

# The Economics of Ecosystem and Biodiversity (TEEB): Promoting a Sustainable Agriculture and Food Sector China project: progress report

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# Outline

- 1. Agri-food system and biodiversity**
2. Road so far
3. Agri-food policies in Yunnan Province and Tengchong City
4. Scoping and scenario setting
5. What's next

# Globally

## We have achieved

- Hiring over 1/3 of world labour
- Sustenance to the poor

## At the expense of

- 80% new farmland converted from rainforests since 80s
- Plantation and pasture produce 5–6 billion tonnes ( $\text{CO}_2^{\text{equiv}}$ ) of greenhouse gases annually
- Appropriating 70% of freshwater
- Non-point source pollution
- Etc.

# China

## Pollution

- **19.4% of farmland monitor sites exceeding threshold (2014)**
- **Fertilizer efficiency 40.2%, chemical efficiency 40.6% (2020)**
- **Water contaminants from agricultural sources (2017): COD 10.67 million Tones (2020)**
- **Etc.**

## Land-use

- **Soil fertility 20-30% lower than developed countries (2015)**
- **Moderately and highly degraded grassland and pasture > 1/3 (2017)**
- **Increased farmland in deserts, over-grazing, using eco-restoration water (2015)**
- **Etc.**

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# TEEB for Agriculture & Food

An initiative of 'The Economics of Ecosystems and Biodiversity' (TEEB)

Reports

Projects

Events

Media

Team

protect biodiversity and contribute to a more sustainable agriculture and food sector' (Malaysia, Mexico and Thailand), with a view to moving towards a level playing field by 2030. It is based on an internationally agreed methodological framework, introducing the TEEB approach and biodiversity.

Beijing—July 2019

- Facilitated by UNEP-IEMP
- Implemented by IGSNRR, CAS and CRAES, MEE
- Inception workshop in Aug 2019
- First PSC meeting in Jul 2020
  - Tengchong selected as project site
- First field survey in October 2020
- Second PSC meeting in Feb 2021
- Second field survey coming soon...



## Promoting a Sustainable Agriculture and Food Sector—Implementation 20–21 August 2019, Beijing China



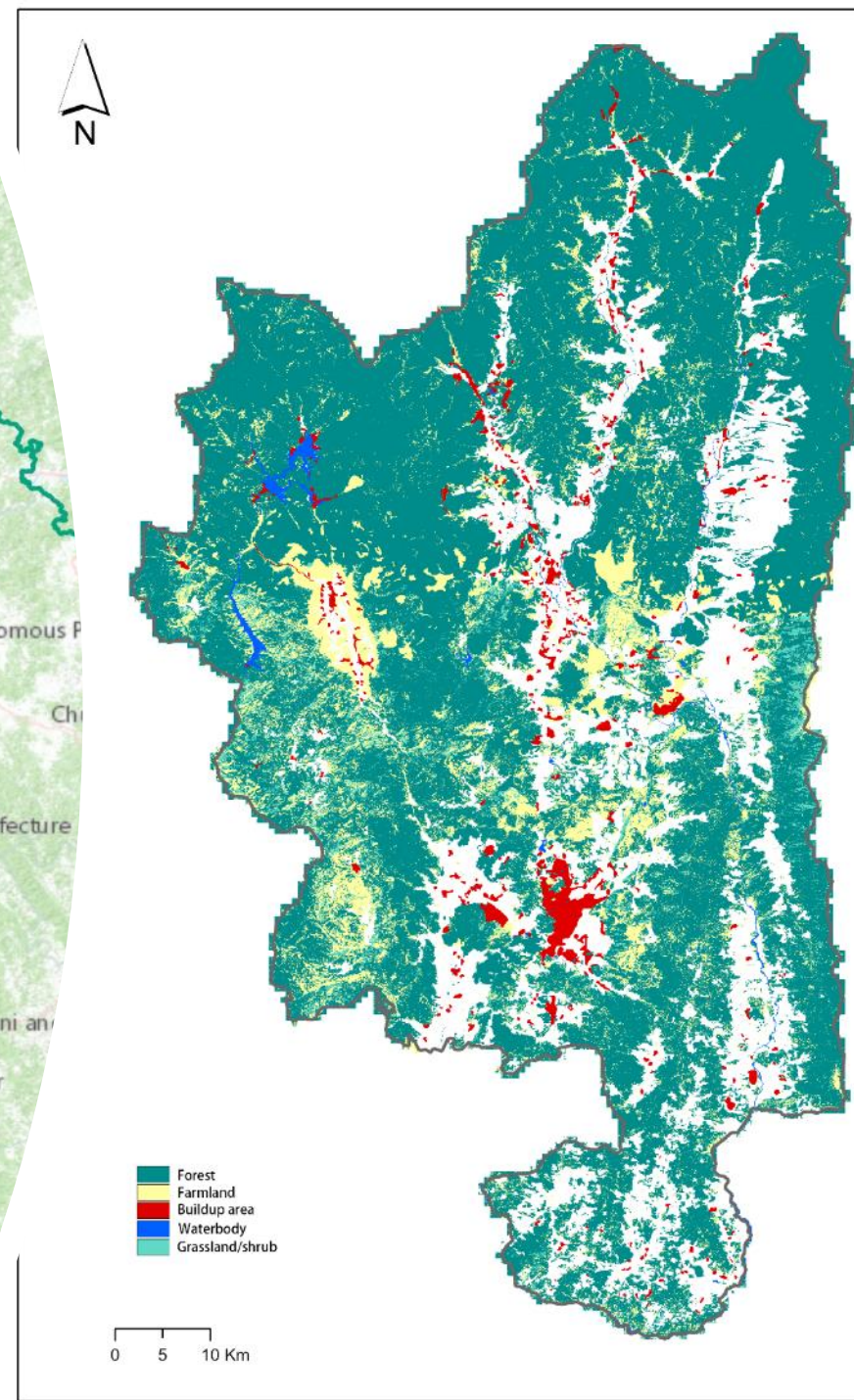
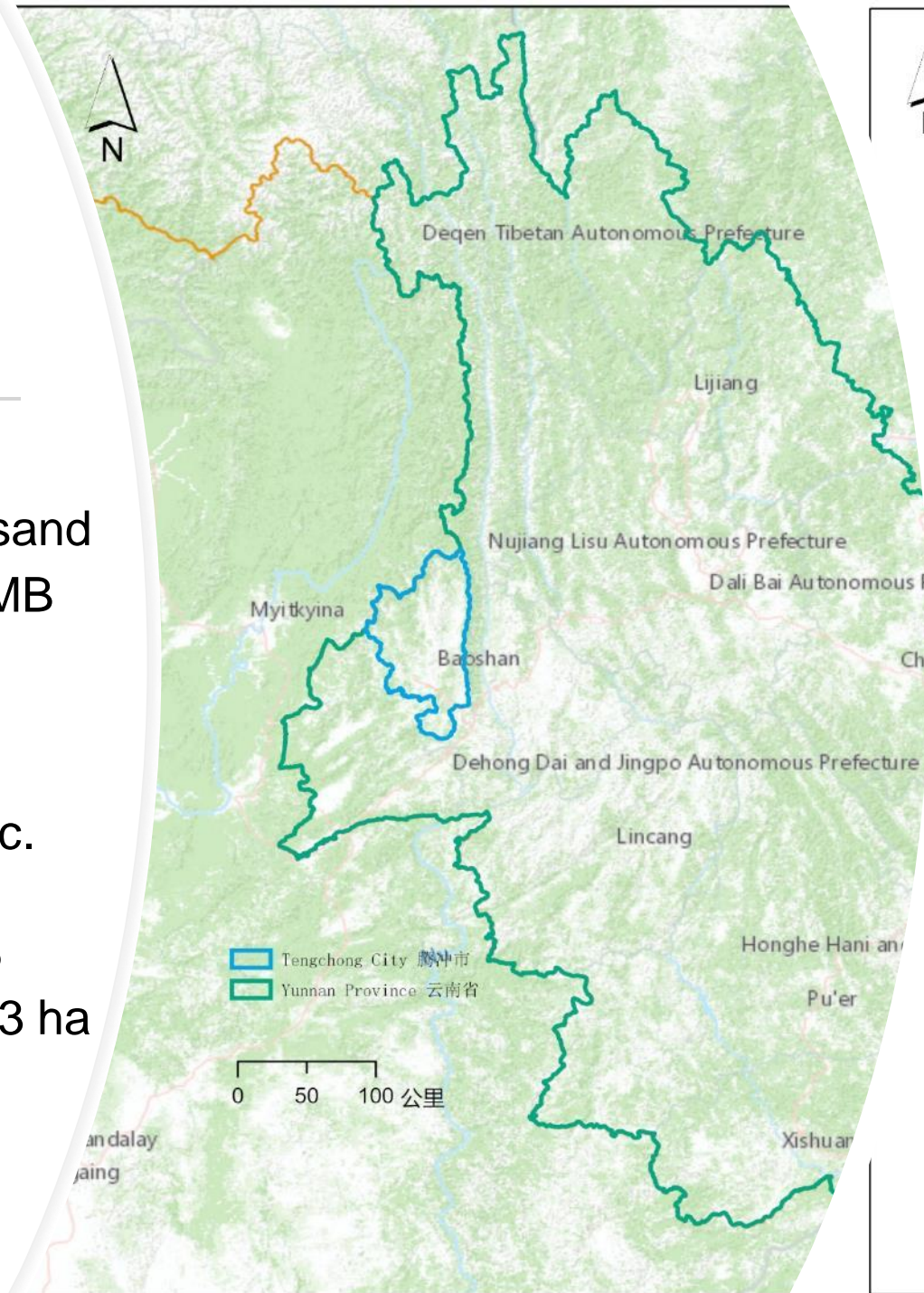
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# Tengchong City

- Area: 5848 km<sup>2</sup>
- Population: 689 thousand
- GDP: 25,27 billion RMB
  - Primary sector 18.6%
- Climate: subtropical monsoon, annual prec. 1531mm,
- Forest coverage 75%
- Basic farmland 66,653 ha (81.4% of total)





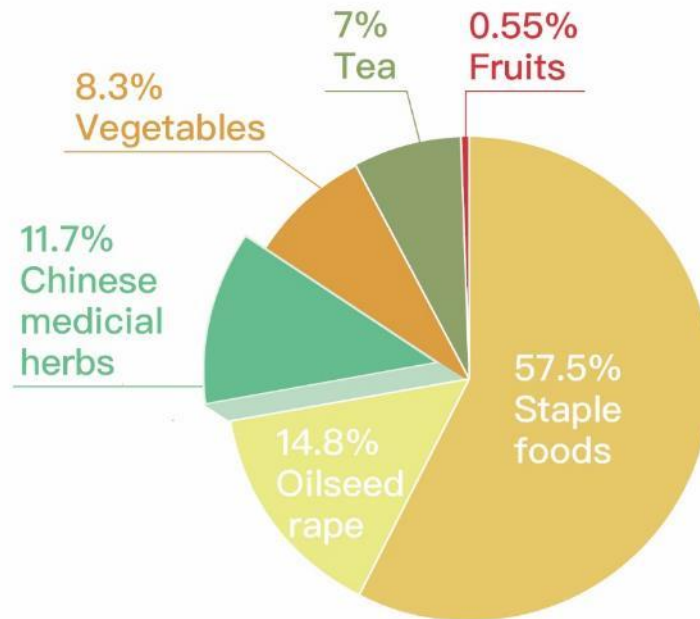
# Current status and trends of Tengchong's Agricultural system

## Plantation



GDP 4 billion yuan (2020 Q1-3)

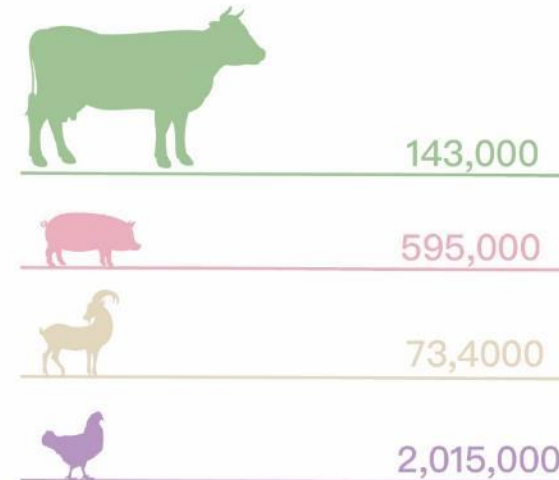
### Area of plantation (%)



## Beef cattle breeding

GDP 2.4 billion yuan (2020 Q1-3)

### Stock (head)



# Yunnan's push for green food brands



# Tengchong's need for transition

## National agenda

- Reduction and efficiency rise for fertilizers and chemicals
- National biodiversity conservation strategy and action plan

## Local

- Under-canopy medicinal herbs
- Beef cattle breeding
- Healthy living destination
- Biodiversity conservation base

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## Driving forces

### **Natural environmental**

- RCP4.5
- RCP8.5

### **Socio-economic**

- Demographic change
  - Total population
  - Population structure
- Urbanisation
  - Expansion of urban area
  - Labour migration
  - Dietary structure
- Agricultural policies

# Tengchong's agricultural system

## **Beef cattle breeding**

- Ecological pasture
- Standardized breeding
- Combined planting-breeding
- Conventional free-range

## **Plantation**

- Conventional crops
- Endemic species
- Under-canopy plantation

## **Industrial integration**

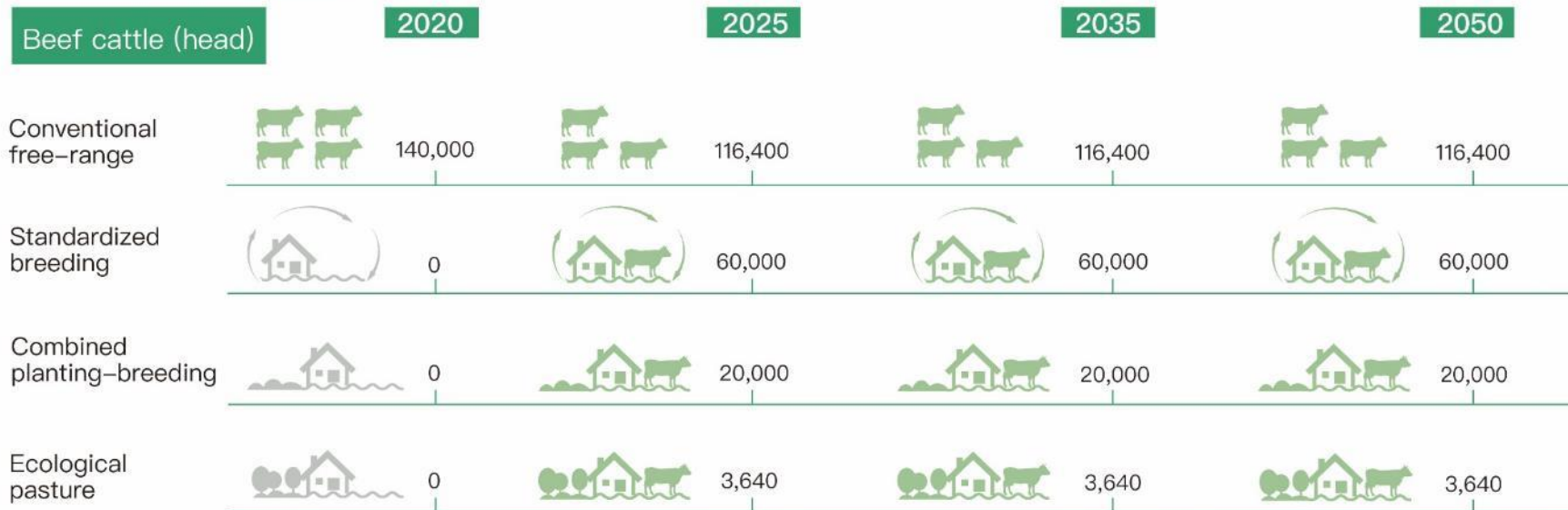
- Agricultural product processing enterprises
- Product quality and brand certification
- Rural tourism and agricultural tourism
- Integration of primary, secondary and tertiary industries

# Scenario setting and time scale

<b>Scenario 1</b> RCP4.5 + BAU	<b>Scenario 2</b> RCP4.5 + Optimistic	<b>Scenario 3</b> RCP4.5 + Pessimistic
<b>Scenario 4</b> RCP8.5 + BAU	<b>Scenario 5</b> RCP8.5 + Optimistic	<b>Scenario 6</b> RCP8.5 + Pessimistic

<b>Short-term (2020-2025)</b>	<b>Mid-term (2020-2035)</b>	<b>Long-term (2020-2050)</b>
<ul style="list-style-type: none"><li>• Endpoint of the 14<sup>th</sup> Five-year plan</li></ul>	<ul style="list-style-type: none"><li>• Basic realisation of modernisation</li><li>• Formation of green production and lifestyle</li></ul>	<ul style="list-style-type: none"><li>• Second century-goal</li><li>• Overall improvement in ecological civilization</li></ul>

## Business as usual

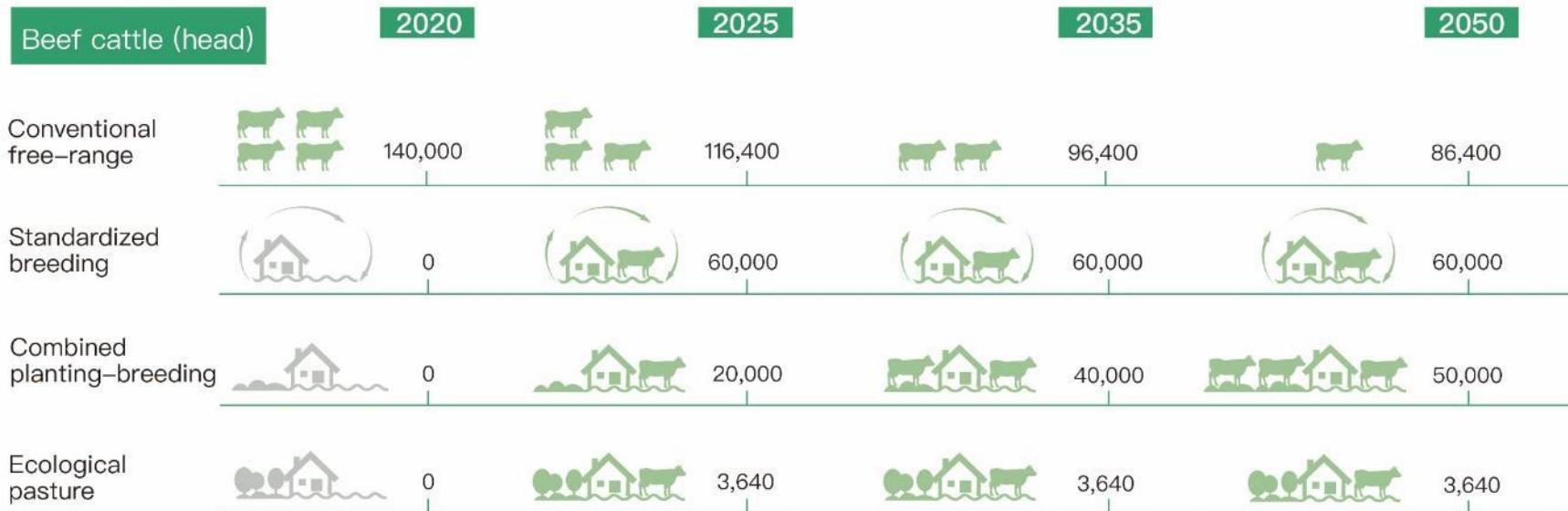


## Plantation

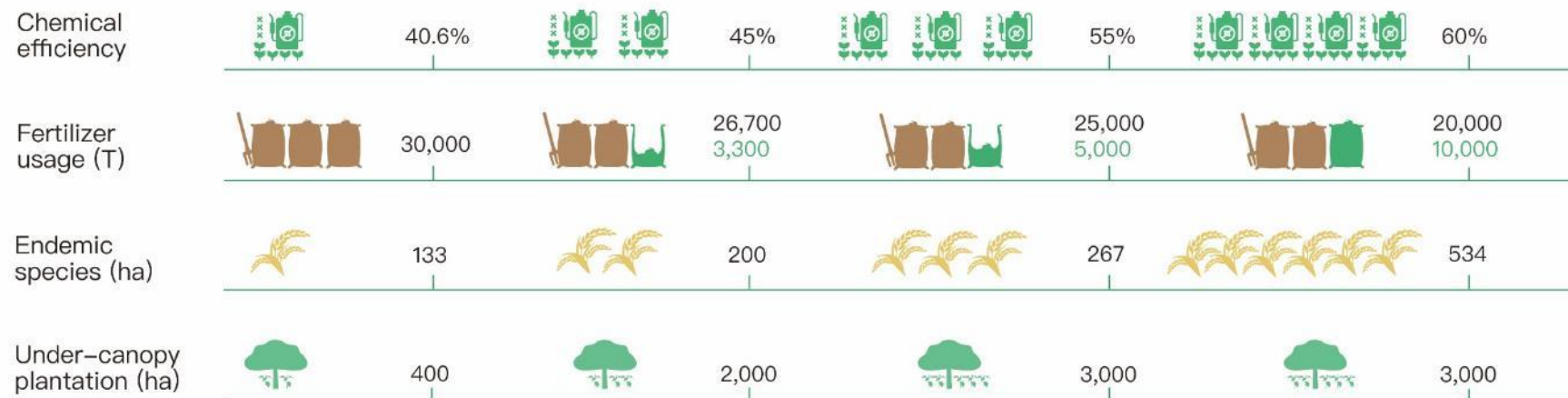




## Optimistic scenario



















## Plantation




## Pessimistic scenario

### Beef cattle (head)

	2020	2025	2035	2050
Conventional free-range	 140,000	 200,000	 200,000	 200,000
Standardized breeding	 0	 0	 0	 0
Combined planting-breeding	 0	 0	 0	 0
Ecological pasture	 0	 3,640	 3,640	 3,640

### Plantation

Chemical efficiency	 40.6%	 40.6%	 40.6%	 40.6%
Fertilizer usage (T)	 30,000	 30,000	 30,000	 30,000
Endemic species (ha)	 133	 67	 0	 0
Under-canopy plantation (ha)	 400	 0	 0	 0

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Objective

**Natural capital**

**Human capital**

**Social capital**

**Produced capital**





## Objective

### **Natural capital**

#### **ES to be assessed**

- Carbon sequestration
- Water quality and quantity
- Soil fertility/erosion/degradation
- Biodiversity services (pollination, pest control, etc.)

### **Human capital**

### **Social capital**

### **Produced capital**



## Objective

**Natural capital**

**Human capital**

**Human factors to be assessed**

- Labour composition/structure
- Education
- Health
- Etc.

**Social capital**

**Produced capital**



## Objective

**Natural capital**

**Human capital**

**Social capital**

**Social factors to be assessed**

- Employment opportunity (government, large industries, educational institutions, etc.)
- Equality (job, gender)

**Produced capital**



Objective

**Natural capital**

**Human capital**

**Social capital**

**Produced capital**

**Produced factors to be assessed**

- Infrastructure (road, irrigation, electricity, running water, etc.)
- Economic structure
- GDP



# Data and method

## **LULC modelling**

- **LULC historical data**
- **Development potential (fitness)**
- **Rules of transformation (restrictions)**
- **Development need**

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- **Based on LULC**

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Future scenarios

## **Invest modelling**

- **Based on LULC**  
Watershed map  
Vegetation types  
Biodiversity conditions  
Forest survey results  
National census data

# Thank you for your attention!

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UN Environment Programme-International Ecosystem Management Partnership (UNEP-IEMP)

Institute of Geographic Sciences and Natural Resources Research (IGSNRR), Chinese Academy of Sciences (CAS)

Visit our website at  
<http://www.unep-iemp.org>