



**GROSS  
ECOSYSTEM  
PRODUCT**

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## Gross Ecosystem Product (GEP)

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GEP is the total value of final ecosystem goods and services supplied to human well-being in given region annually, like a county, a province, or a country.



# GEP accounting methods

Ecosystem and environmental monitoring

Ecosystem service  
bio-physical valuation

Ecosystem Service  
Pricing

Ecosystem service  
monetary valuation

GEP accounting

GEP

Market pricing

Alternative market

Market model simulation

# GEP accounting methods

- **Accounting of economic values of ecosystem goods and services**

- ✓ GEP: the total economic value of ecosystem provision (EPV), Ecosystem regulating services (ERV) and cultural services (ECV) in the given area annually.

$$\mathbf{GEP} = \mathbf{EPV} + \mathbf{ERV} + \mathbf{ECV}$$

$$\mathbf{GEP} = \sum_{i=1}^n \mathbf{EP}_i \times \mathbf{P}_i + \sum_{j=1}^m \mathbf{ER}_j \times \mathbf{P}_j + \sum_{k=1}^l \mathbf{EC}_k \times \mathbf{P}_k$$

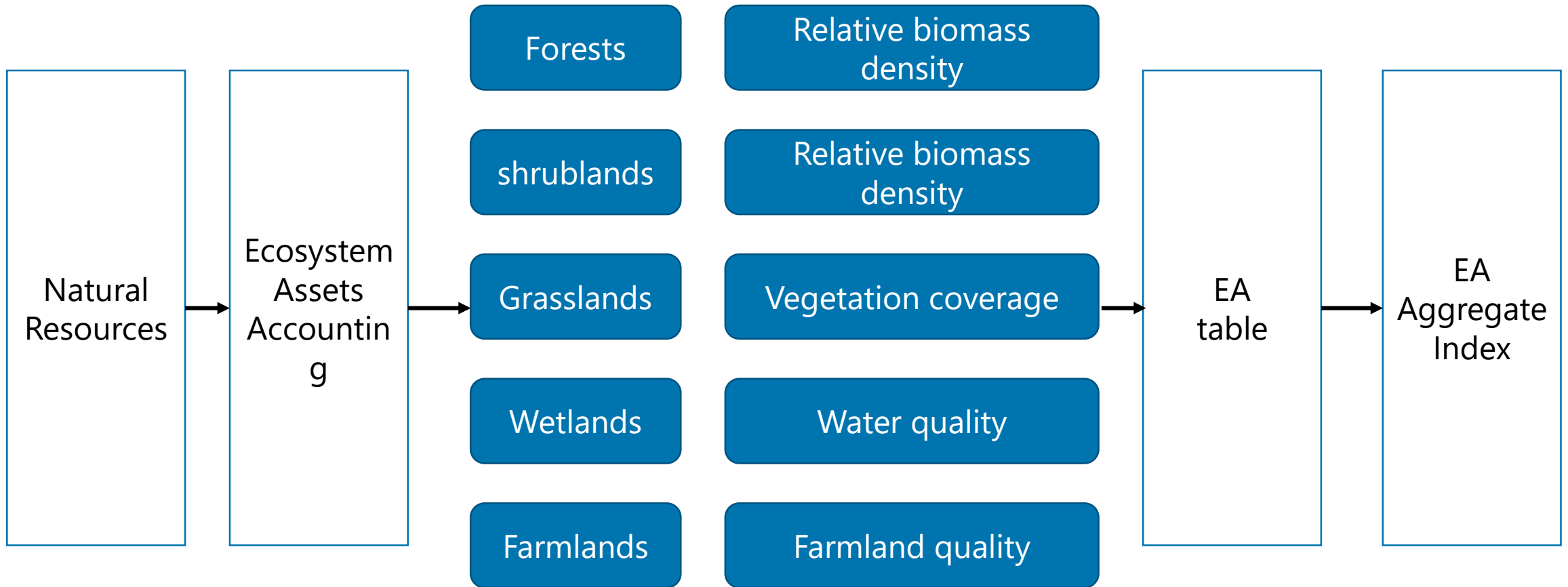
## Ecosystem Asset (EA)

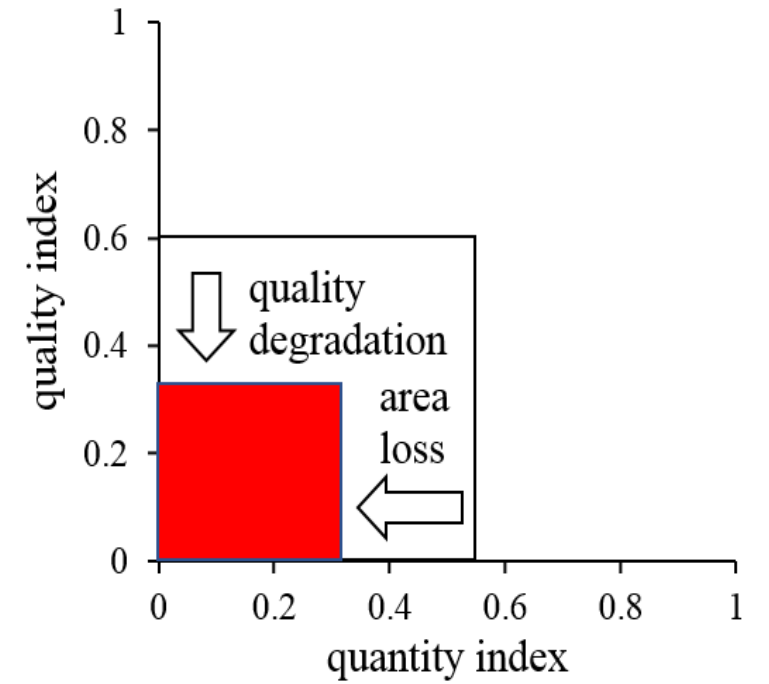
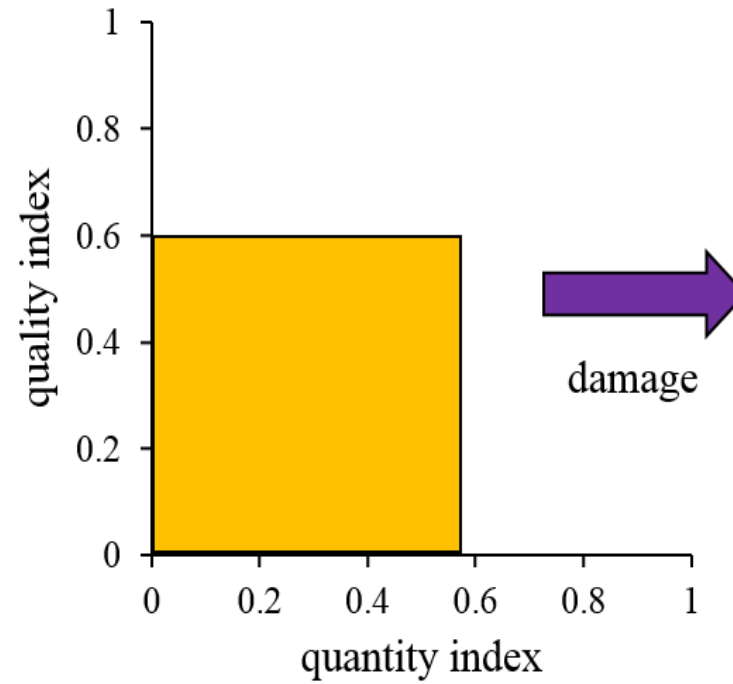
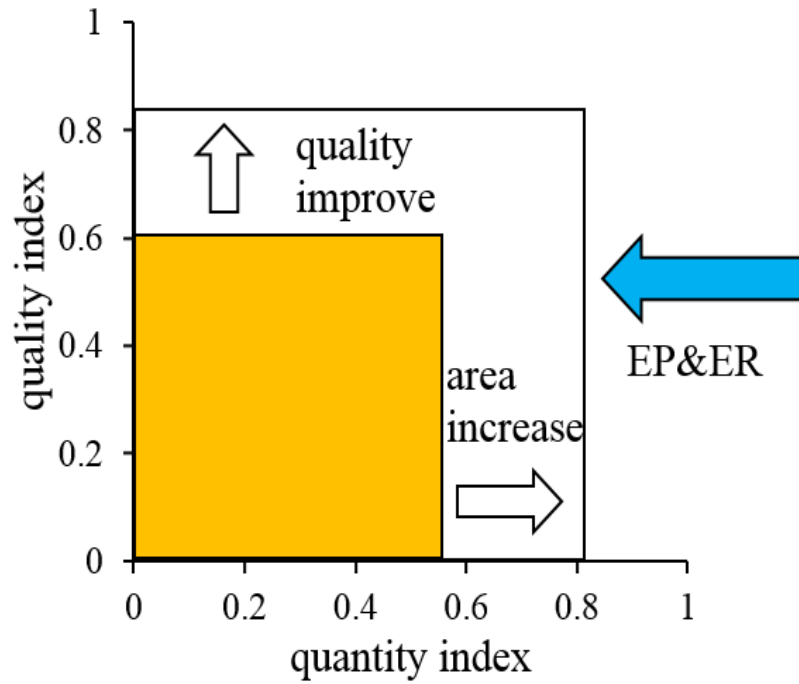
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Ecosystem Assets are the natural resources that produce and provide ecological goods and services.

- ▶ Natural Ecosystem Assets
- ▶ Natural-Based Artificial Ecosystem Assets
- ▶ Wild fauna and flora resources









# EA table

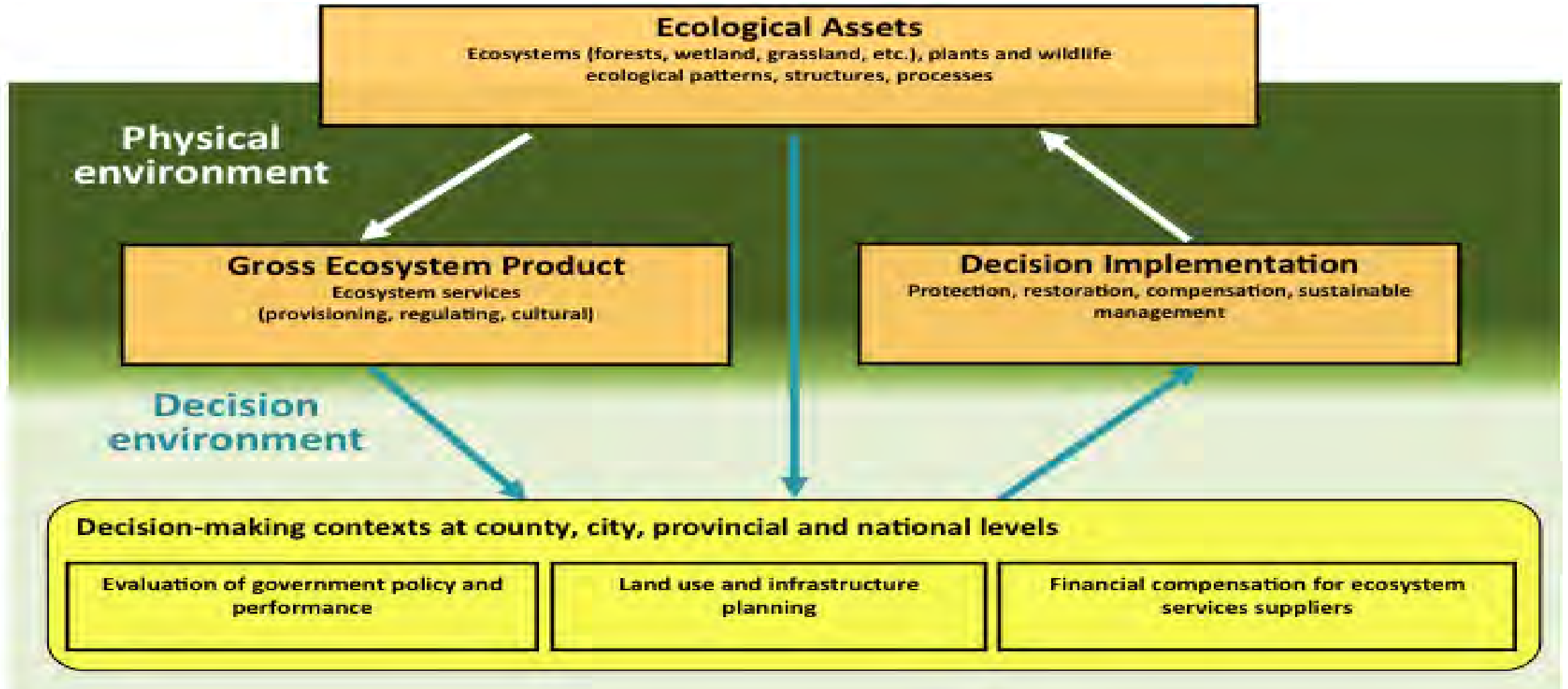


Category		Sub-category	Area against quality level					Quality Indicator
			Total	A	B	C	D	
natural ecosystems	Forests	Forests subtotal						Relative biomass density
		coniferous forest						
		deciduous forest						
		heropencedrymion						
	shrublands	Shrublands subtotal						Vegetation coverage
	grasslands	grassland						
	wetlands	Wetland subtotal						Water quality
		lake						
		river						
Natural based artificial ecosystems	farmlands	Farmland subtotal						Area Slope, soil organic matter Irrigation guarantee rate Effective soil thickness
		Dry farm						
		Paddy field						
		garden						



# Concept of GEP

## GEP accounting and policy implementation



# ADVANTAGES AND OPPORTUNITIES

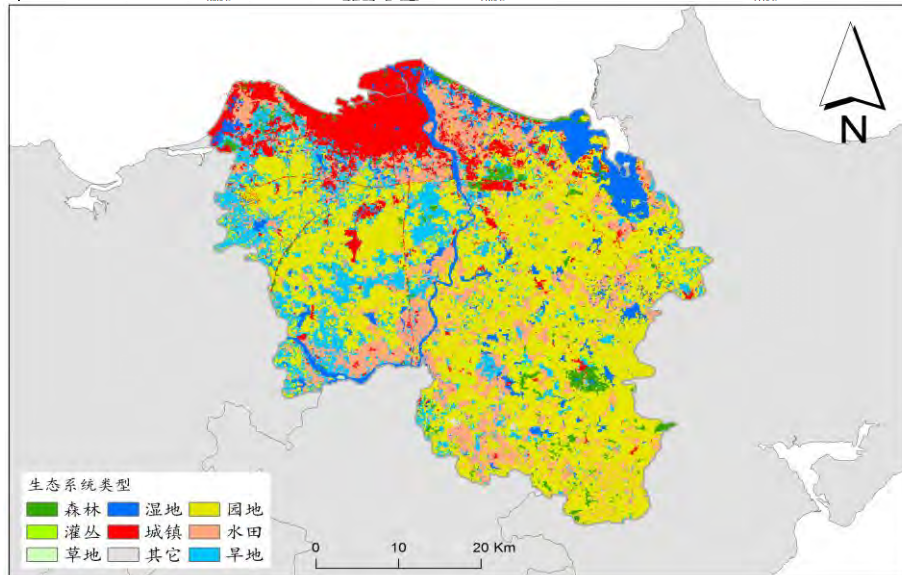
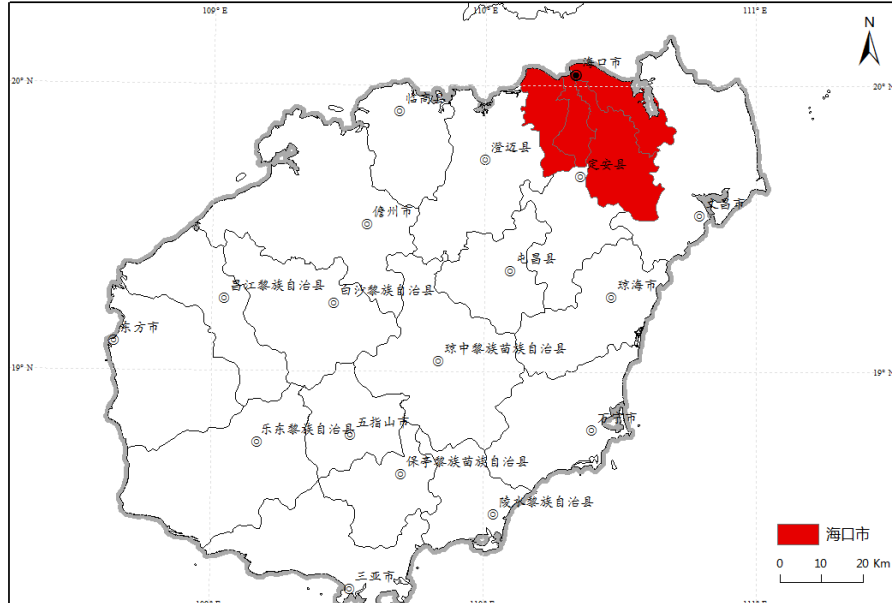
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- GEP can be applied as a quantitative indicator for **officials' performance appraisal** and **off-office auditing**.
- GEP can be applied as a scientific basis for **PES/Eco-Compensation** and **public financial transfers**.
- GEP can be applied to measure the status of ecosystem services, which is an important indicator of **sustainable development**. It is also an critical indicator for measuring the progress of **Eco-civilization**.
- GEP is an **universal measure** of ecological status. It can be applied to various countries and regions, and all types of ecosystems.

IUCN China and RCEES are working with Chinese Central & local government at 30 GEP pilot studies: e.g.

- ▶ Guizhou & Qinghai Province
- ▶ Shenzhen & Tonghua City
- ▶ Qiandongnan Prefecture
- ▶ Xing'an League, Ganzi Prefecture, Ordos City
- ▶ Arxan City, Xishui County
- ▶ Haikou City
- ▶ 10 counties of Guizhou province

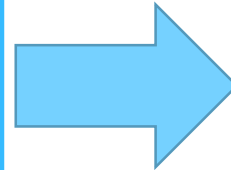




- Total 2289.09 Km<sup>2</sup>
- 2.2m population
- Sea area 830 km<sup>2</sup>
- Coastline 172.7 km.
- Monsoon tropical climate zone.
- Farmland 78.32%, urban 11.99%, wetland 6.15% water resources 1.9 b m<sup>3</sup> (reservoir 1.5 b m<sup>3</sup>)



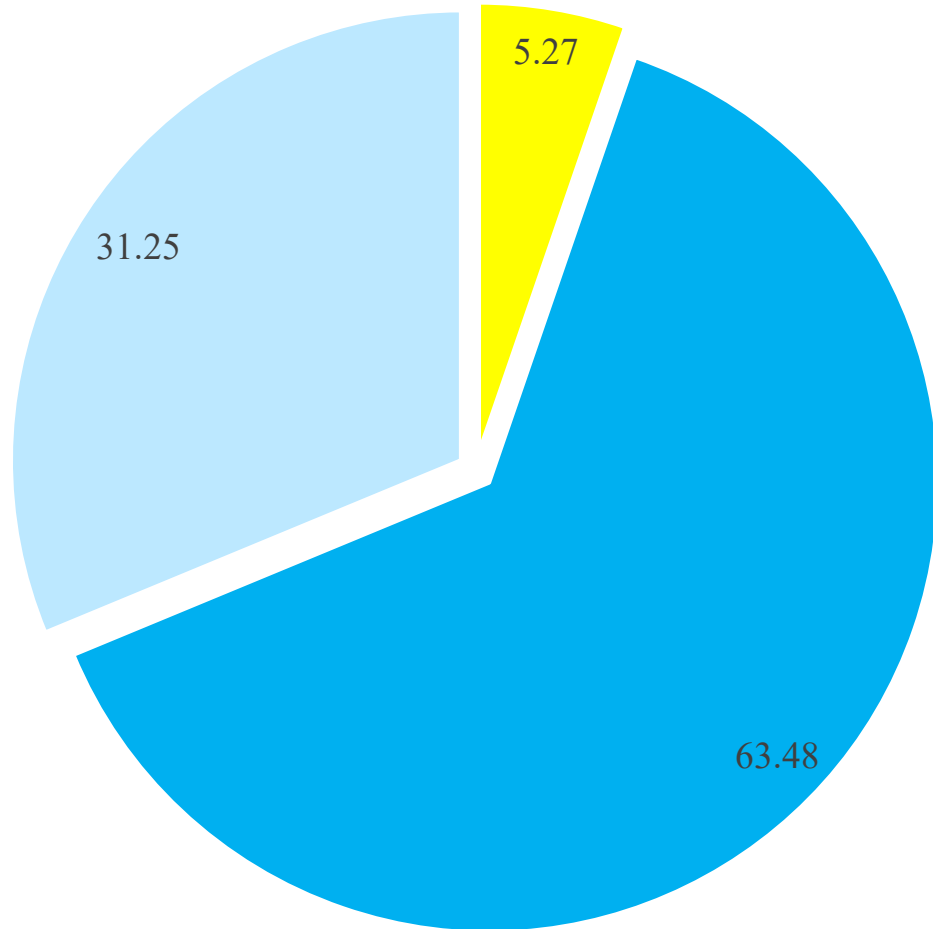
- 2015, 2016, 2017
- Overall ecosystem condition
- Conservation effectiveness
- Contribution to economy and social development



- Natural resources balance sheet;
- Government officials performance evaluation and assessment
- PES

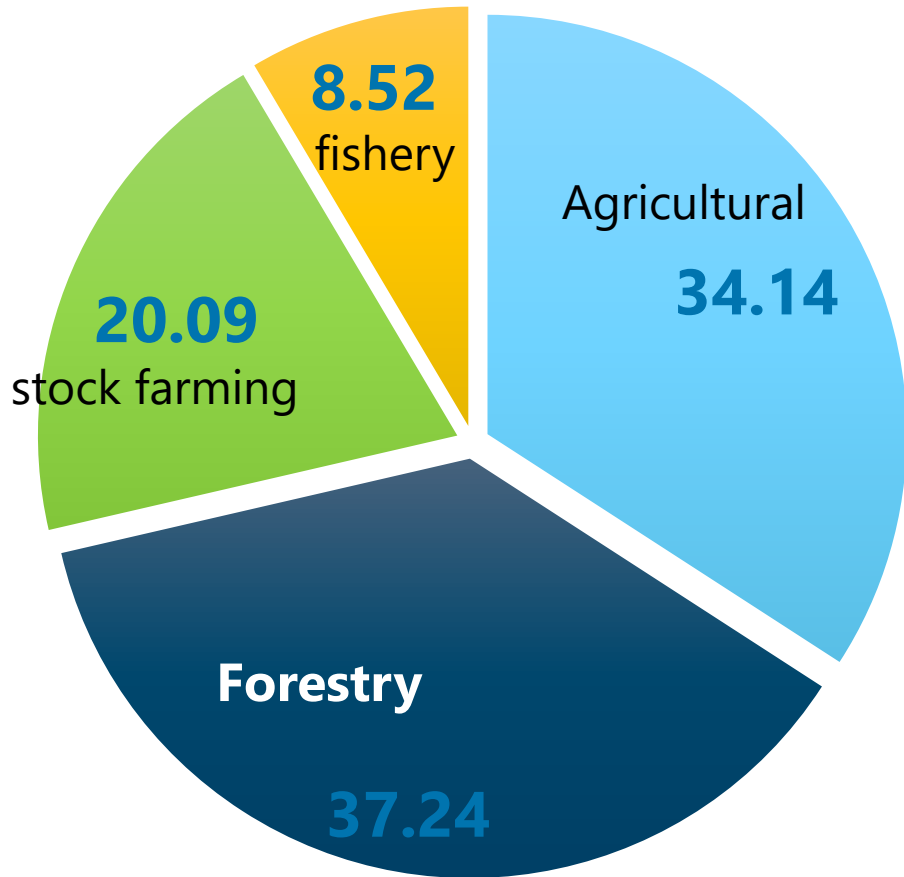
Services	Indicators	Quantity indicators	Value indicators	Value valuation methods
Provisioning services	Agricultural products	Production of agricultural products	Value of agricultural products	Market price method
	Forestry products	Production of forestry products	Value of forestry products	
	Animal products	Production of animal products	Value of animal products	
	Fishery products	Production of fishery products	Value of fishery products	
	Water resources	Water consumption	Value of water resources	
Regulating services	Water retention	Amount of water retention	Value of water retention	Alternative cost/ shadow price
	Soil retention	Amount of soil retention	Value of sediment reduction	
			Value of diffused pollution reduction	
	Flood mitigation	Lake: adjustable storage capacity	Value of flood mitigation	
		Reservoir: flood control storage		
		Swamp: stagnant water		
		mangroves: stagnant water		
	Carbon sequestration	Amount of carbon sequestration	Value of carbon dioxide sequestration	
	-oxygen release	Amount of oxygen release	Value of oxygen release	
	Air quality maintenance	Amount of SO <sub>2</sub> absorption	Value of SO <sub>2</sub> treatment	
		Amount of NO <sub>x</sub> absorption	Value of NO <sub>x</sub> treatment	
		Amount of dust reduction	Value of dust treatment	
	Water purification	Amount of COD reduction	Value of COD treatment	
		Amount of total nitrogen reduction	Value of total nitrogen treatment	
		Amount of total phosphorus reduction	Value of total phosphorus treatment	
Climate regulation	Energy consumption of plant transpiration	Value of plant transpiration		
	Energy consumption of water surface evaporation	Value of water surface evaporation		
	Energy consumption of ocean surface evaporation	Value of water surface evaporation		
Biological control	Area of pest and disease occurrence	Value of biological control		
<b>Costal Protection</b>	<b>Reduction of wind and wave</b>	<b>Value of disaster prevention and dam construction</b>		
Cultural services	Natural landscape	Number of tourists	Value of landscape recreation	Travel cost method





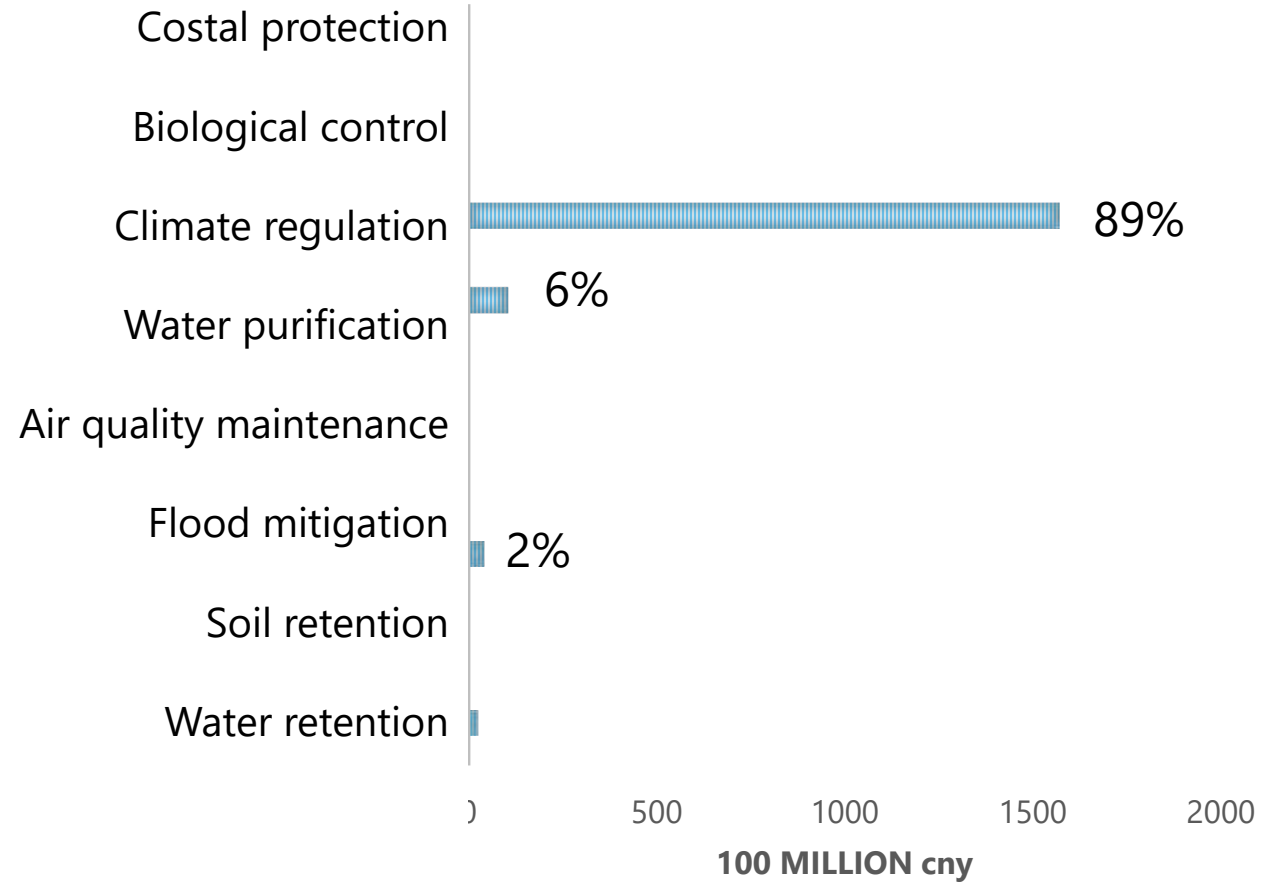
- Provisioning
- Regulating
- Culture

- 2017, Haikou City GEP 276 billion CNY, ~1.99 times GDP
- Regulating Services, 63.48%;
- Culture Services, 31.25%;
- Provisioning Services, 5.27%。



**Provisioning Services**

## REGULATING SERVICES

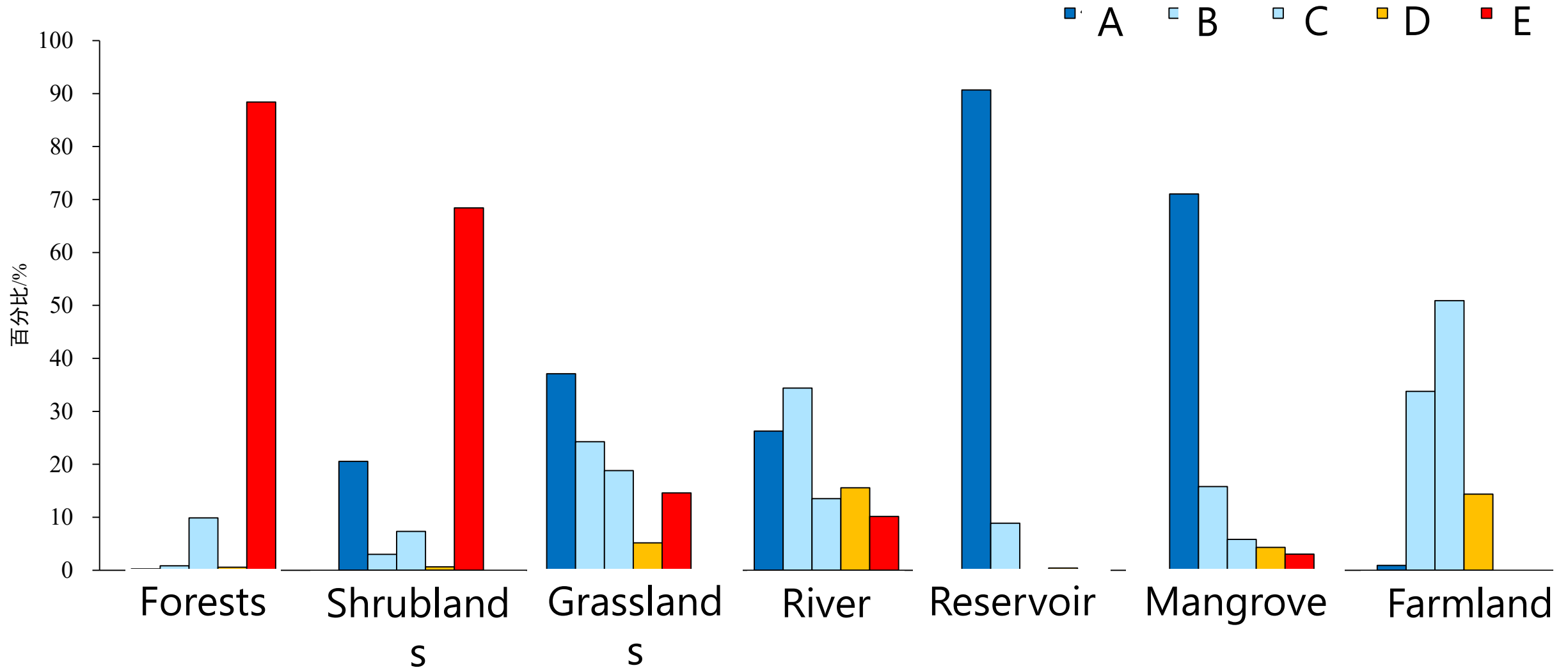




	2015 Billion CNY	2016 Billion CNY	2017 Billion CNY	2015-2017 change rate
Provisioning	13.5	14.6	14.5	1.30
Regulating	171.9	174.6	175.3	1.38
Cultural	47.3	59.1	86.3	71.58
Total	232.6	248.2	276.1	15.64

- “Belt and Road Initiative” and continuously increases the development of overseas routes
- cruise travel routes and accelerate cruise touris







Year	Aggregate Index	Forests	Shrublands	Grasslands	Farmlands	Wetlands
2015	140.6	1	1.6	0.1	124.5	13.4
2017	142.9	1.18	1.8	0.31	125.9	13.8
Difference	<b>2.30</b>	<b>0.18</b>	<b>0.20</b>	<b>0.21</b>	<b>1.40</b>	<b>0.40</b>

**EA Index increased by 1.6%**



# Thanks

Chinese Academy of Sciences  
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Standardization Administration of China  
Asian Development Bank  
Natural Capital Project (Stanford University, Minnesota University )





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