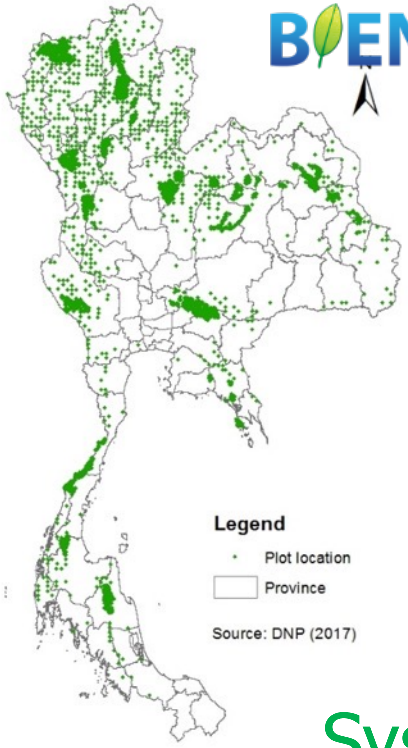


Corridor Index

4) Digital Atlas of TH's Biodiversity



BIEN GBIF

Raw data

BIEN/GBIF: Thailand 659 spp.; 1,471 record

ITTO/RFDS/DNP: 24,605 records

376 species

- SDMs for 201 spp. with >20 occurrences

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DOI: 10.1111/1440-1703.12105

SPECIAL FEATURE
Data rescue—collection of precious and laborious in situ observed data
ECOLOGICAL RESEARCH WILEY

Systematic forest inventory plots and their contribution to plant distribution and climate change impact studies in Thailand

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Abstract

Thailand is recognized as having high species richness both flora and fauna. The systematic plant taxonomy and collection was initiated in 1957–1958. However, the distribution of specimen collections is uneven and mainly located near road networks. The Royal Forest Department (RFD) has since 2001 initiated the systematic uniformly fixed grids of 20 km × 20 km for measuring trees and their environments with the financial and technical support from the International Tropical Timber Organization. After the reorganization of the RFD in 2002, the Department of National Parks, Wildlife and Plant Conservation of Thailand, which then was separated from the RFD, has carried on this project and added the uniformly fixed grids ranging from 2.5 km × 2.5 km to 10 km × 10 km over the entire protected areas in Thailand. Throughout three project phases (2001–present), there are over 3,150 plots collected from 59 provinces, while the remaining 18 provinces do not have monitoring plots because of either the security issue or no forest covers. There were, based on altogether 24,605 occurrence records of trees with a diameter greater than 4.5 cm at breath high level from 363 species from 81 families and 222 genera. Trees belong to Dipterocarpaceae, Lamiaceae, Burseraceae, Phyllanthaceae, Malvaceae and Fabaceae families are dominant. Besides for simple estimation of tree density and volume, the data were used for bio-geographical and climate change impact studies.

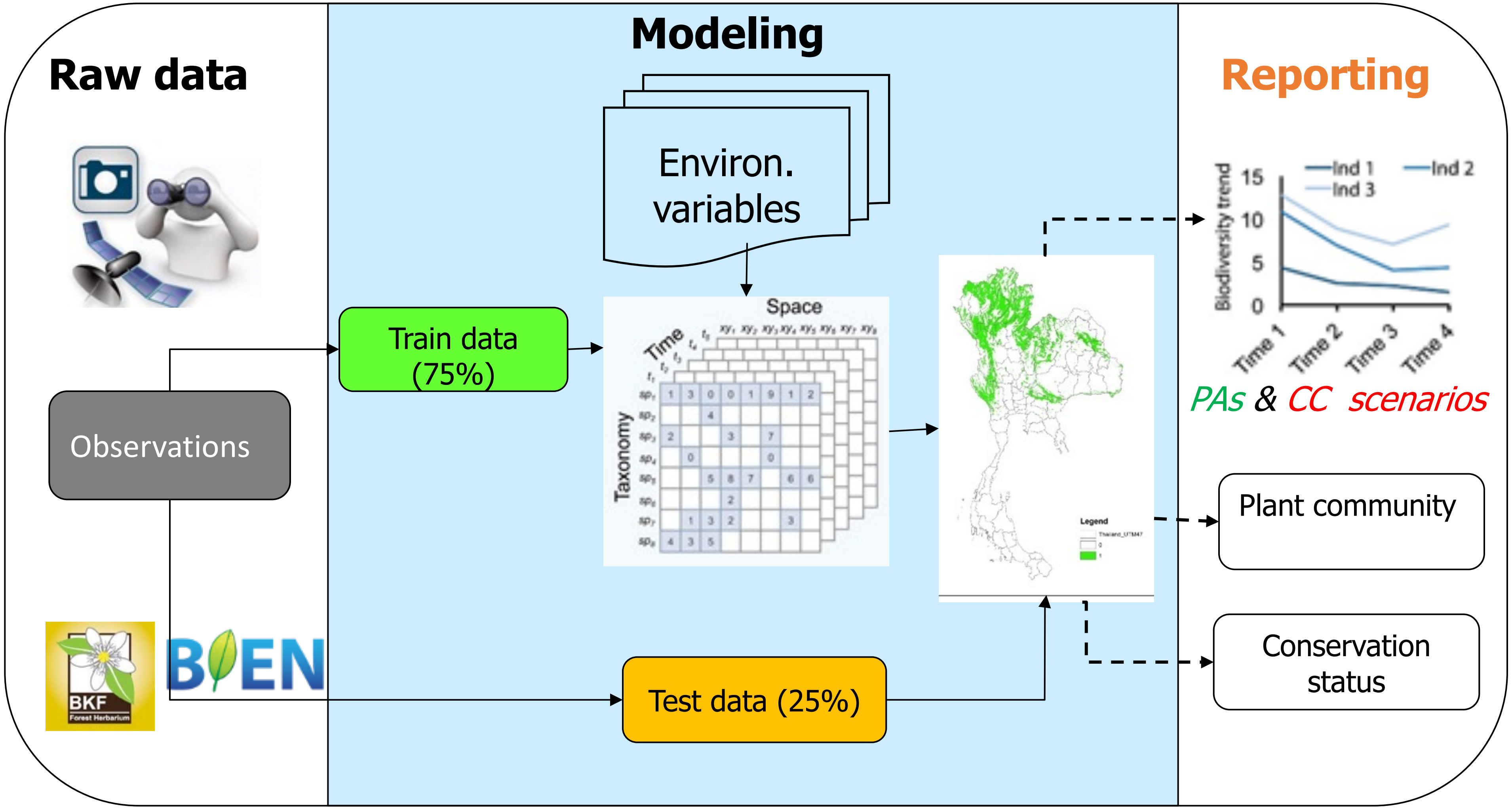
Systematic Forest Inventory

ITTO

RFD/DNP

Spacing	Year	Number of plots	Extent	Responsible agency	Remarks
1.5 km × 1.5 km	2001–2003	903	Country	RFD/ITTO	Designed and pilot project
20 km × 20 km	2004–2007	1,285	Country	RFD/ITTO	Entire country but 158 plots un-established
10 km × 10 km	2004–2005	10,372	Country	RFD/DNP	Only inside remaining forest cover
5 km × 5 km	2006–2010	14,152	Protected area	DNP	Using a 0.1 ha plot center
10 km × 10 km	2011	859	Country	DNP	Using a 0.1 ha plot center
2.5 km × 2.5 km [a]	2012–present	4,500	Protected area	DNP	Using a 0.1 ha plot center

GIS geo-species mapserver



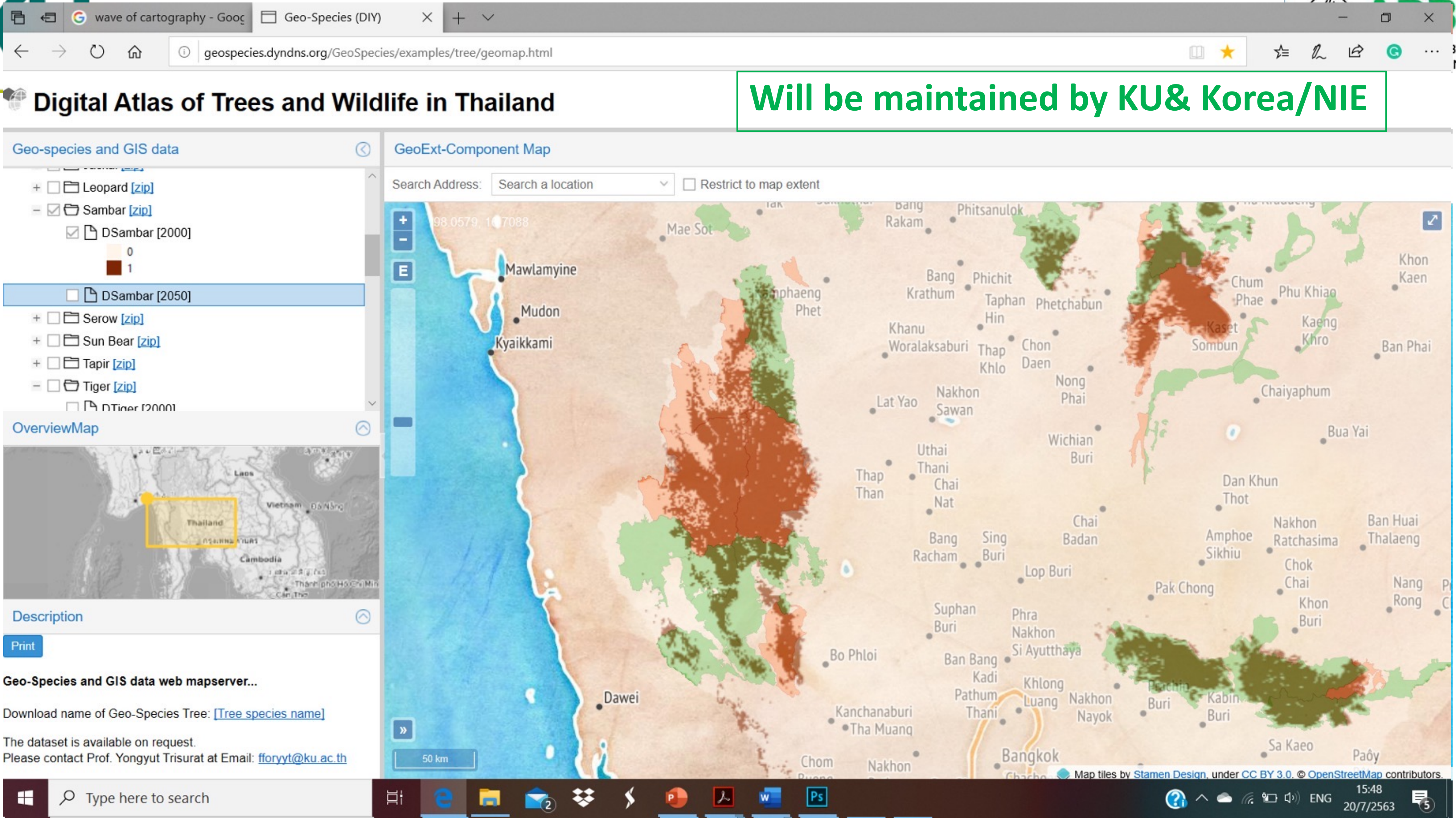
Raw data from field survey & digitized database

Harmonized dataset, quality Checked & SDM

Accuracy assessment

Change detection (gain & loss)

Will be maintained by KU& Korea/NIE



http://geospecies.dyndns.org/GeoSpecies/examples/tree/

Data Use for International Platforms for Policies

Challenges

- To transform analog dataset to standardized digital database (information management system: **IMS**) – avoid data entropy
- To promote the system to **share and synthesize** data to be used within the region and to address a large scale questions - CC.
- To embed dataset and research results into **policy implementation**

Opportunities

- **Collaboration** (e.g., APBON, ILTER, GBIF, Korea/NIE, KBAs) , **networking** and facilities are in place.
- Establishment of **Thailand Biodiversity Information facility** (TH-BIF) by ONEP
- Biodiversity data greatly contribute to **CBD, KBAs, NBSAP, IPCC etc.**