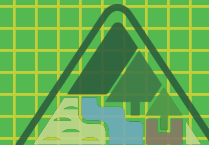


Taiwan Ecological Network (TEN)

Chih-Chin Shih*, Jin-Jia Jang,
Hsiao-Tien Hsieh, Chia-Tzu
Chen
Forestry Bureau, Council of Agriculture
Taiwan

2022.11.23





Eurasian Plate

The Tropic of Cancer

Philippine Sea Plate

100

Km

About Taiwan

- Subtropical & tropical island
- Highest mountain : 3,952 m
- Wide variety of ecological environments



Esri, HERE, Garmin, (c)
OpenStreetMap contributors, and
the GIS user community



Taiwan's Biodiversity

- Over **60,000** species
 - **3.4%** of the world
- High percentage of endemic and rare species

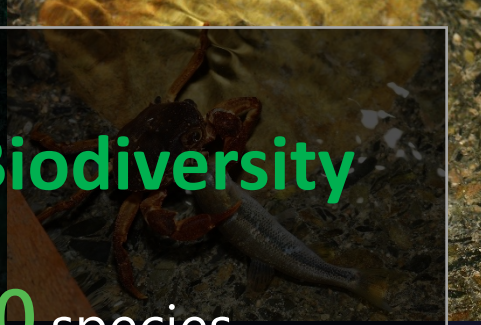


Photo Credit: Tun-Yu Chen; Jerome Chie-Jen Ko

Protected areas in Taiwan

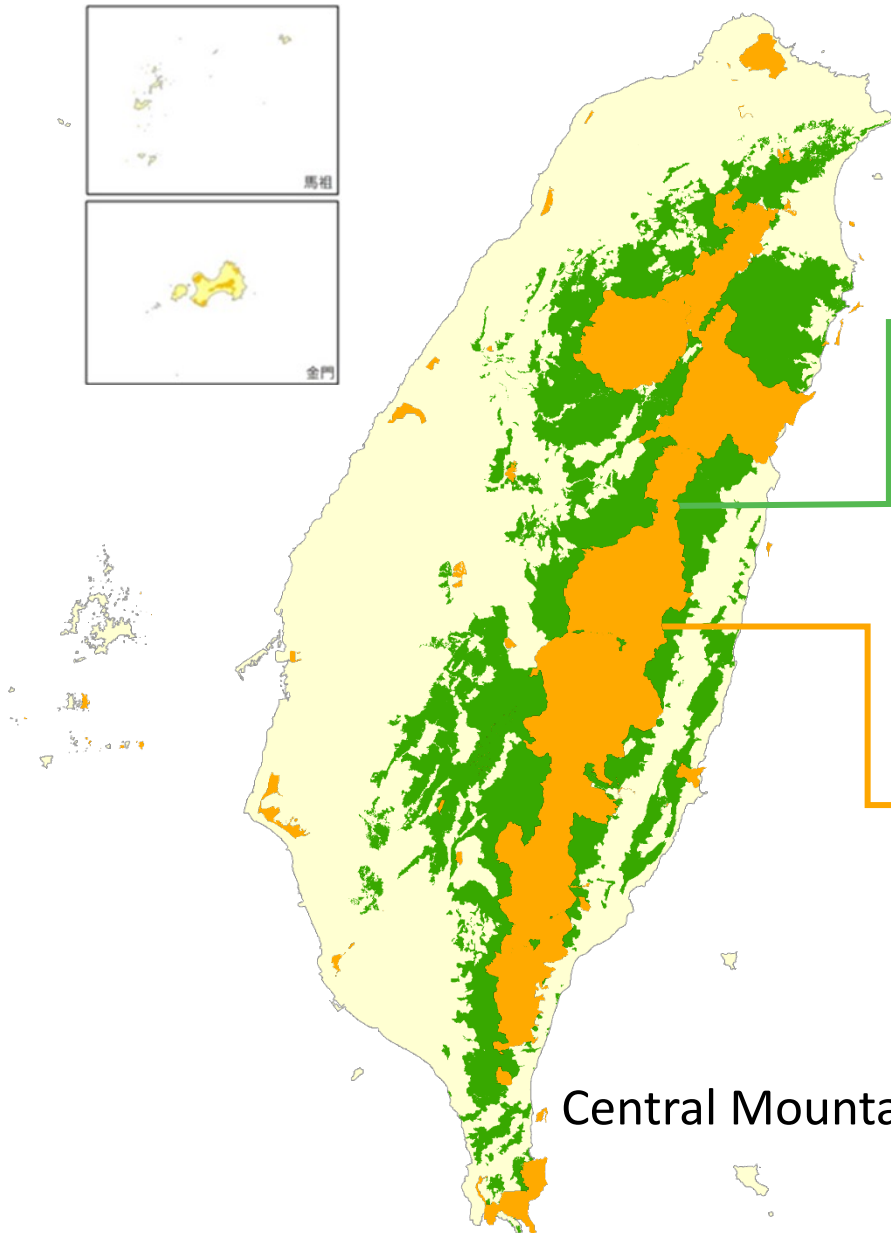
- Well-managed
State-owned forests

42.5% of the total surface
(1.538 million hectares)

- Protected area

19.2% of the land
98 protected areas

Central Mountain Conservation Corridor

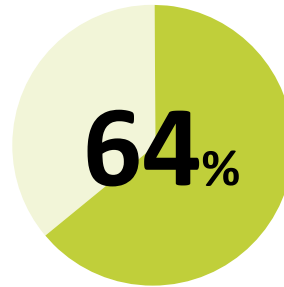
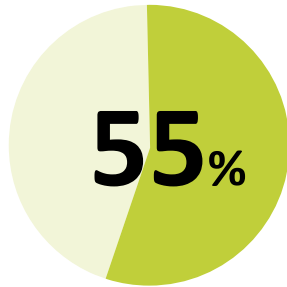




Taiwan is a highly human-modified island

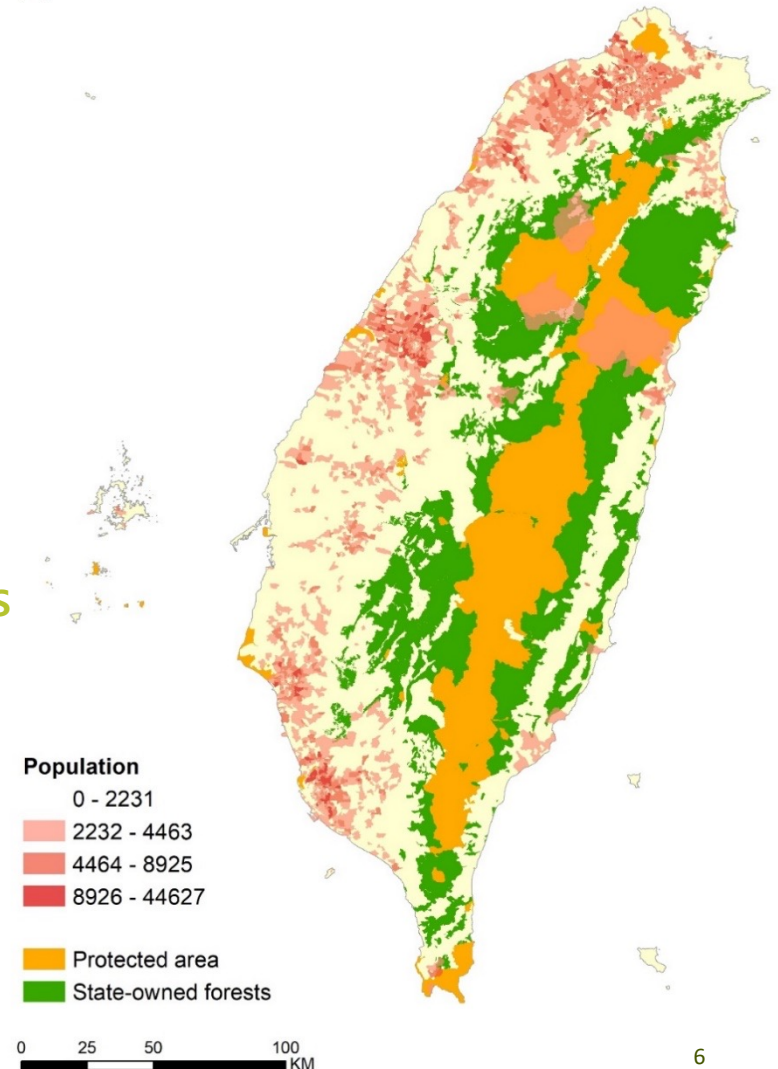
- Population : 23,198,133
 - Population density : 641 / km²
- World Ranking: < 20

Conservation and species protection outside the protected areas is insufficient



Protected Animals The Red List of Plants

- Located outside the well-protected forest areas
- Overlap with human population in shallow mountain and coastal areas



Habitat fragmentation



Conservation challenges on a populous island

Biodiversity hotspots outside the protected areas and state-owned forests are mostly located on private lands
- difficult to designate protected areas



Taiwan Ecological Network (TEN) (2018 ~)

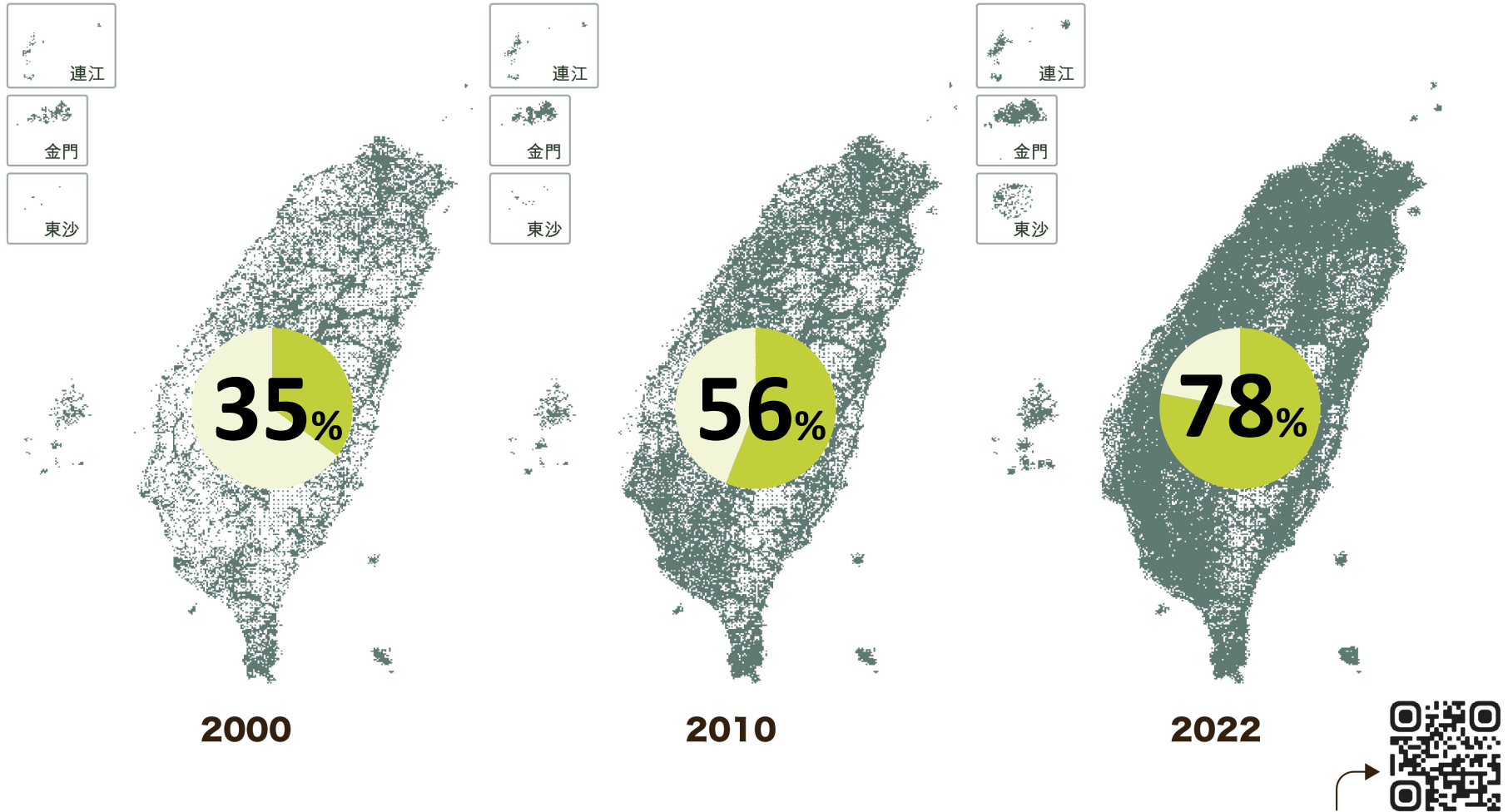


Habitat connectivity network
implemented through cross-sectoral integrated strategies
and biodiversity data-based spatial planning

What and where needs to be linked ?

We need to find
priority connectivity areas

Taiwan's biodiversity data coverage



Data from Taiwan Biodiversity Network "www.tbn.org.tw"
(updated to 2022-08)

TaiBIF – GBIF's node in Taiwan



Global
science
research

Policy-
making

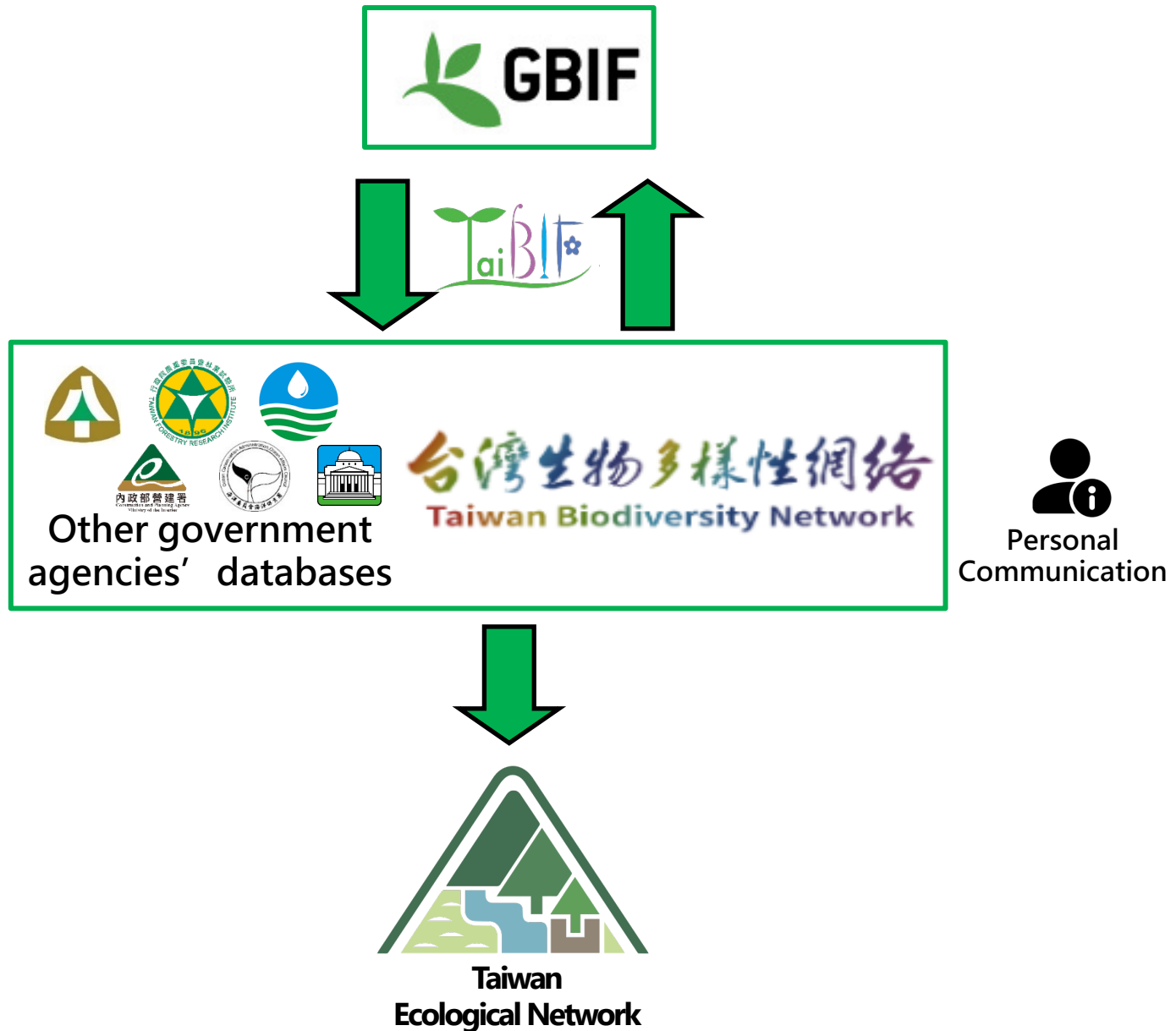
Public
construction
use



Occurrence records: **14,698,604**
No.2 in Asia

From: GBIF Map Toolbox

Biodiversity data used by TEN



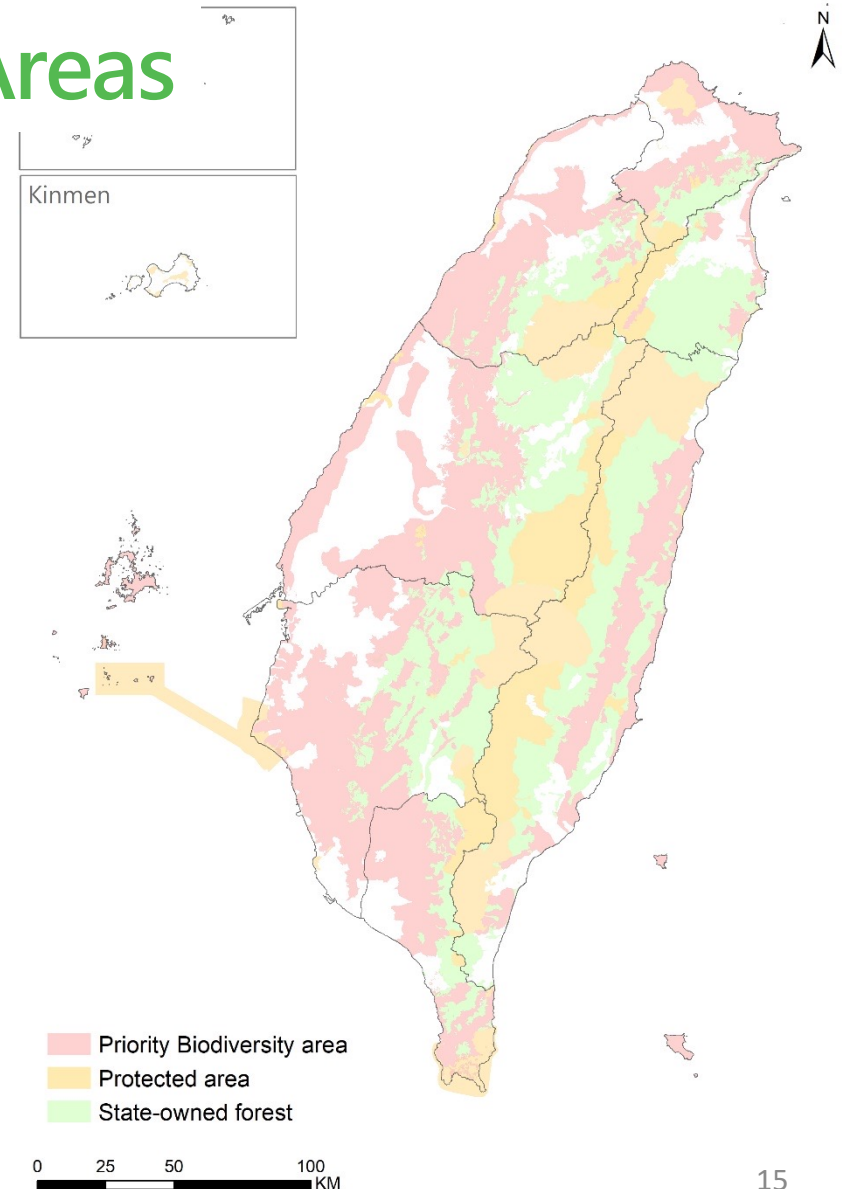
Spatial Planning :

(1) Priority Biodiversity Areas (terrestrial)

Principles of identification

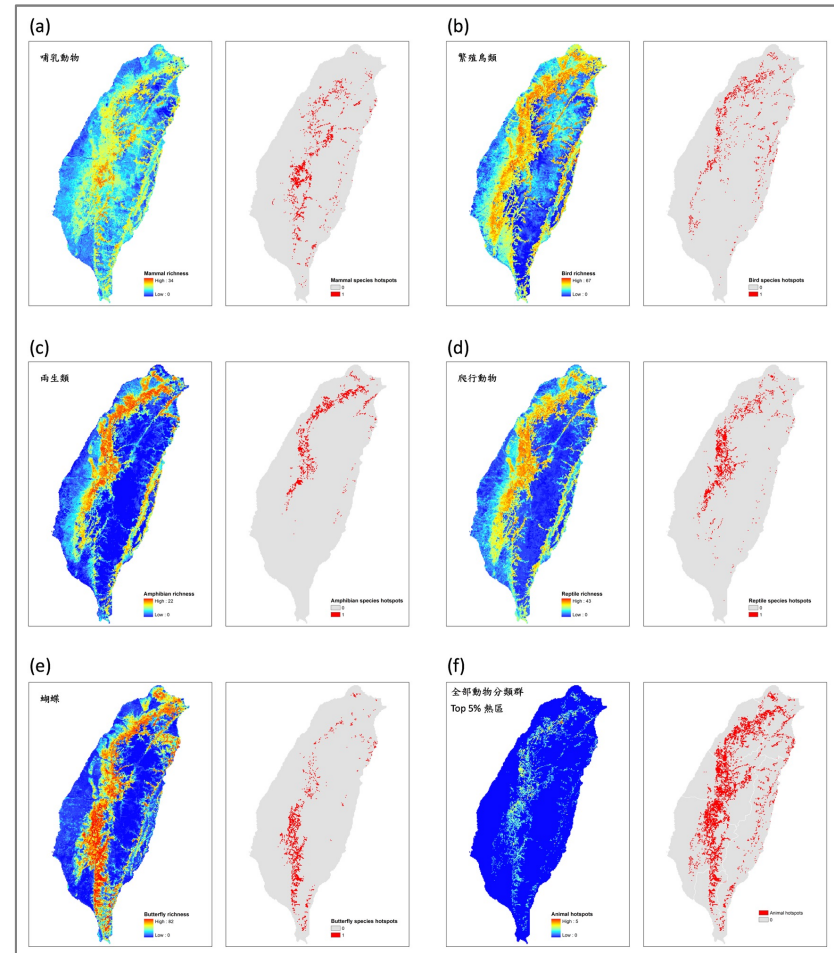
- Biodiversity hotspots*
- Habitats of endangered animals & threatened plants*
- Waterfowl hotspots*
- Socio-Ecological Production Landscapes and Seascapes
- Issues of interest
- Opinions of scientists

* biodiversity data was applied



Biodiversity hotspots

- Species Distribution Models (SDMs)
 - mammals, birds, reptiles, amphibians, insects
 - Total: **306** species
- Overlay the distribution maps of five taxa
- Define biodiversity hotspots: grids with **top 5% species richness** of at least 1 taxon



Biodiversity hotspots are mainly located in mosaic landscapes of shallow mountains

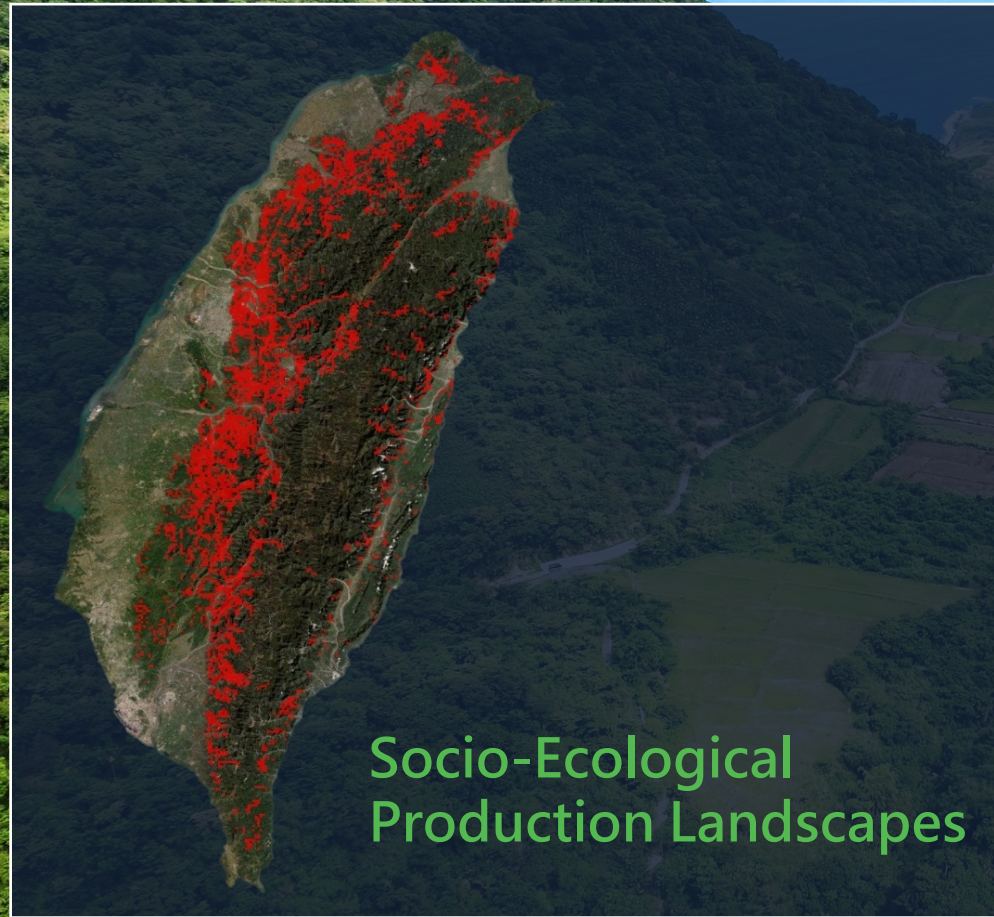


Photo Credit : Vision Way Communication Co., LTD

Habitats of endangered animals & threatened plants

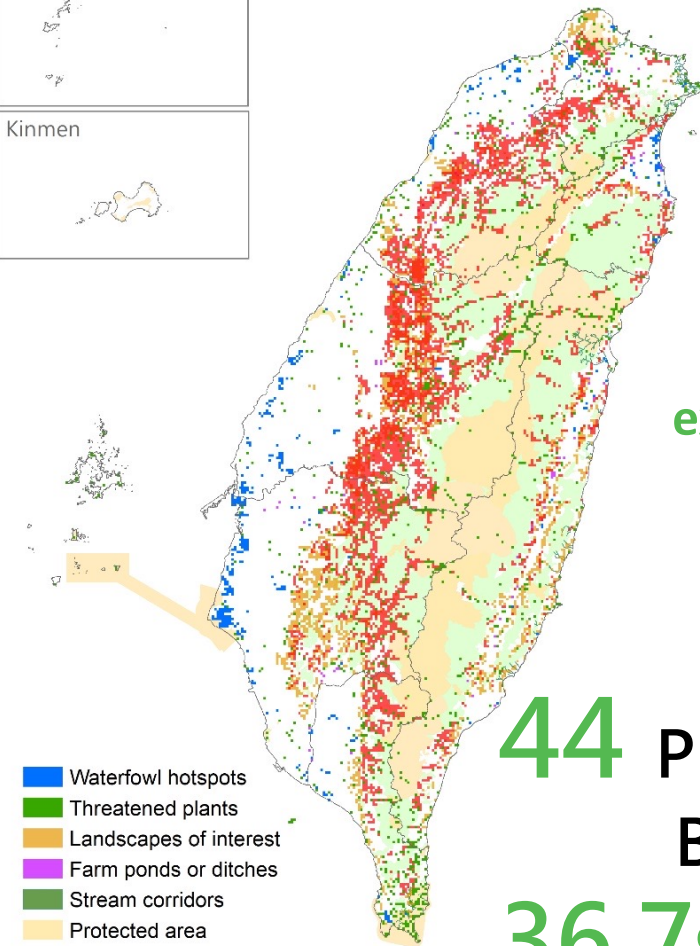
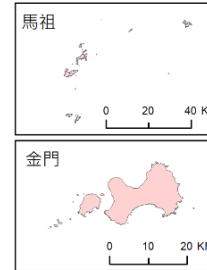
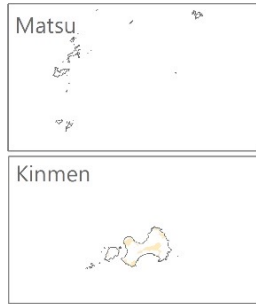
- **71** endangered or focal animals (occurrence data, SDMs)
 - Mainly live in shallow mountains, plains and coastal areas
 - Protected species, Red List species, umbrella species
- **908** threatened plants (occurrence data)



Chinese box turtle (*Cuora flavomarginata*)

Spatial overlay analysis

Identification of priority biodiversity areas



expert meeting



44 Priority
Biodiversity Areas
36.7% of the land area

0 25 50 100 KM

Spatial Planning :

(1) Priority Biodiversity Areas

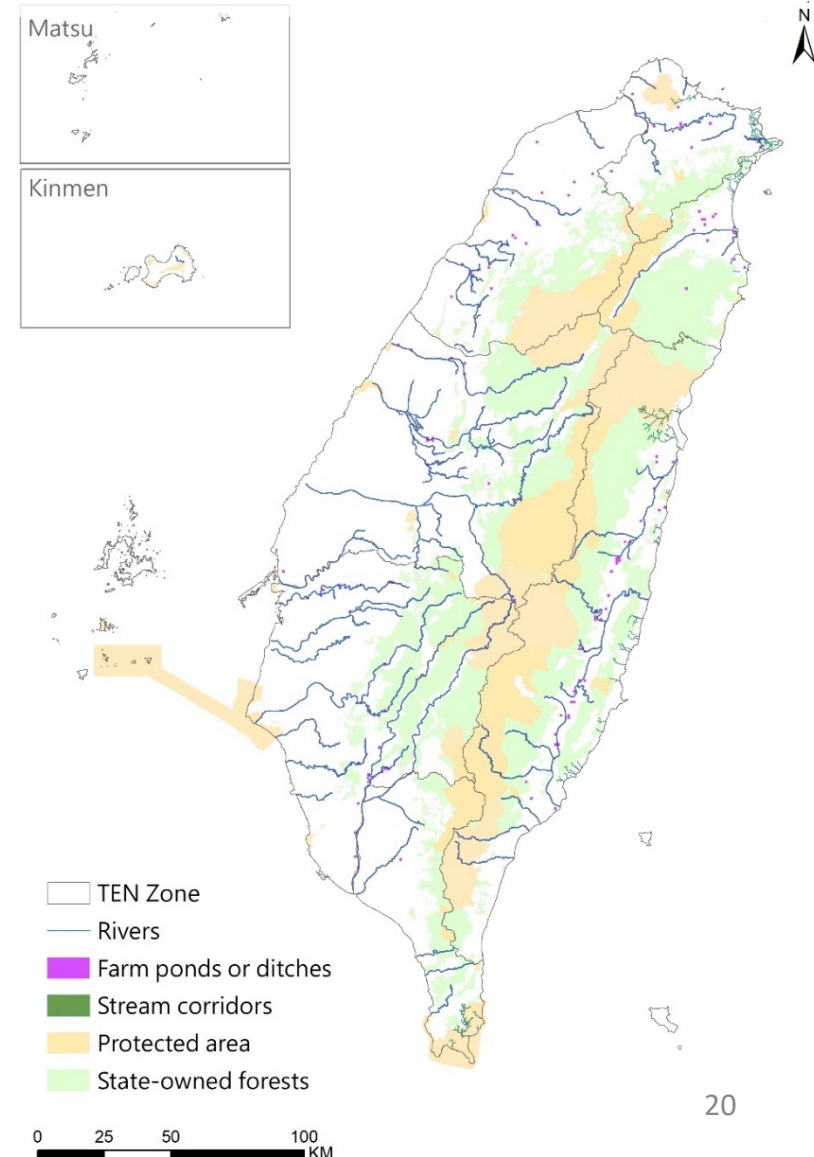
(Aquatic)

Principles of identification

- Habitats for freshwater fish species of interest & migratory aquatic species *
- Waterfowl hotspots *
- Opinions of scientists

* biodiversity data was applied

- **98** rivers
- **127** farm ponds or ditches
- **56** stream corridors



Spatial Planning :

(2) conservation corridors

45 conservation corridors

Shallow mountain Type (12)

Lowland forest and farmland

River Type (14)

River 、 Stream 、 Riparian habitat

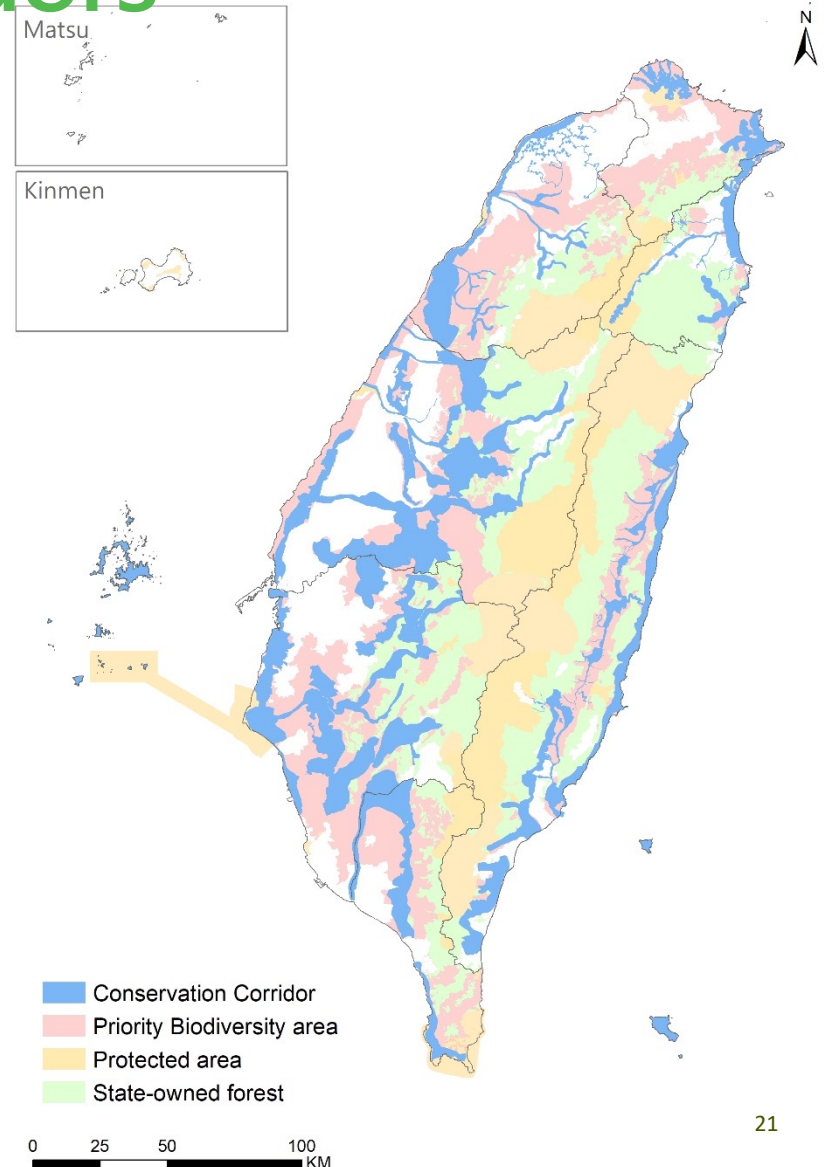
Plain Type (8)

Farm pond 、 Grassland 、 Rural and Urban greenspace

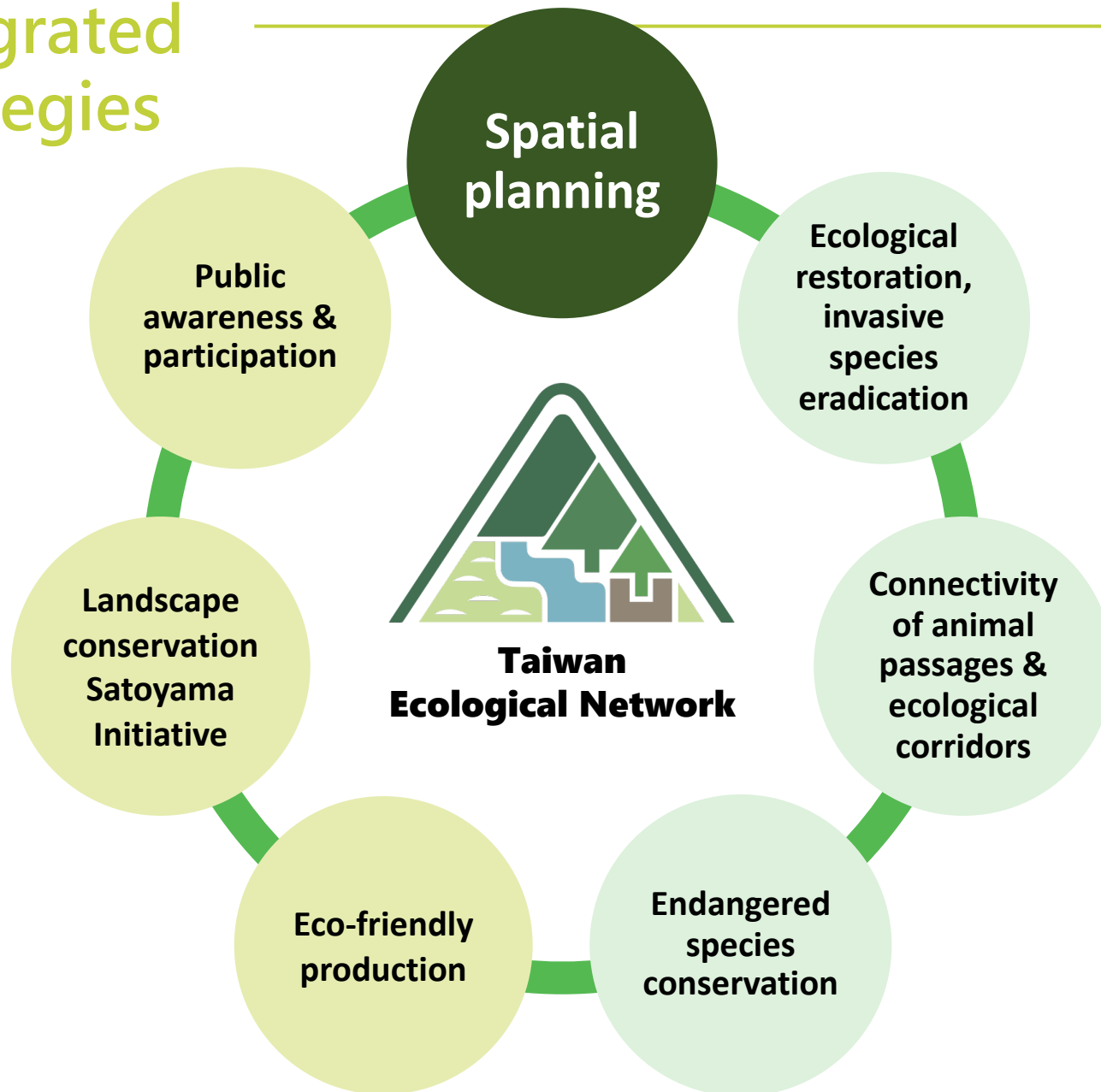
Coastal Type (6)

Fish Farm 、 Paddy field 、 Coastal forest

Offshore Islands (5)



Integrated strategies



A Case Study from Western Taiwan

Leopard Cat



Leopard cats

(*Prionailurus bengalensis*)

The only native feline species in Taiwan

- Endangered species
- Umbrella species in shallow mountain and plain areas
- Mainly distributed on private lands and easily come in conflict with human activities.



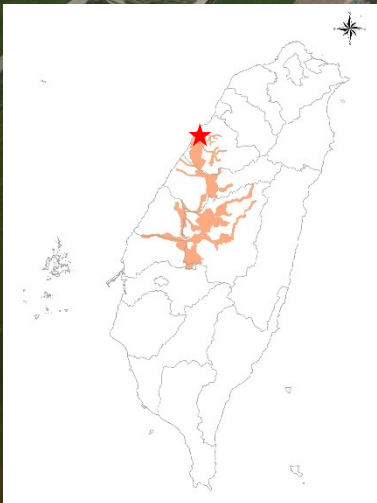
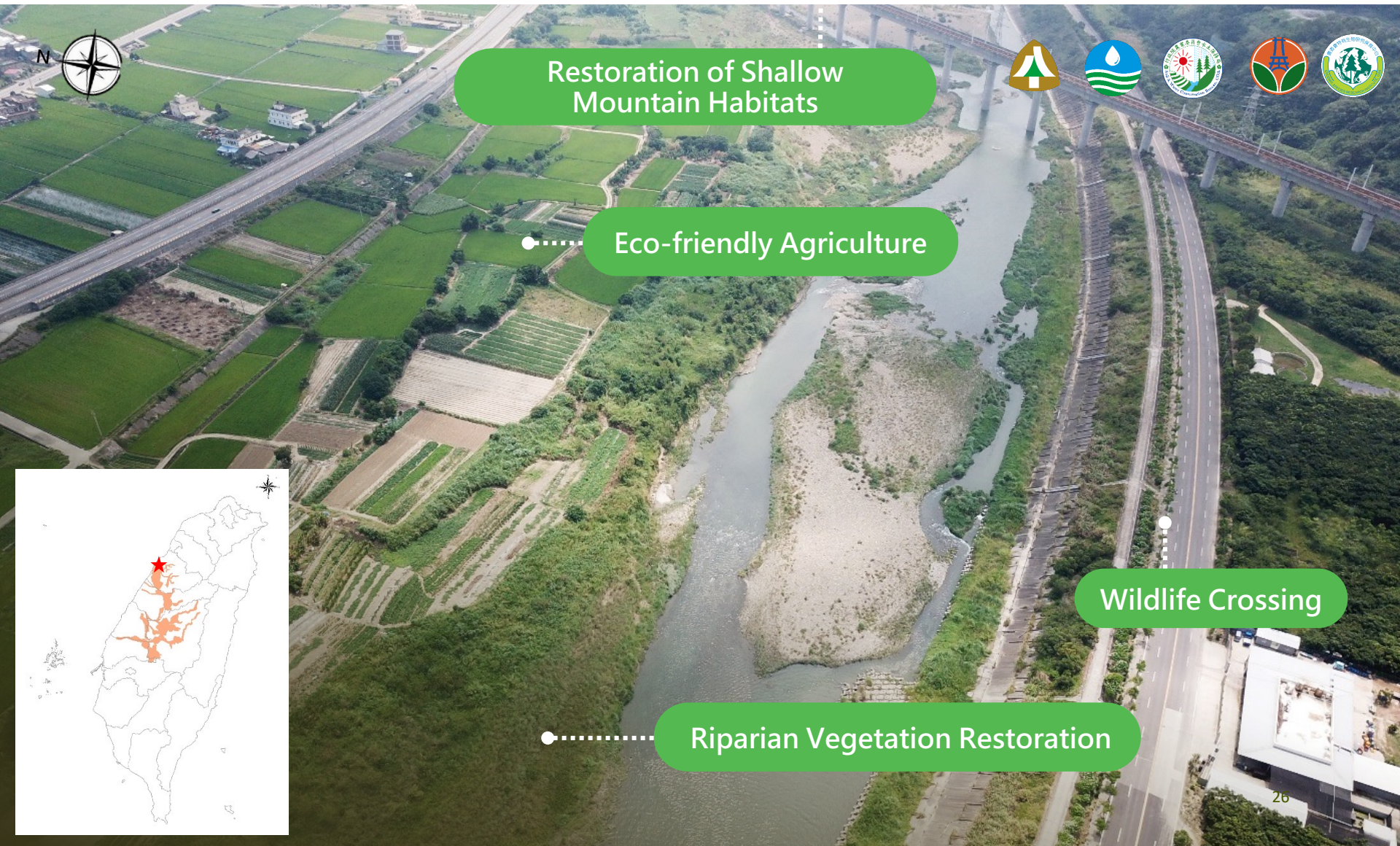
0 20 40 80
KM 1:1,500,000

8 Conservation Corridors related to Leopard Cat habitats

- Leopard Cat is one of the focal species in these corridors

Cross-sectoral cooperation on habitat management

A typical shallow mountain landscape in northwestern Taiwan



Wildlife crossing are built by transportation agencies to reduce roadkill



PES (Payments for Ecosystem Services) for farmers and local communities



Eco-friendly
farmland

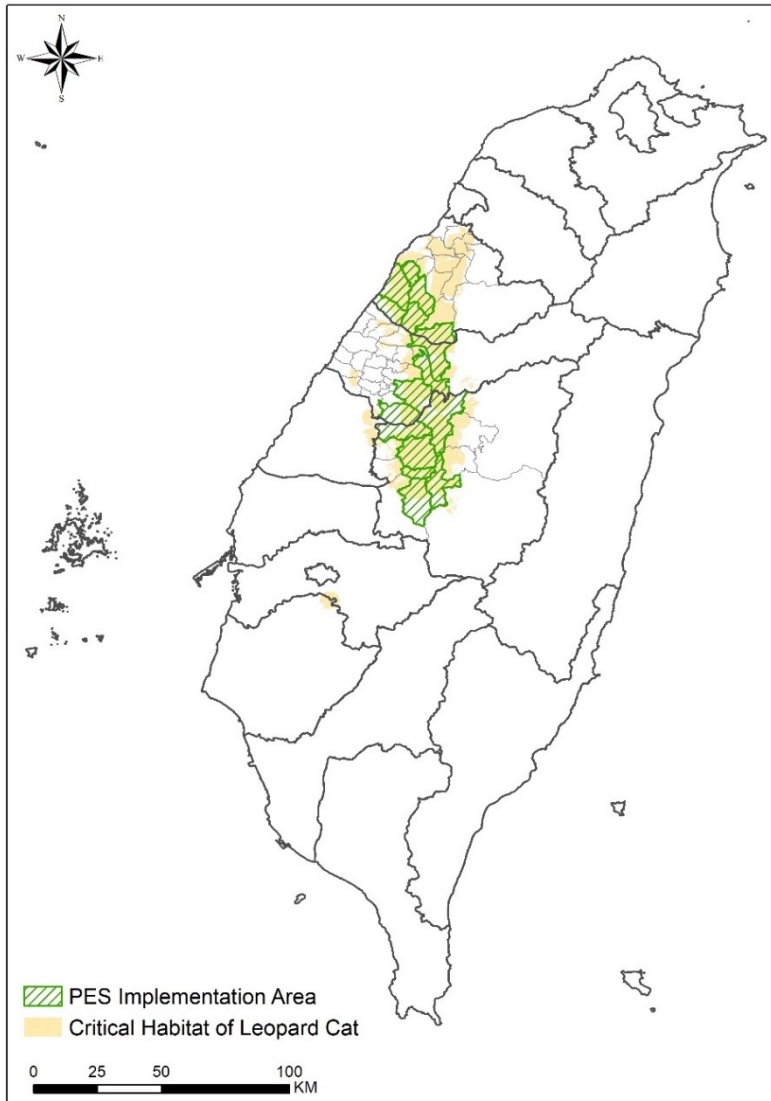


Monitoring



Local patrol

Leopard cat PES Implementation Area



- Occurrence data and SDMs of Leopard cat
- Deciding on the area for implementing Leopard cat PES

A Case Study from Southwestern Taiwan

Coastal conservation corridor



Bird Migratory Route

East Asian-Australasian Flyway

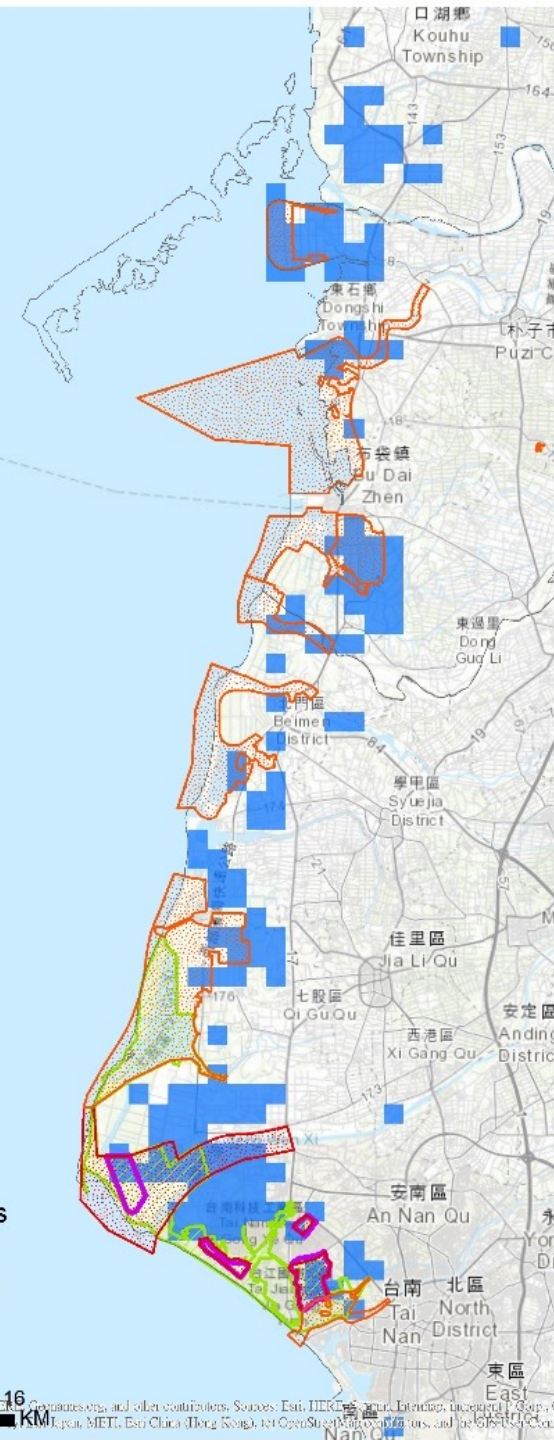
Protected areas

10 Important Wetlands

1 National Park

2 Wildlife Refuges

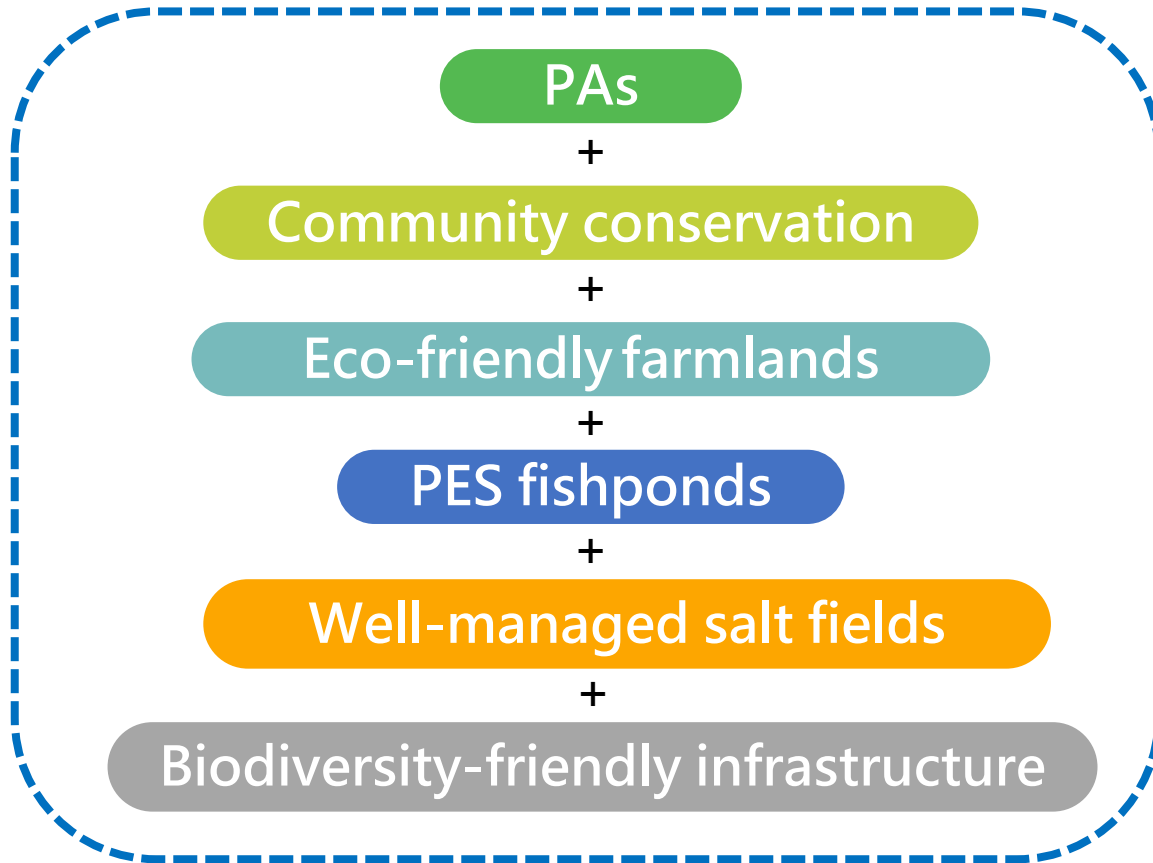
Many waterfowl hotspots are located outside these protected areas



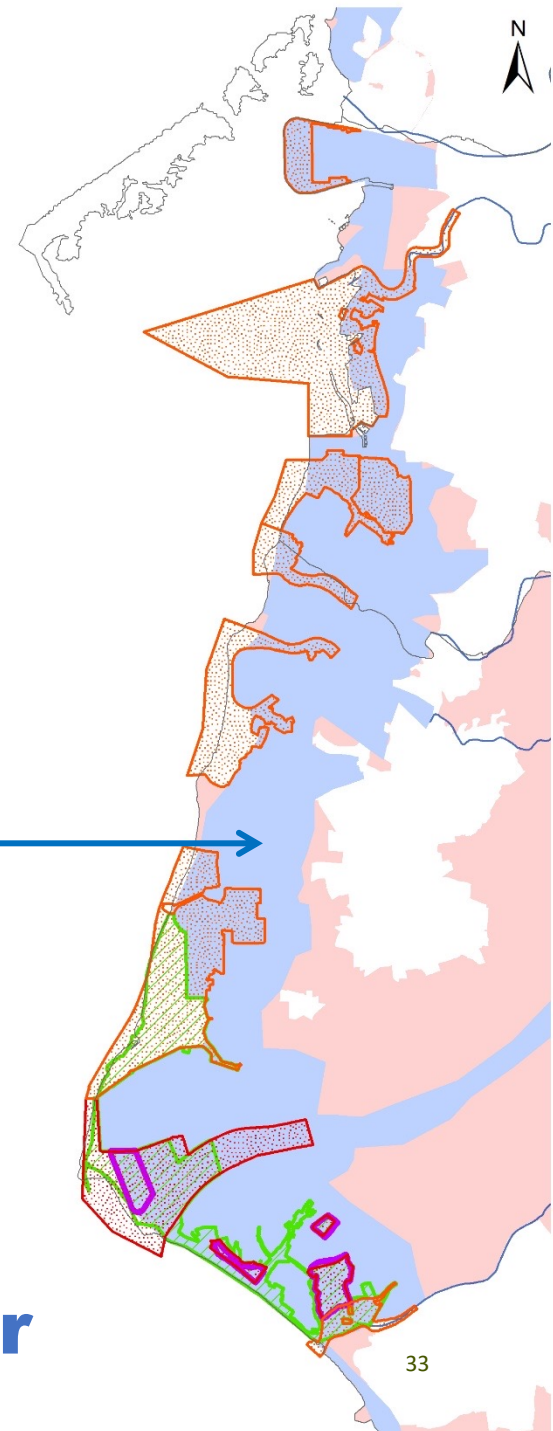
Black-faced spoonbill (*Platalea minor*)



Combining multiple strategies to form a large-scale conservation corridor for the needs of waterfowl

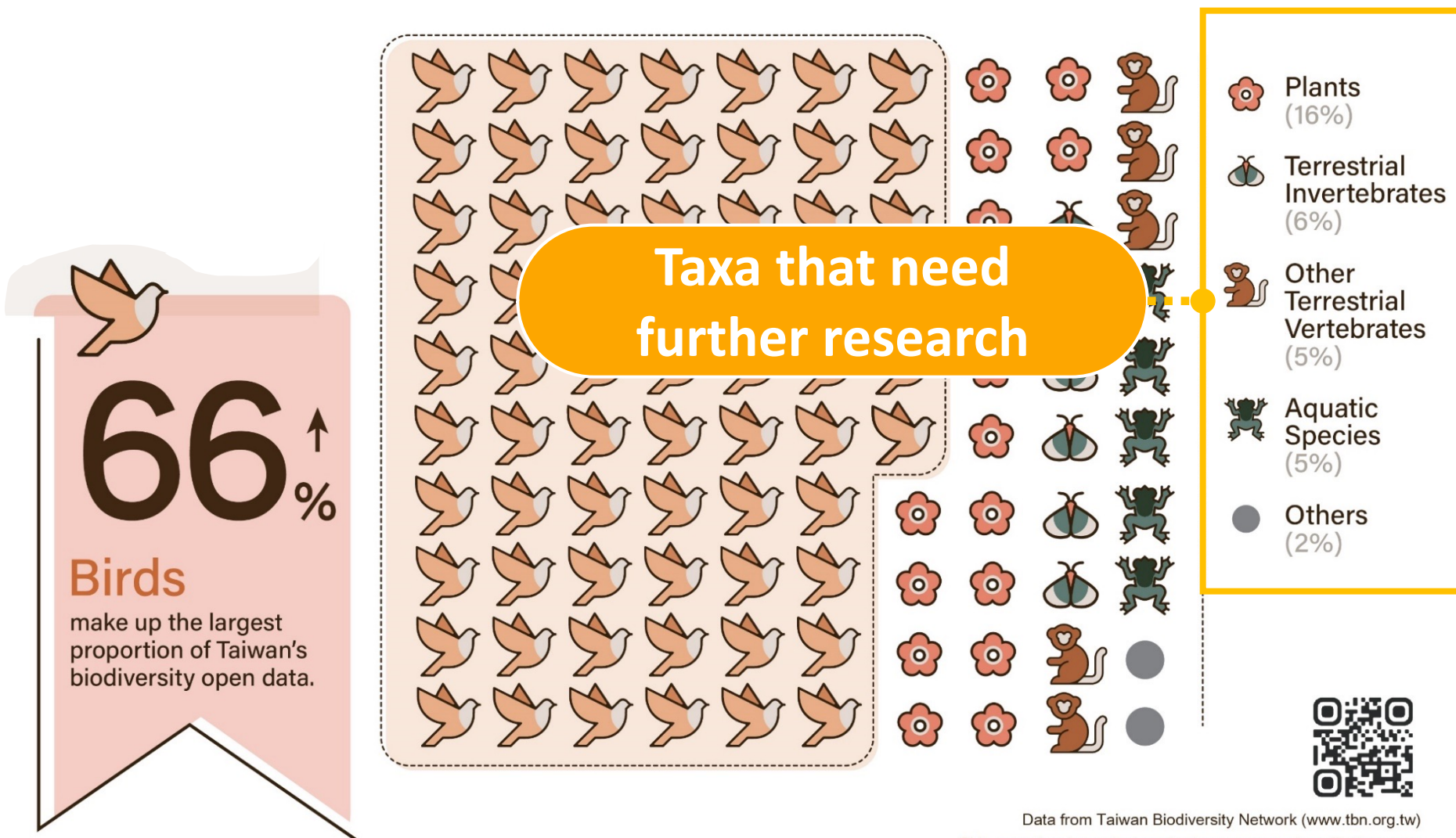


Coastal conservation corridor



Future Prospects

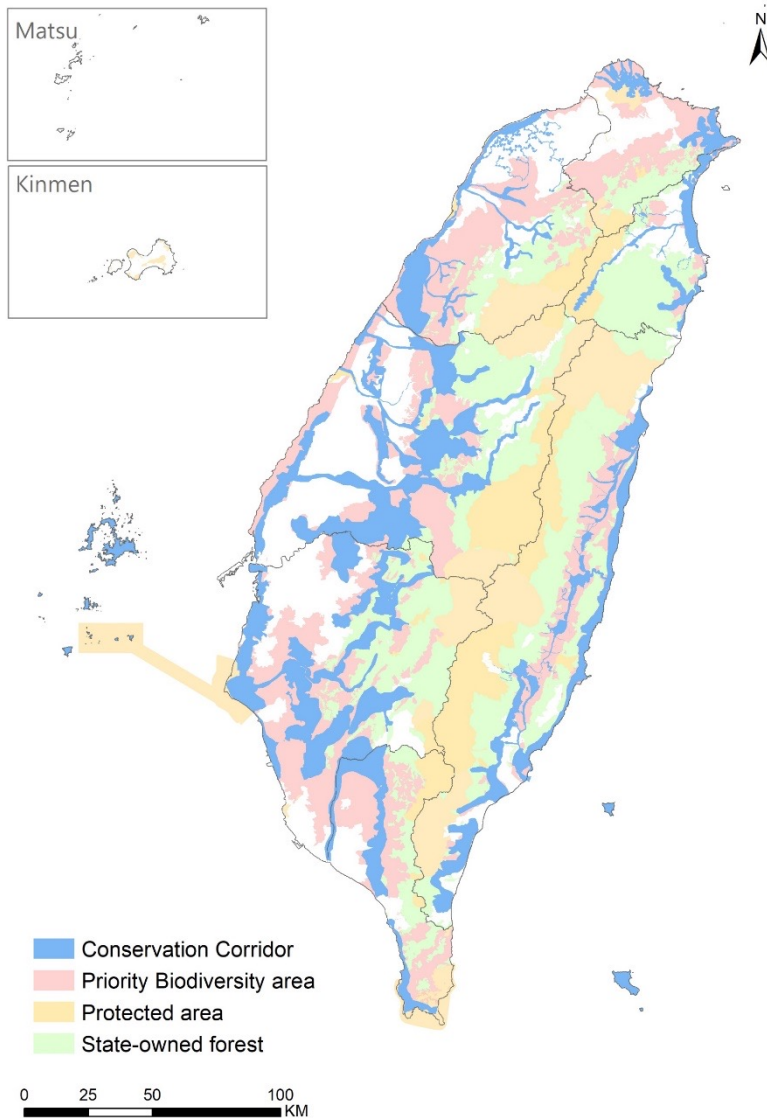
(1) Fill in the biodiversity data gap



(2) Enhance the cross-sectoral database cooperation



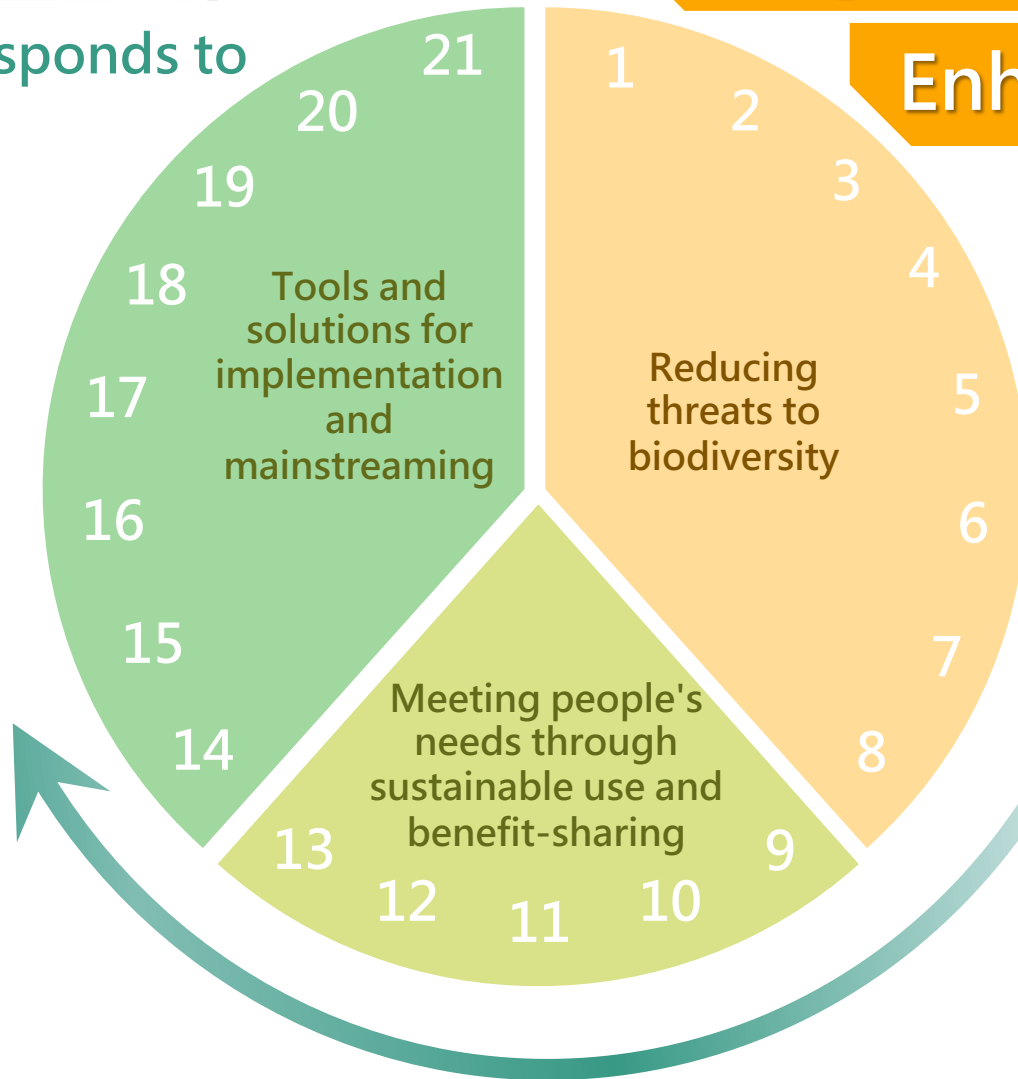
(3) Scale up conservation corridors



- Scale up and increase the number of on-the-ground implementation cases along the conservation corridors
- Link the priority biodiversity areas from the shallow mountains to the coastal areas



responds to



Integrated spatial planning

Enhance connectivity

PAs & OECMs

**CBD
Post-2020
Global Biodiversity
Framework**



Our 2050 vision:
With the help of Taiwan Ecological Network,
23 million people living in Taiwan will find their way
to living in harmony with nature.

Acknowledgements





Thanks for your attention

Chih-Chin Shih, Ph.D.

E-mail: ccshih@forest.gov.tw

<https://www.forest.gov.tw/EN>