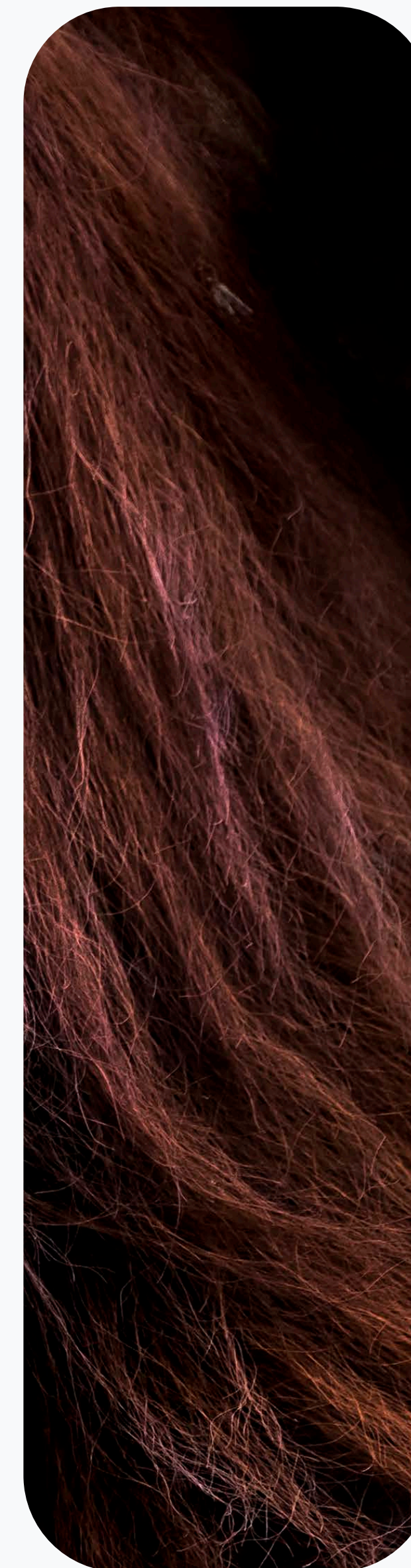
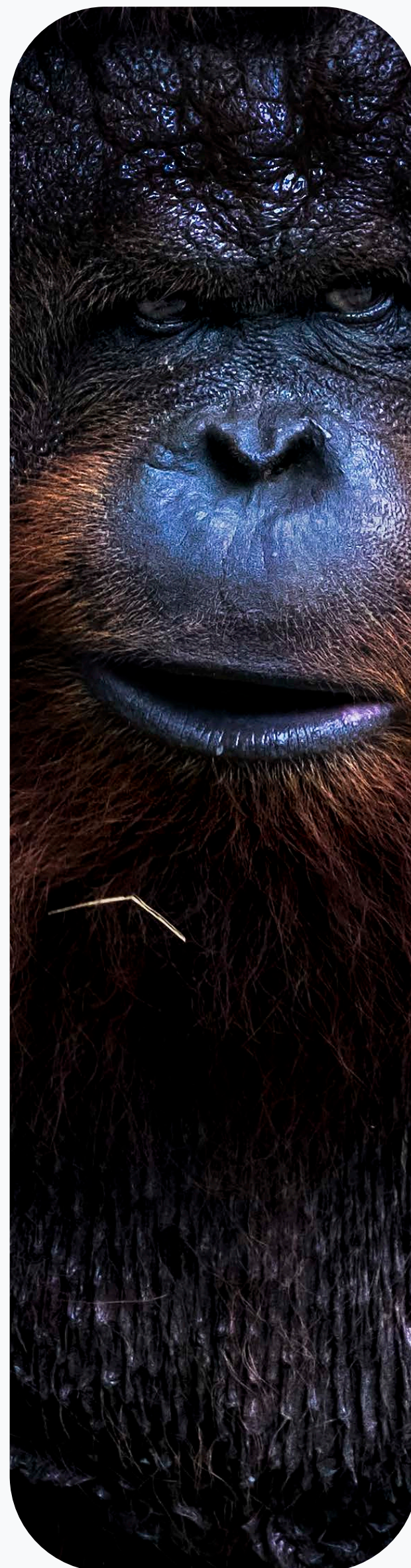


# Innovations in Biodiversity Informatics Tools

## Unlocking Nature's Code

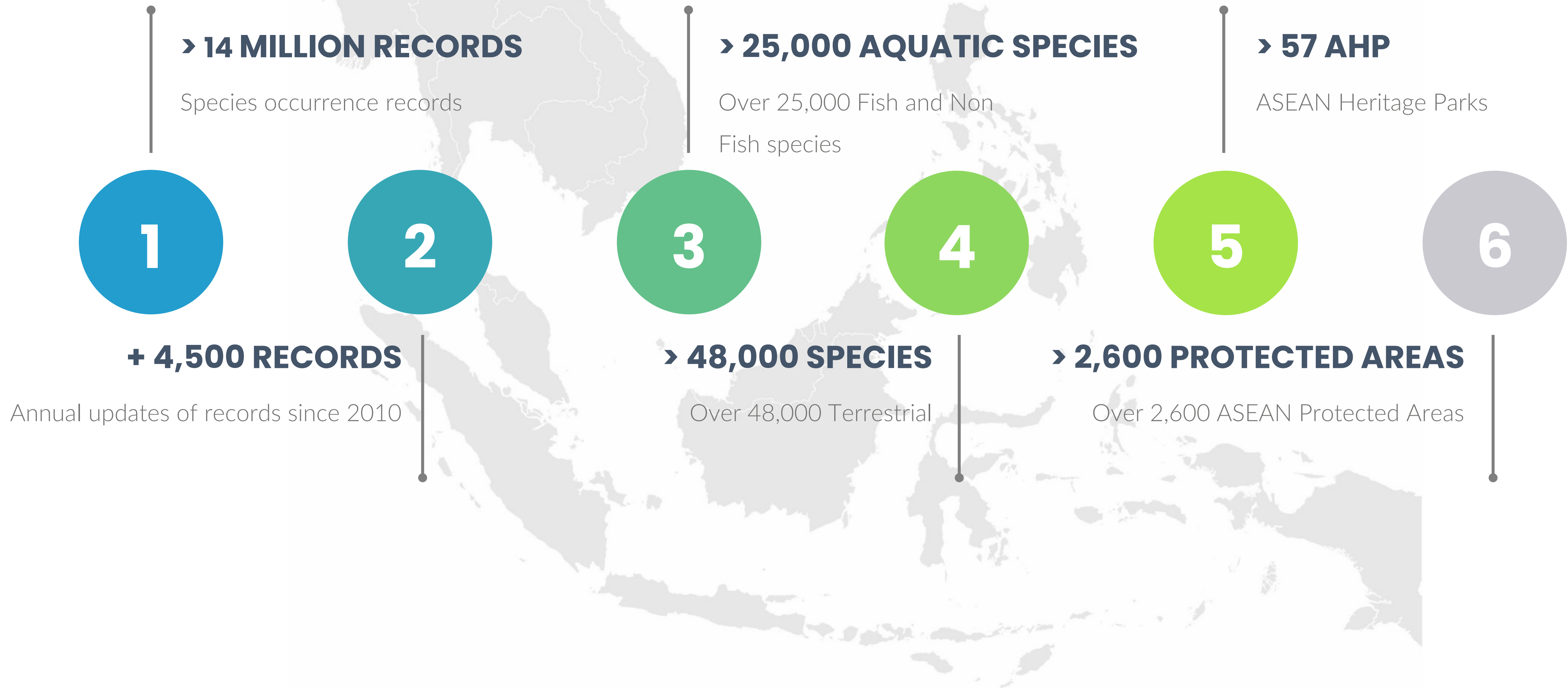
Kit Elloran  
Division Director  
Biodiversity Informatics and Geospatial  
Analysis Division

15th Asia-Pacific Biodiversity Observation  
Network (APBON) Workshop





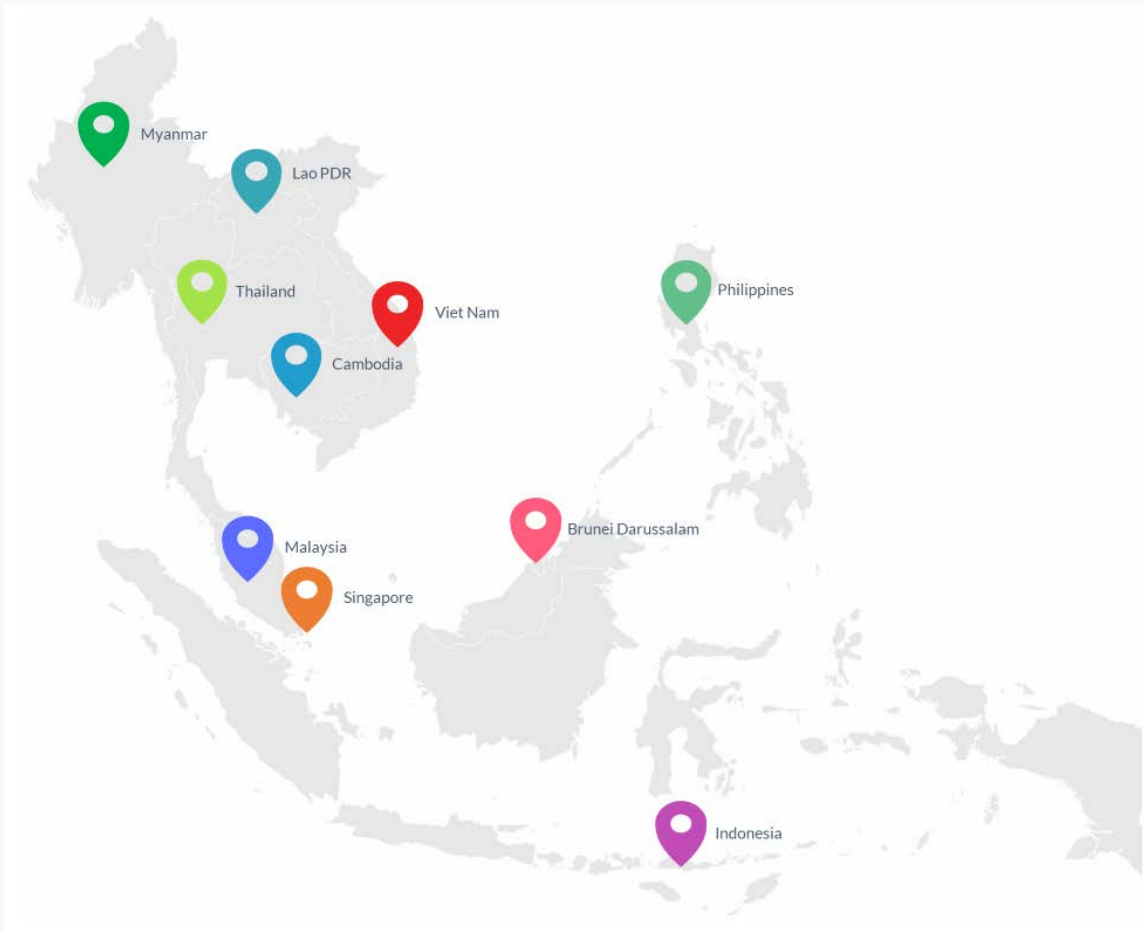
# Biodiversity Knowledge Management Department Databases





















# Biodiversity Knowledge Management Department Databases



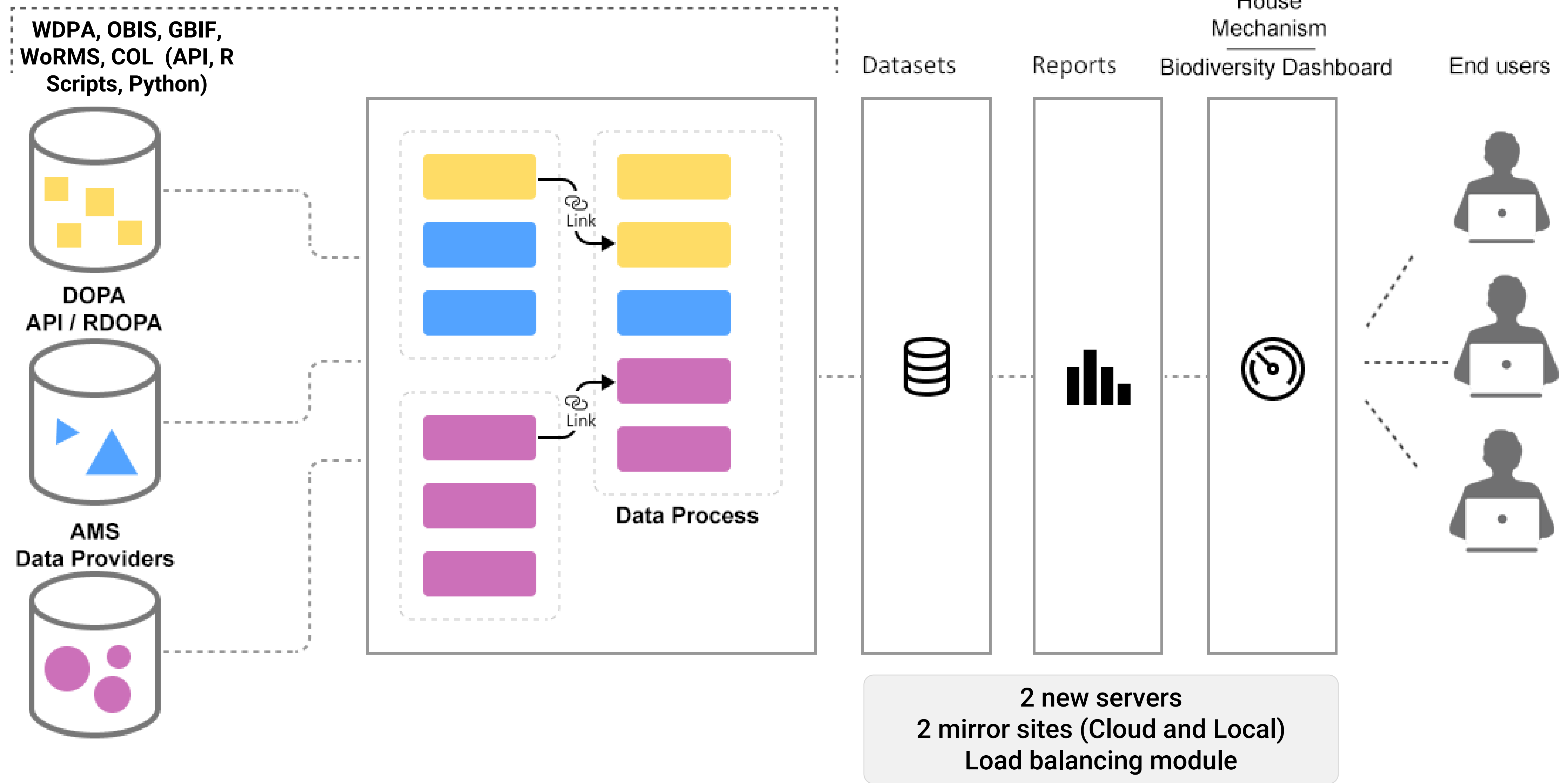
## DEMOGRAPHICS



Country or area		
<input checked="" type="checkbox"/>	Brunei Darussalam	54,061
<input checked="" type="checkbox"/>	Cambodia	819,320
<input checked="" type="checkbox"/>	Indonesia	3,658,754
<input checked="" type="checkbox"/>	Lao People's Democratic Republic	273,633
<input checked="" type="checkbox"/>	Malaysia	3,143,150
<input checked="" type="checkbox"/>	Myanmar	400,556
<input checked="" type="checkbox"/>	Philippines	2,453,916
<input checked="" type="checkbox"/>	Singapore	1,362,954
<input checked="" type="checkbox"/>	Thailand	4,988,086
<input checked="" type="checkbox"/>	Viet Nam	857,773

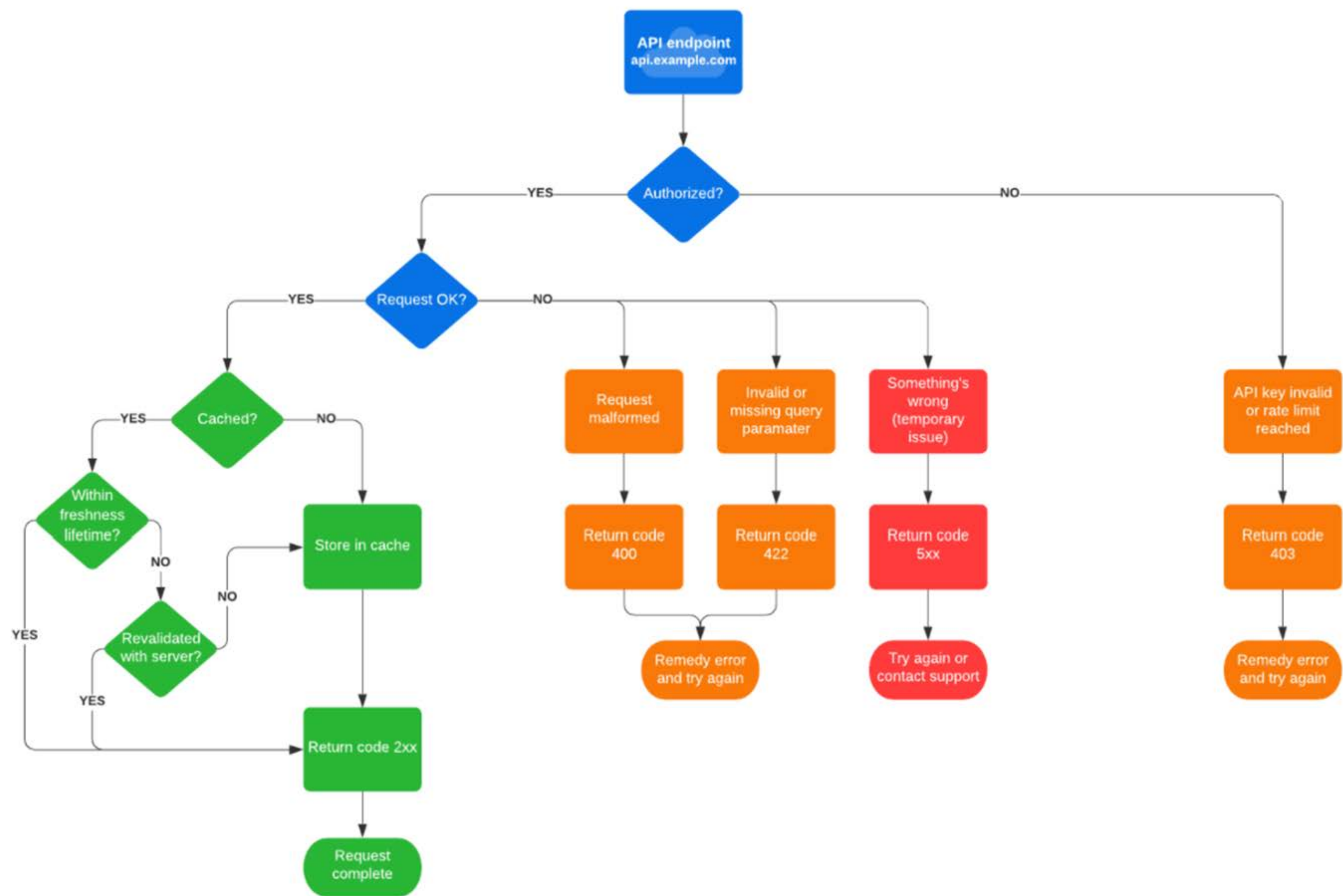
Total data available for selected taxonomic groups in the ASEAN Region					
 <b>Amphibians</b> 781	 <b>Bacteria</b> 270	 <b>Birds</b> 2,637	 <b>Bony fish</b> 7,813	 <b>Crustaceans</b> 1,883	 <b>Cnidarians</b> 784
 <b>Demosponge</b> 517	 <b>Echinoderms</b> 140	 <b>Ferns</b> 25	 <b>Fungi</b> 3,547	 <b>Insects</b> 2,696	 <b>Plants</b> 13,336
 <b>Mammals</b> 1,155	 <b>Medicinal plants</b> 727	 <b>Molluscs</b> 2,587	 <b>Mosses</b> 137	 <b>Reptiles</b> 938	 <b>Unknown</b> 21
<b>Amphibians</b> : Group > Amphibians	<b>Bacteria</b> : Kingdom > Bacteria	<b>Birds</b> : Class > Aves	<b>Bony fish</b> : Group > Fish	<b>Crustaceans</b> : Phylum > Crustacea	<b>Cnidarians</b> : Phylum > Cnidaria
<b>Demosponge</b> : Group > Demosponge	<b>Echinoderms</b> : Phylum > Echinodermata	<b>Ferns</b> : Phylum > Pteridophyta	<b>Fungi</b> : Kingdom > Fungi	<b>Insects</b> : Group > Insect	<b>Plants</b> : Group > Plants
<b>Mammalia</b> : Group > Mammals	<b>Medicinal plants</b> : Group > Medicinal plants	<b>Molluscs</b> : Group > Molluscs	<b>Mosses</b> : Phylum > Bryophyta	<b>Reptiles</b> : Group > Reptiles	<b>Unknown</b> : Taxonomic Group Not assigned

# DATA MODELS





# API Request



## Output JSON file

```
"BIMDashboard_v1": [
{
  "taxonID": "57414",
  "catalogNumber": "ACBBISS-MY-57414",
  "scientificName": "Vibrio cholerae",
  "Kingdom": "Bacteria",
  "Phylum": "Proteobacteria",
  "Class": "Gammaproteobacteria",
  "Order": "Vibrionales",
  "Family": "Vibrionaceae",
  "Country": "Malaysia",
  "CountryID": "MY",
  "source": "",
  "modified": "2012-06-22 20:00:00",
  "collectionCode": "57414",
  "basicOfRecord": "",
  "scientificNameAuthorship": "Pacini 1854",
  "identifiedBy": "",
  "stateProvince": "",
  "county": "",
  "locality": "",
  "decimallongitude": "0",
  "decimallatitude": "0"
},
{
  "taxonID": "68830",
  "catalogNumber": "ACBBISS-MY-57414",
  "scientificName": "Vibrio cholerae",
  "Kingdom": "Bacteria",
  "Phylum": "Proteobacteria",
  "Class": "Gammaproteobacteria",
  "Order": "Vibrionales",
  "Family": "Vibrionaceae",
  "Country": "Malaysia",
  "CountryID": "MY",
  "source": null,
  "modified": "2012-06-22 20:00:00",
  "collectionCode": "57414",
  "basicOfRecord": null,
  "scientificNameAuthorship": "Pacini 1854",
  "identifiedBy": null,
  "stateProvince": null,
  "county": null,
  "locality": null,
  "decimallongitude": "0",
  "decimallatitude": "0"
}
]
} ...
```

[http://bim-mirror.aseanbiodiversity.org/dashboard/bim\\_api/product/get\\_species.php?CountryID=PH&API\\_TOKEN=#](http://bim-mirror.aseanbiodiversity.org/dashboard/bim_api/product/get_species.php?CountryID=PH&API_TOKEN=#)

Run API

/bim\_api/product/get\_species.php?TaxonomicGroup=(TaxonomicGroup)&API\_TOKEN=?



## BIM Web service API

General information on how to use the REST API

The Biodiversity Information Management handles API request using Darwincore structure using pre defined paramters. The API can be customized based on the requirements of datasets. You can request an API token from Kit Elloran @ cbelloran@aseanbiodiversity.org

### Species by country

#### To get a list of species per country

A simple way to get data from the server by API code when querying using "CountryID" as parameter and a unique API TOKEN provided (request).

**Note:** Parameters for "CountryID" are "BN", "KH", "ID", "LA", "MY", "MM", "PH", "SG", "TH", "VN"

Run API `/bim_api/product/get_species.php?CountryID=(CountryID)&API_TOKEN=?`

### Taxon group

#### To get a list of Taxonomic group

To get a list of species based on their Taxonomic group (TaxonomicGroup). Using "TaxonomicGroup" as parameter.

**Note:** Parameters are listed below for reference

#### Taxonomic group

Alga  
Amphibians  
Anthozoans  
Aquatic plant  
Arachnid  
Arachnids  
Archaea  
Bacteria  
Birds  
Bryozoan  
Butterflies  
Coral  
Crustaceans  
Flatworm  
Flowering Plants  
Freshwater Fishes  
Fungi  
Grass  
Herb  
Hydrozoans  
Insects  
Mammals  
Marine Fishes  
Marine Reptiles  
Medicinal Plants  
Merostomata  
Molluscs  
Plants  
Protozoa  
Reptiles  
Shrub  
Succulent  
Terrestrial Mammals  
Terrestrial Reptiles  
Viruses

### Output JSON file

```
"BIMDashboard_v1": {
  {
    "taxonID": "57414",
    "catalogNumber": "ACB8ISS-MY-57414",
    "scientificName": "Vibrio cholerae",
    "Kingdom": "Bacteria",
    "Phylum": "Proteobacteria",
    "Class": "Gammaproteobacteria",
    "Order": "Vibrionales",
    "Family": "Vibrionaceae",
    "Country": "Malaysia",
    "CountryID": "MY",
    "source": "",
    "modified": "2012-06-22 20:00:00",
    "collectionCode": "57414",
    "basicOfRecord": "",
    "scientificNameAuthorship": "Pacini 1854",
    "identifiedBy": "",
    "stateProvince": "",
    "county": "",
    "locality": "",
    "decimalLongitude": "0",
    "decimalLatitude": "0"
  },
  {
    "taxonID": "68830",
    "catalogNumber": "ACB8ISS-MY-57414",
    "scientificName": "Vibrio cholerae",
    "Kingdom": "Bacteria",
    "Phylum": "Proteobacteria",
    "Class": "Gammaproteobacteria",
    "Order": "Vibrionales",
    "Family": "Vibrionaceae",
    "Country": "Malaysia",
    "CountryID": "MY",
    "source": null,
    "modified": "2012-06-22 20:00:00",
    "collectionCode": "57414",
    "basicOfRecord": null,
    "scientificNameAuthorship": "Pacini 1854",
    "identifiedBy": null,
    "stateProvince": null,
    "county": null,
    "locality": null,
    "decimalLongitude": "0",
    "decimalLatitude": "0"
  }
}
```

Run API `/bim_api/product/get_species.php?TaxonomicGroups=(TaxonomicGroup)&API_TOKEN=?`

### Species name

Run API `API for Species name is under development`

### Threats

API for Threats is under development

# Data Management

## Developing tools and mechanism R Package, API and Python

### BIM Web service R Package

Data access using rBIM R package

BIM provides downloadable access in various databases using defined parameters. The mapper web service allows you to vis reserachers, policy makers, universities, NGO and non-government organizations.

### Species occurrence per country

#### To get a list of species occurrence per country

A simple way to get data from the server and visualize using map using GBIF online mapper

**Note:** Parameters for &country = 'country=PH' # country code of Philippines

### Generating species occurrence map per country

```
library(leaflet)
# need to define new projection. Only this projection will work
epsg4326 <- leafletCRS(crsClass = "L.CRS.EPSG4326", code = "EPSG:4326")
proj4def = "+proj=longlat +datum=WGS84 +no_defs",
resolutions = 2^(10:0),
origin = c(0,0)
)
# create the gbif-geyser style raster layer
projection <- '4326' # must use this projection code for
style <- 'style=gbif-geyser' # any style will work
tileRaster <- paste0('https://tile.gbif.org/', projection, '.png')
# create the data layer with dragonfly data # Note the 'country=PH'
prefix <- 'https://api.gbif.org/v2/map/occurrence/adhoc/'
# make query
style <- 'style=classic.poly' # style of polygons
taxonKey = 'taxonKey=1' # taxon key of Odonata
country = 'country=PH' # country code of Philippines
tilePolygons = paste0(prefix, style, '&', taxonKey, '&', country, '.png')
# plot the map
leaflet(options = leafletOptions(crs = epsg4326)) %>%
  setView(lng=121.65357287126402, lat=11.204269254887807, zoom=10) %>%
  addTiles(urlTemplate=tileRaster) %>%
  addTiles(urlTemplate=tilePolygons) %>%
```

## Downloadable files

Species and Protected Areas encoder tools

BIM provides online and offline downloadable materials and tools to support in digitizing biodiversity data.

### Online Species and Protected Areas encoder

**You need to have a user account to login in remote data entry**

#### Online Species and Protected Areas encoder

Species encoder [Link](#)  
Protected areas [Link](#)

### Offline Species and Protected Areas encoder

**Download may take a while due to large number of files**

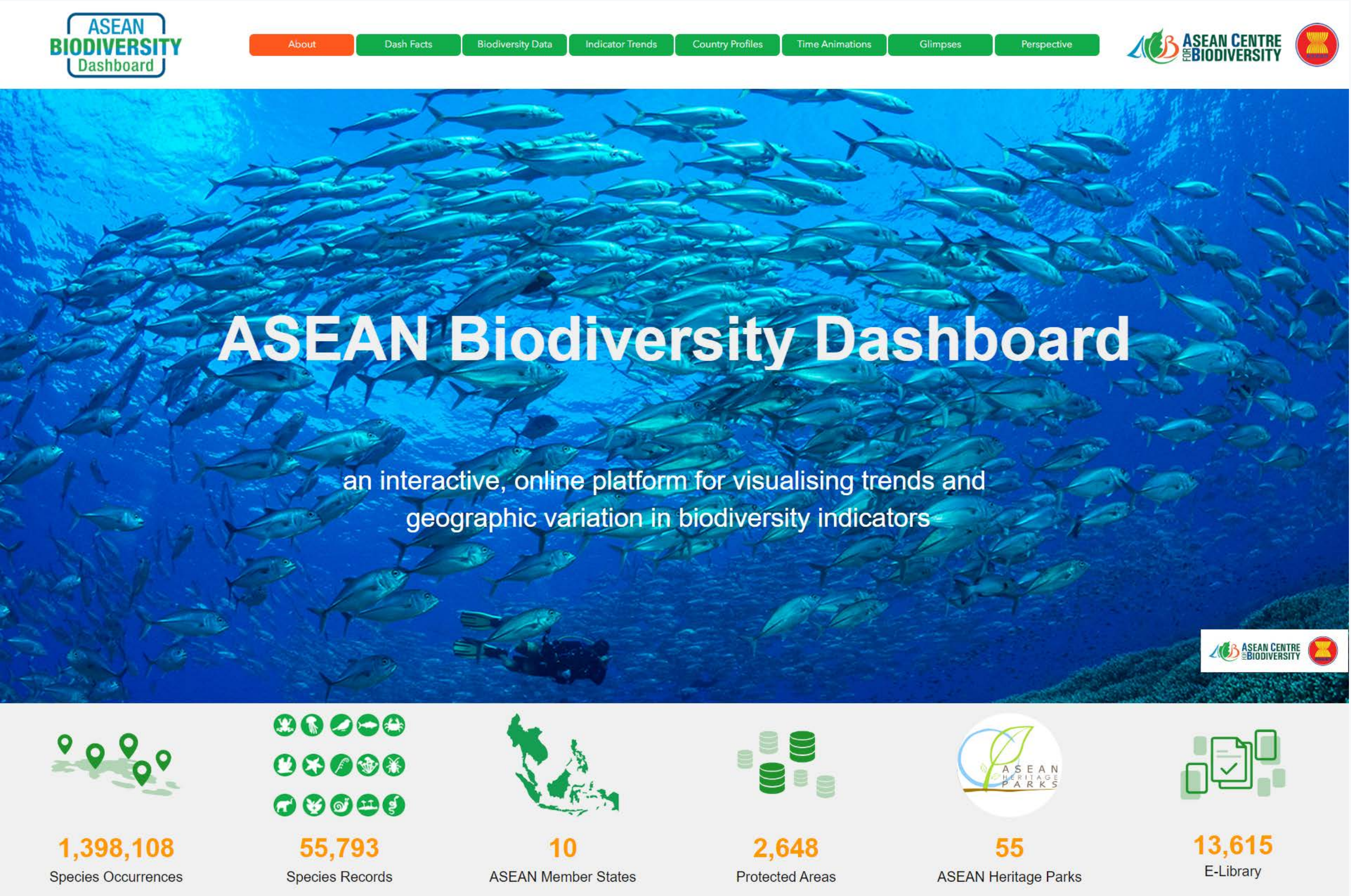
Download the latest version of excel files and extract to desktop

#### Download offline Species and Protected Areas encoder

Species encoder [ver.4.2.6 \(stable\)](#)  
Protected areas [ver.4.2.4](#)

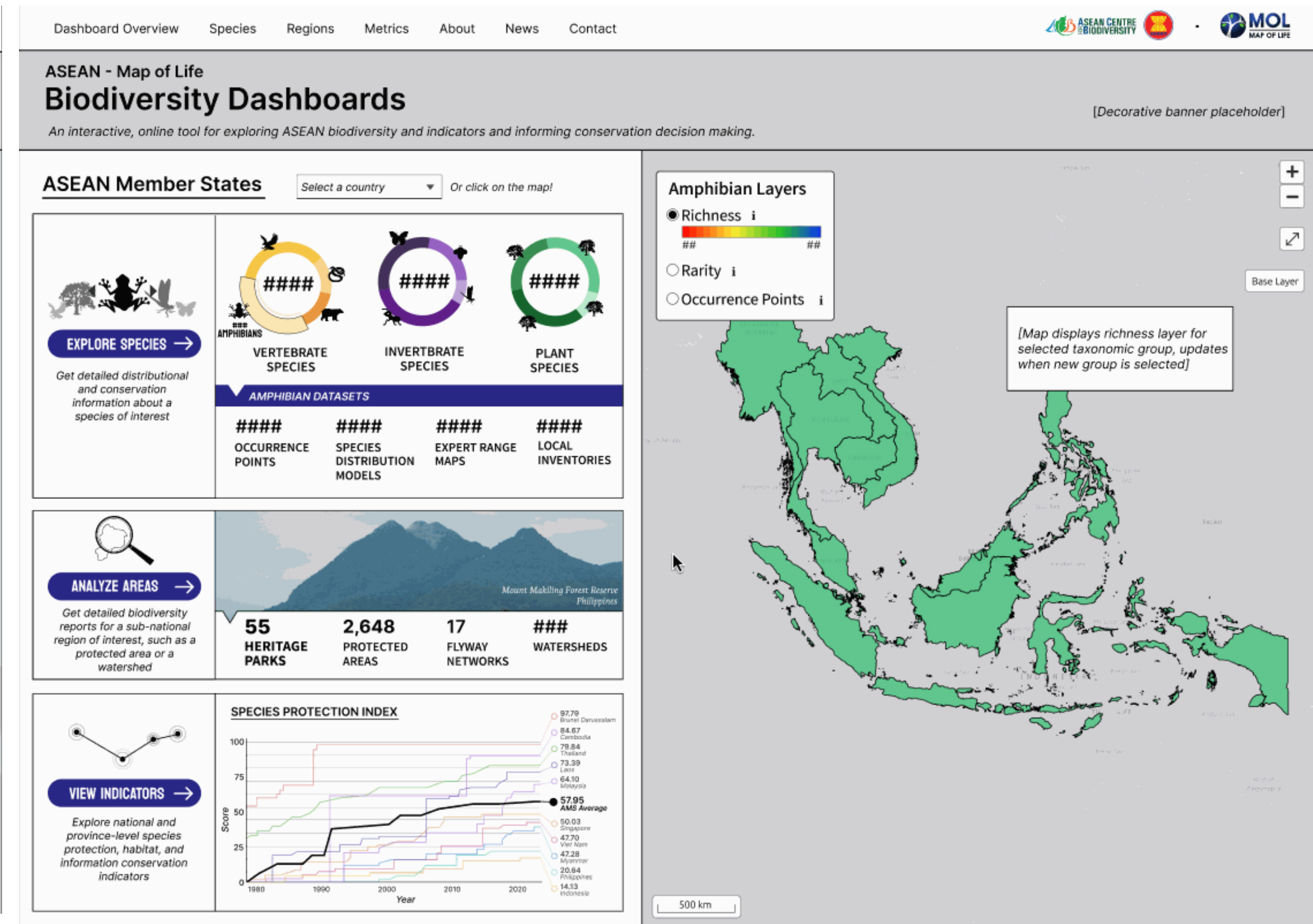
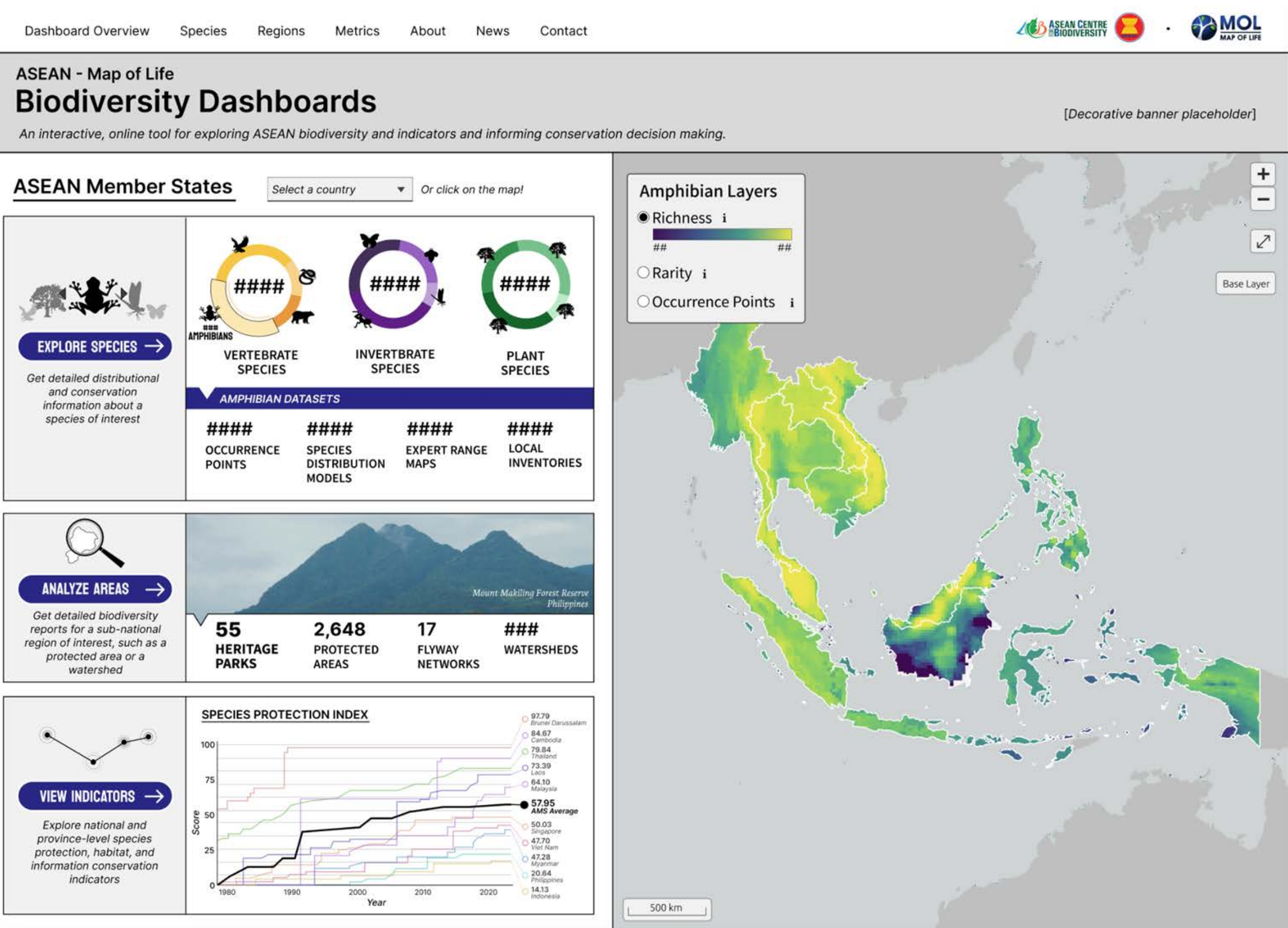


# Ongoing development





# Ongoing development

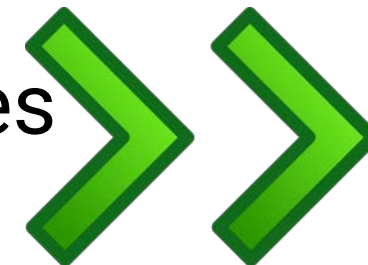




## Explore Species Panel

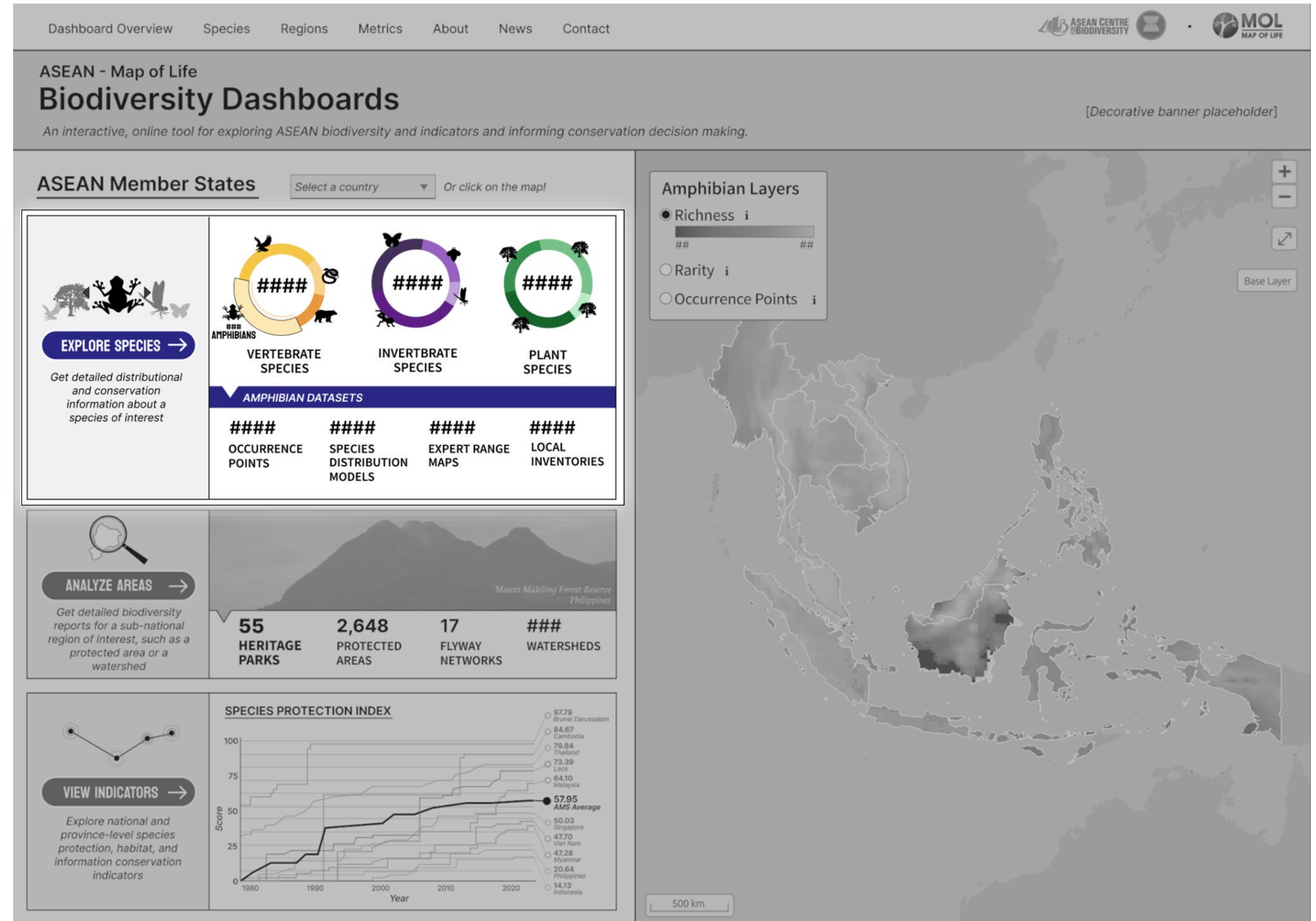
Displays species taxonomic statistics for vertebrates, invertebrates, and plants

Taxa within each wheel are hoverable and display species stats on hover



Datasets section updates for the selected taxon; here, amphibians are selected, so the datasets section reflects the number of each types of dataset available for amphibians

“Explore species” button takes the user to a dedicated page for searching species information



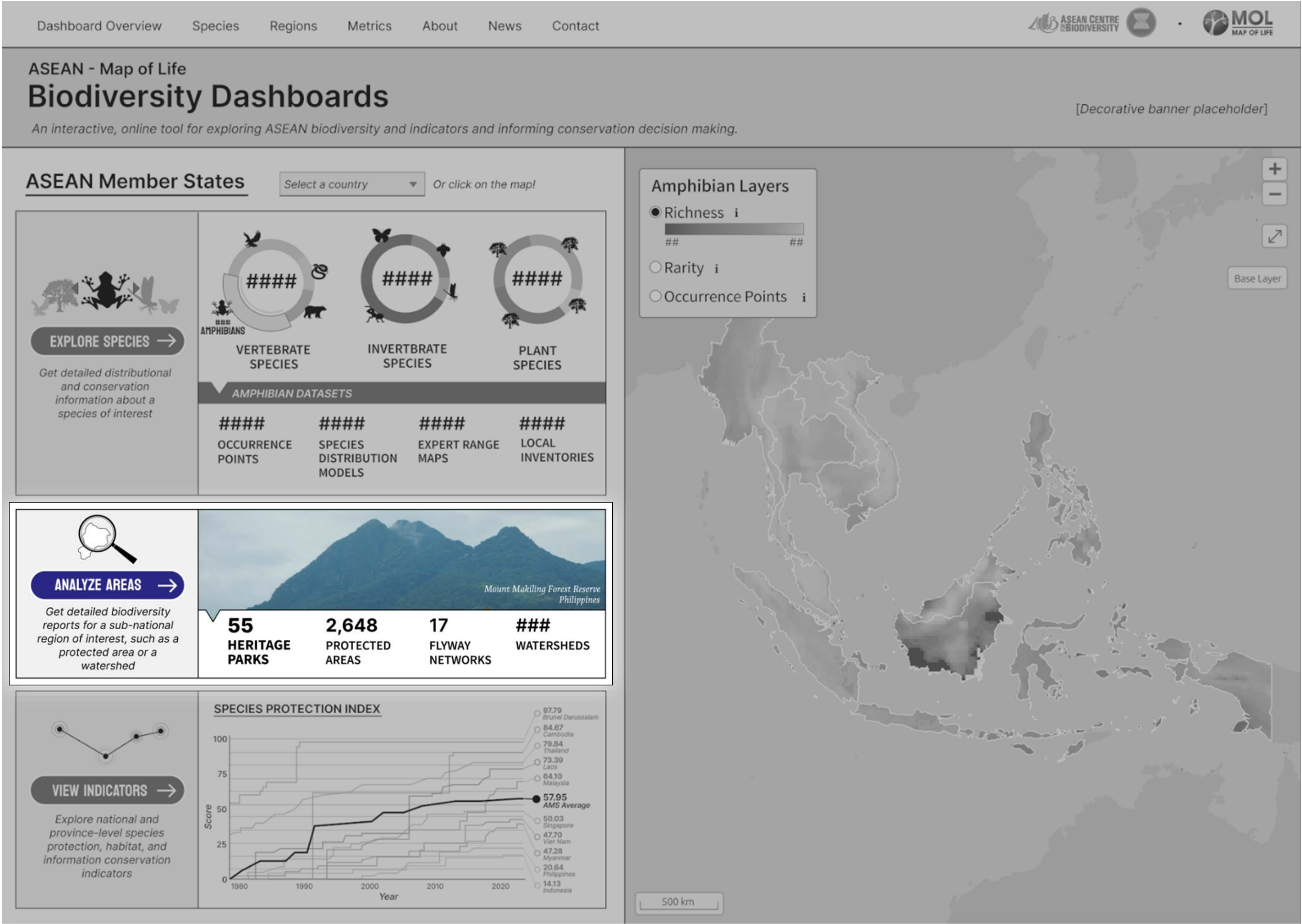
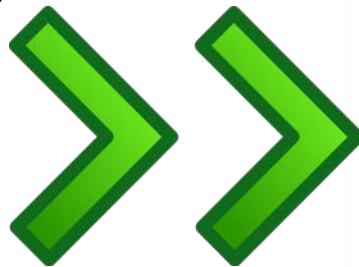


# Analyze Areas Panel

Displays statistics for number of each type of region in the AMS (here, just showing Heritage parks, PAs, Flyway Networks, and watersheds for example, but this list can be edited/expanded)

Here, Heritage parks are selected by default, and selecting a different area type will change the header image to an example of that type of region in the AMS

Clicking “Analyze Areas” button takes the user to a dedicated page for generating biodiversity and other information for an area of interest



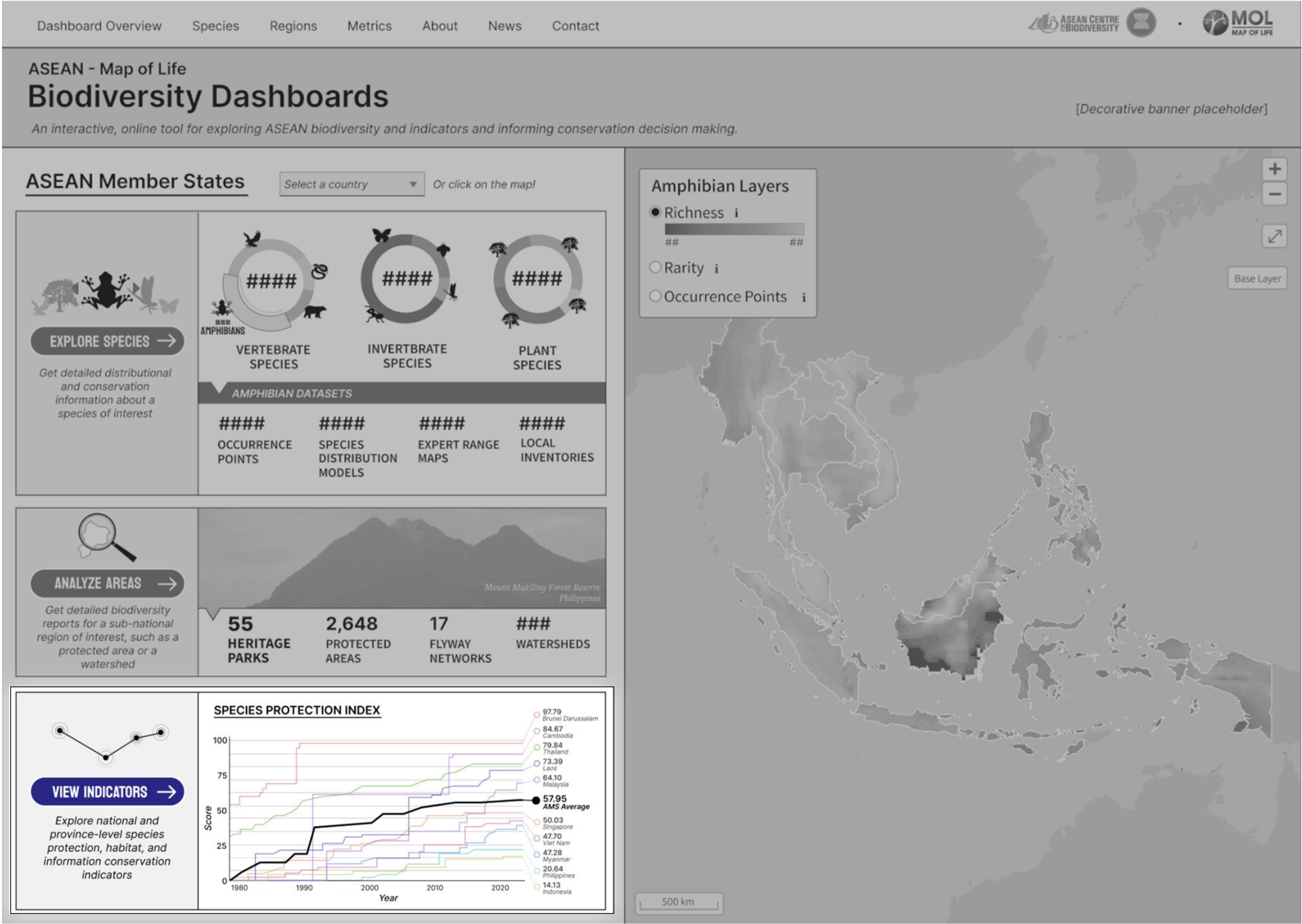
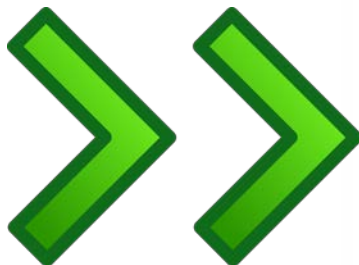


View Indicators Panel

Displays Species protection Index information on default for all AMS

AMS average is always highlighted; user can hover over the graph to highlight other lines

Clicking “View Indicators” button takes the user to a dedicated page to view all indicators at national and province/state levels (where available)





## Species Page Features

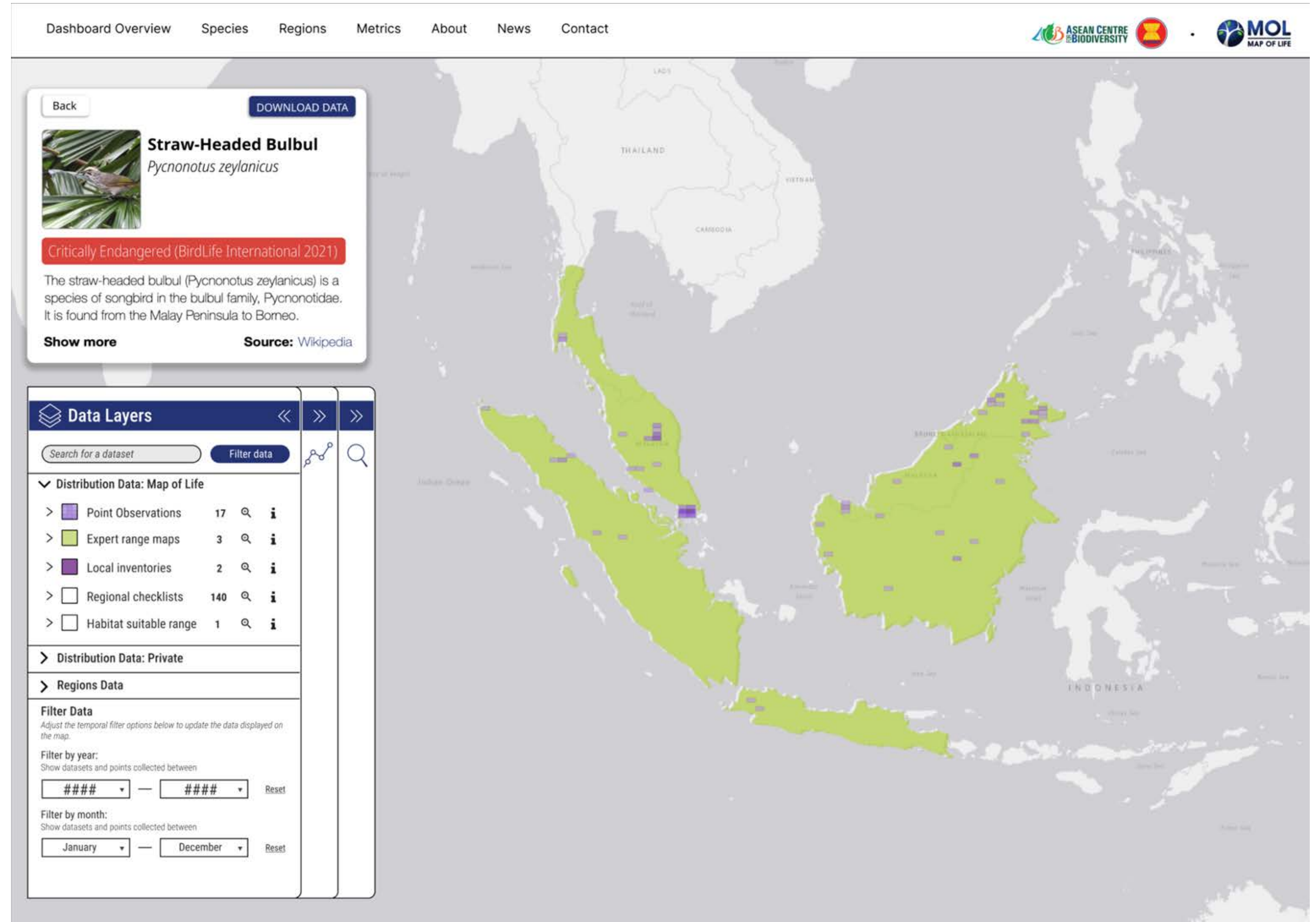
View public distribution data from MOL and private data

Overlay regions of interest

View conservation metrics and compare between countries

Analyze tables of regions the species occurs in (for example, all protected areas within the species range and how much of its range in within each area)

\*Note: These pages would display the individual SDMs for each species as well





# Species Search Features

Ability to filter by the data source type (e.g., species that have been record (occurrence point, inventory) in the area versus species are expected to be found there (range map, SDM))

Ability to filter by country and IUCN status

View and sort by species conservation metrics

See a preview of the species data when selected before going to the species page

Dashboard Overview

Species

Regions

Metrics

About

News

Contact

ASEAN CENTRE OF BIODIVERSITY

MOL MAP OF LIFE

Filters

Expected Sources

Expert Range Map: 1598

Recorded Sources

Occurrence: 2030

Local Inventory: 503

IUCN Status

Critically Endangered: 24

Endangered: 46

Vulnerable: 89

Least Concern: 1368

Unknown: 535

Country

Brunei Darussalam: ##

Cambodia: ##

Indonesia: ##

Lao PDR: ##

Malaysia: ##

Myanmar: ##

Philippines: ##

Singapore: ##

Thailand: ##

Species








Sort species by: Select one

Back

Download

#### Birds

Filter birds

Species	SHS	SPS	SIS
<b>Bulbuls</b> <i>Pycnonotidae</i>			
 <b>Straw-Headed Bulbul</b> <i>Pycnonotus zeylanicus</i> <a href="#">3 datasets here</a>	##	##	##
<b>Fantails</b> <i>Rhipiduridae</i>			
 <b>Cerulean Paradise Flycatcher</b> <i>Eutrichomyias rowleyi</i> <a href="#">3 datasets here</a>	##	##	##
<b>Owls</b> <i>Strigidae</i>			
 <b>Siau Scops Owl</b> <i>Otus siaoensis</i> <a href="#">2 datasets here</a>	##	##	##
<b>Starlings</b> <i>Sturnidae</i>			
 <b>Rothschild's Myna</b> <i>Leucopsar rothschildi</i> <a href="#">3 datasets here</a>	##	##	##
<b>Ibises</b> <i>Threskiornithidae</i>			
 <b>White-Shouldered Ibis</b> <i>Pseudibis davisoni</i> <a href="#">3 datasets here</a>	##	##	##
<b>Plovers</b> <i>Charadriidae</i>			
 <b>Javanese Lapwing</b> <i>Vanellus macropterus</i> <a href="#">2 datasets here</a>	##	##	##
<b>Pigeons</b> <i>Columbidae</i>			
 <b>Silvery Wood-Pigeon</b> <i>Columba argentina</i> <a href="#">3 datasets here</a>	##	##	##

Map

Base Layer

Display gridded density map of vertebrate occurrences; updates as filters are selected or when species is selected

500 km



# Ongoing development

ASEAN Centre for Biodiversity

Web Map Service

An OGC compliant web mapping service that seeks to aid the ASEAN Centre for Biodiversity in its efforts to combat biodiversity loss through the power of geospatial technology.

Login



BCAMP

ASEAN CENTRE FOR BIODIVERSITY

ACB Web Map Service

BCAMP

ASEAN CENTRE FOR BIODIVERSITY

ACB Web Map Service

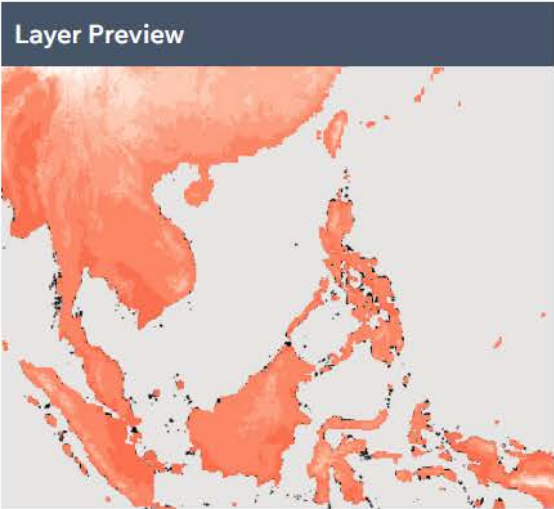
kitelloran

Layers

Styles

Layer: Minimum Temperature October 2020

Layer Preview



Description:

Minimum temperature dataset covering the ASEAN region for October 2020. CRU-TS 4.06 (Harris et al., 2020) downscaled with WorldClim 2.1 (Fick and Hijmans, 2017). Fick, S.E. and R.J. Hijmans, 2017. WorldClim 2: new 1km spatial resolution climate surfaces for global land areas. International Journal of Climatology 37 (12): 4302-4315. Harris, I.,

Layer Preview

Philippines LC 2019

Legend

shrub

Herbaceous Vegetation

cultivated and managed vegetation/agriculture (cropland)

Urban / built-up

Bare / sparse vegetation

Snow and ice

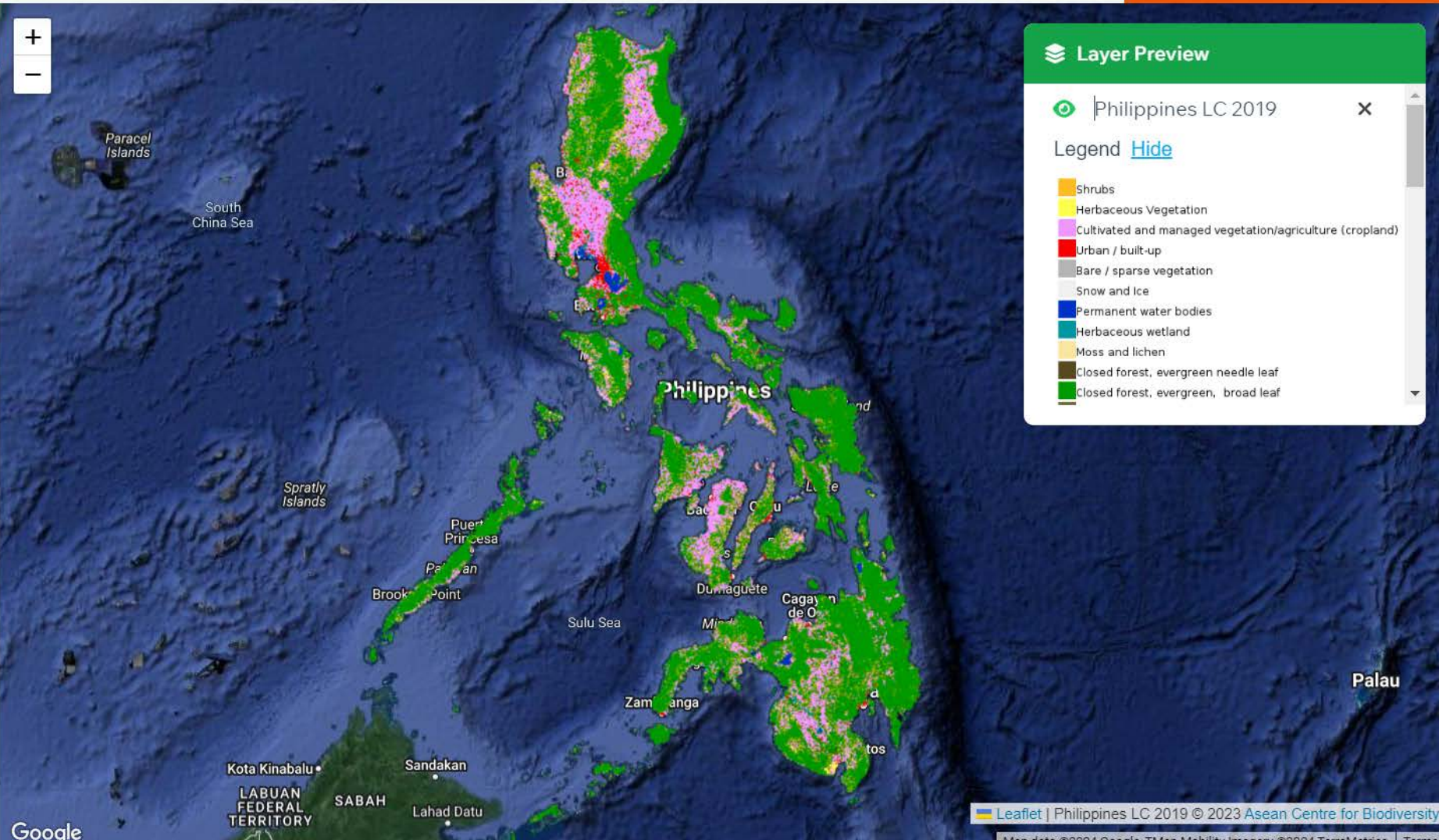
Permanent water bodies

Herbaceous wetland

Moss and lichen

closed forest, evergreen, needle leaf

closed forest, evergreen, broad leaf



BCAMP

ASEAN CENTRE FOR BIODIVERSITY

ACB Web Map Service

kitelloran

Layers

Styles

AHP 55

Description: ASEAN Heritage Parks

Category: Protected Areas

Tags: AHP

AMS Boundaries

Description:

Category: Basemap

Tags: AMS


ASEAN EEZ

Description: ASEAN Exclusive Economic Zones

1 - 4 of 11

Filters

Upload



BCAMP

ASEAN CENTRE FOR BIODIVERSITY

ACB Web Map Service

kitelloran

Layers

Styles

Legend Request Template

https://wms.aseanbiodiversity.org/geoserver/wm/

Legend Preview

<= 100.0000

100.0000 - 200.0000

200.0000 - 300.0000

300.0000 - 400.0000

400.0000 - 500.0000

500.0000 - 600.0000

600.0000 - 700.0000

700.0000 - 800.0000

800.0000 - 900.0000

900.0000 - 1000.0000

Remove from Map

Edit Layer

Delete Layer

Layer Preview

Precipitation October 2...

Legend

<= 100.0000

100.0000 - 200.0000

200.0000 - 300.0000

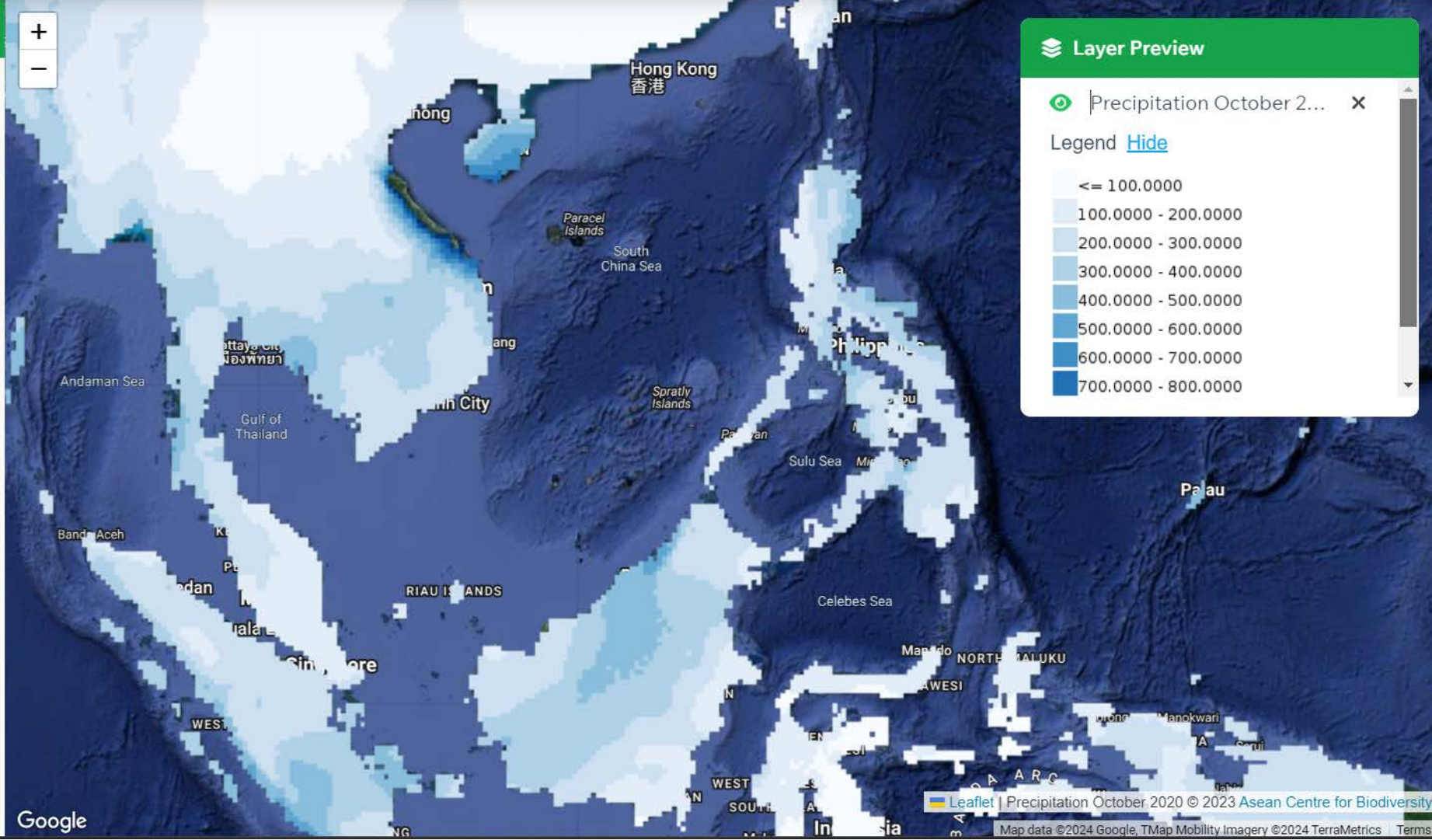
300.0000 - 400.0000

400.0000 - 500.0000

500.0000 - 600.0000

600.0000 - 700.0000

700.0000 - 800.0000





# Biodiversity data publishing



ASEAN Clearing House Mechanism

HOME

ABOUT US

BIODIVERSITY

IMPLEMENTATION

RESOURCES

TOOLS

ACB SCIENTIFIC ADVISORY COMMITTEE

ASEAN BIODIVERSITY OUTLOOK 3

ASEAN BIODIVERSITY DASHBOARD

MORE

#WEAREASEANBIODIVERSITY

A Sanctuary of Biodiversity and Natural Wonders

ASEAN, Google Arts & Culture launch online exhibit on Southeast Asia's natural and cultural heritage

While people are aware of the triple planetary crisis—pollution, climate change, and biodiversity loss—biodiversity remains an abstract concept to many. In simple terms, biodiversity refers...


READ MORE

SEA OBIS


South-East Asian OBIS node

<http://chm.aseanbiodiversity.org>

<http://aseanbiodiversity.org>



Christian Elloran  
cbelloran@aseanbiodiversity.org



Pauline Carmel Joy Eje  
pcjeje@aseanbiodiversity.org

ACB Southeast Asia Node "SEA OBIS"

OBIS OCEAN BIODIVERSITY INFORMATION SYSTEM

HOME ABOUT DATA MANUAL MEDIA ACTIVITIES CONTACT

SEA OBIS

Feeds

Description

Website

Contacts

STATISTICS

DISTRIBUTION

RECORDS

COMPOSITION

TOP TAXA

TOP DATASETS

TOP TAXA

34 Regional Nodes

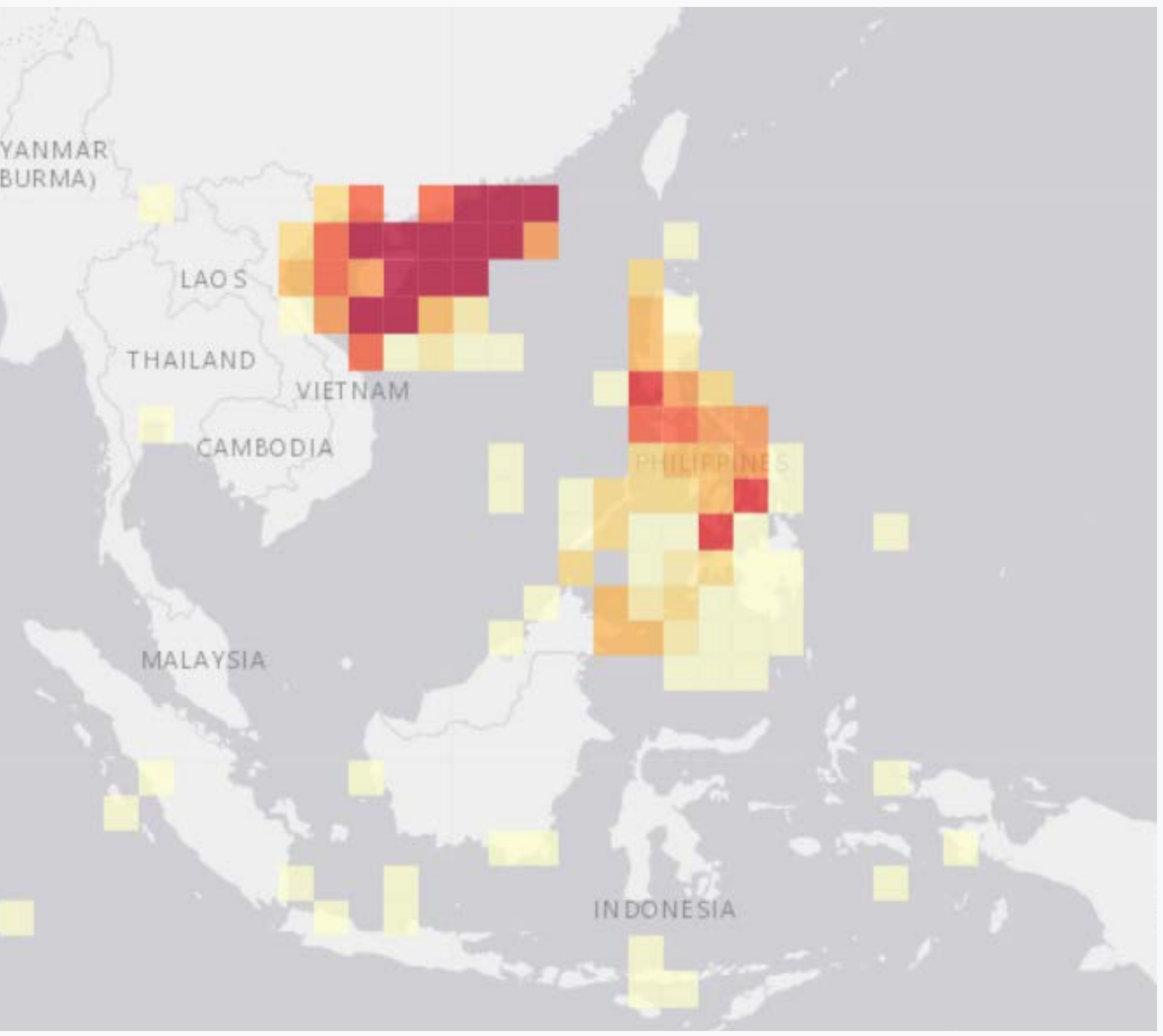
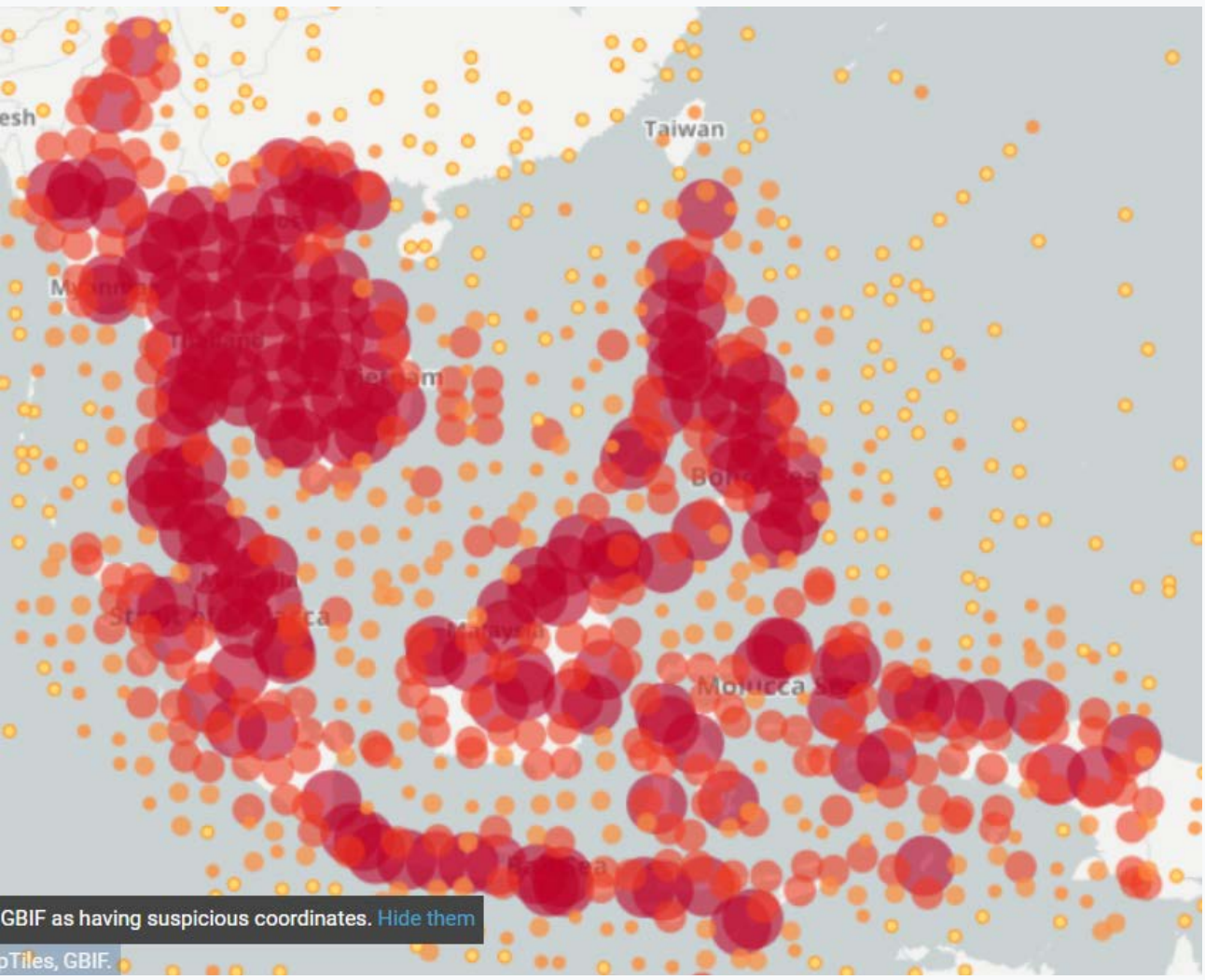
Integrated Publishing Toolkit

Resources you have rights to manage

Overview: Fish Collection of National Museum, Philippines

23 Resources and datasets published in GBIF

<http://bim-mirror.aseanbiodiversity.org:8080/lpt/>





# Engaging research communities for data mobilization

## Organized Biodiversity Data Mobilization

- **KBA e-Learning & Biodiversity Data Mobilisation Workshops**  
21-24 August 2023, Philippines
- **Workshop on Establishment of National Clearing-House Mechanism Using Bioland Tool**  
9-12 October 2023, Thailand

## Workshops and Trainings

- **Training of Trainers: Multisector Framework for Mainstreaming Biodiversity Workshop**  
25-26 July
- **Philippine Biodiversity Strategy and Action Plan Expert's Consultation Meeting**  
27 July Philippines
- **Completion of the Internship Program**  
August 2023 Philippines



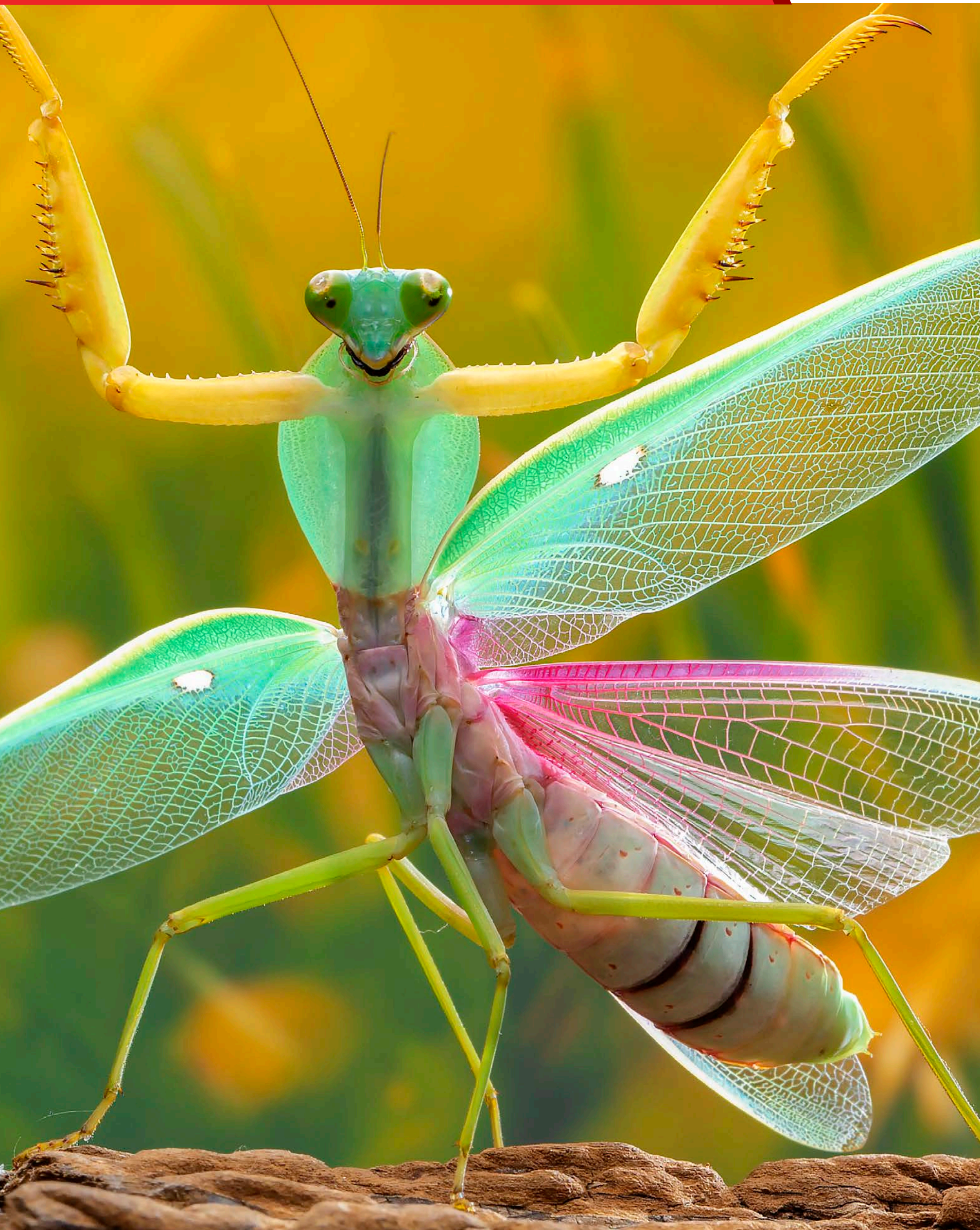


## Technical

- **Assemble and curate data** and information on biodiversity in the ASEAN region
- **Develop geographic mapping and analytical tools** to support knowledge generation and management
- **Provide scientific inputs** to conservation management initiatives and key programs and projects of ACB.
- **Provide science-based information** for the development of regional initiatives and conservation policies.
- **Maintain the technical platforms** of ACB such as the Regional CHM and the ASEAN Biodiversity Dashboard
- **Support the development of project** websites and maintain databases: AHP, e-library, policies, Friends of Biodiversity, good practices, etc.







## Science and Research

- **Analyse** biodiversity-related data and information,
- **Develop regional syntheses and organise** the ASEAN Biodiversity Outlook publication to support science-based policy-making on biodiversity conservation.
- **Ensure that the science and research outputs**, as well as the knowledge products produced by the ACB are reviewed and validated by the ACB Scientific Advisory Committee (ACB SAC).
- **Coordinate the conduct of ACB SAC-related activities** and provide support to the ACB SAC members in fulfilling their functions





## Potential added features for Analyze Areas tool:

- . **Ability to bulk download data** for all areas of a selected type without having to select each area individually
- . **Add filters for country endemism** (and other filters AMS would be interested in having)
- . **Include species indicator scores on the site display**, in the downloaded data, and potentially as an added filter or sorter
- . **Calculate the percent** of each species suitable range in the selected area (and potentially include as a filter/sorter)
- . **Add ability for users to save/star** areas that would appear on the Analyze Areas landing page for ease in returning to those areas



# #WeAreASEANBiodiversity

## OUR HOME • OUR LIVES • OUR STORIES

[weare.aseanbiodiversity.org](http://weare.aseanbiodiversity.org)



For more information, log on to  
**[www.aseanbiodiversity.org](http://www.aseanbiodiversity.org)**



D.M. Lantican Avenue  
University of the Philippines Los Baños  
Laguna, Philippines 4031



[facebook.com/ASEANbiodiversity](https://facebook.com/ASEANbiodiversity)



[@ASEANBiodiversity](https://@ASEANBiodiversity)



[@ABiodiversity](https://@ABiodiversity)



[TheASEANBiodiversity](https://TheASEANBiodiversity)



ASEAN Clearing  
House  
Mechanism



ASEAN Biodiversity  
Dashboard



ACB e-learning