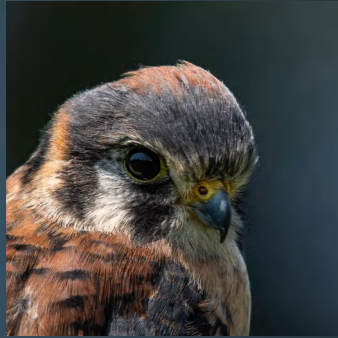


BIOFIN China – Shanghai Pilot

Shanghai Biodiversity Finance
Policy and Institutional Review

Summary Report



动物名称

红隼 (学名: *Falco tinnunculus*)

动物种类

隼科、隼属的小型猛禽之一

动物简介

体重173-335克，体长305-360毫米。翅狭长而尖，尾亦较长，外形和共同爪隼非常相似。雄鸟头蓝灰色，背和翅上覆羽砖红色，具三角形黑斑；腰、尾上覆羽和尾羽蓝灰色，尾具宽阔的黑色次端斑和白色端斑，眼下有一条垂直向下的黑色口角鬃纹。下体颈、喉乳白色或棕白色，其余下体乳黄色或棕黄色，具黑褐色纵纹和斑点。雌鸟上体从头至尾棕红色，具黑褐色纵纹和横斑，下体乳黄色，除喉外均被黑褐色纵纹和斑点，具黑色眼下纵纹。脚、趾黄色，爪黑色。

红隼是上海地区较为常见的猛禽，属于冬候鸟，喜欢停栖在柱子或枯树等较高的区域。红隼的适应能力较强，在上海的公园绿地和沿海湿地均可以发现其踪迹，属于国家二级保护动物。



BIOFIN China – Shanghai Pilot

Shanghai Biodiversity Finance Policy and Institutional Review

Summary Report

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Introduction

白头鹎



01

1.1 | Overview of BIOFIN

Biodiversity Finance Initiative (BIOFIN) was initiated by the United Nations Development Programme (UNDP) and European Commission, in response to the urgent global need to divert more finance from all possible sources towards global and national biodiversity goals in 2012. Now present in 41 countries, BIOFIN is working with governments, civil-society, vulnerable communities, and the private sector to catalyze investments in nature.

The BIOFIN approach starts with the baseline scenario, usually applicable to most countries, where both the level and demand of finance for biodiversity. BIOFIN has worked with countries on future scenario models to analyze the data and deploy solutions to the challenges of finance for biodiversity. The BIOFIN

process aims to increase the scope of finance for biodiversity, improve the effectiveness of the biodiversity resources management and adjust the most important expenditures (such as shifting harmful subsidies to positive), improve the risk management and invest in preventive measures to reduce future expenditures (such as eliminating alien invasions and saving eradication costs) to reduce the biodiversity finance gap. By the end, these efforts will meet the global biodiversity goals and to ensure a greener, safer future for nature and for society.

1.2 | Backdrop and Objectives of PIR

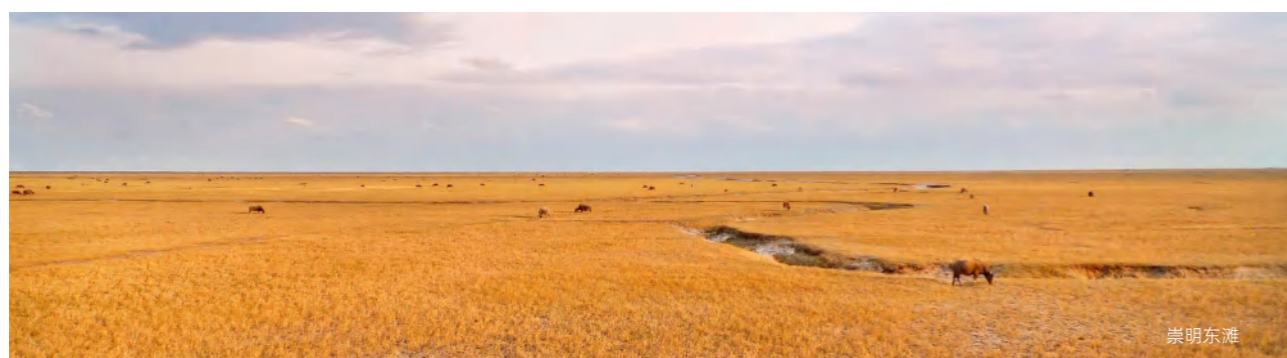
The Policy and Institutional Review (PIR) aims to analyze the policy and institutional context of finance for biodiversity, assess the linkages between a region's natural environment and its fiscal, economic, legal,

policy and institutional frameworks, and establish a baseline for the remaining BIOFIN processes by gathering information from different contexts. Its basic objectives may include the following three points:

① An improved understanding of how the management of biodiversity and ecosystem services supports national sustainable development goals and visions.

② A comprehension of key policy and institutional drivers of biodiversity change.

③ A first-time catalogue of existing biodiversity finance mechanisms, incentives, subsidies and other instruments, including sources of biodiversity revenues.



崇明东滩

1.3 | Participating Organizations and Contributors



湿地的血脉 - 纵横交错的潮沟

This Report was prepared by the Shanghai Academy of Environmental Sciences, Green Finance & Development Center at FISF, and supported by Fudan University, and Shanghai Environment and Energy Exchange.

Established in 1979, the Shanghai Academy of Environmental Sciences is a public welfare institution engaged in environmental research and scientific and technological services under the Shanghai Municipal Bureau of Ecology and Environment. The main research areas include technology in the environmental protection of total factors, such as air, water and soil, ecological and environmental protection policies, and environmental and economic development.

Founded in 2018, the Green Finance & Development Center at FISF, Fudan University focuses on green finance and aims at theoretical research, talent training and decision-making consultation. Meanwhile, it's committed to publicity and training, practical exploration, cooperation and exchanges in green finance.

Shanghai Environment and Energy Exchange is the first domestic environmental and energy trading platform approved by Shanghai Municipal People's Government. Officially established on August 5, 2008, it mainly provides carbon emissions trading, China-certified voluntary emission reduction trading, carbon emission forward product trading, carbon finance and carbon advisory services.

The main contributors to this Report are:

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Technical support from: Tracey Cumming, Onno van den Heuvel, Wang Yao, Ma Chaode, Leng Fei

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Overview of Biodiversity Conservation in Shanghai

上海嘉定北水湾

An aerial photograph of a cityscape, likely Shanghai, showing a mix of modern high-rise buildings and older residential structures. A prominent river or canal winds through the center, surrounded by lush green trees and parks. A large, semi-transparent number '2' is overlaid on the left side of the image. In the bottom right corner, there is a blue text box containing a paragraph of text.

Located in the eastern part of the Yangtze River Delta where the river meets the sea, Shanghai boasts favorable wetland resources and is one of the cities with the highest percentage of wetlands in the world. Chongming Island of Shanghai is an important transit hub for birds migrating between Siberia and Australia, with its avian diversity ranking top among the world's megacities. Due to the interactions between runoffs of the Yangtze River and ocean currents, Shanghai is also a place where freshwater and seawater converge, making it a habitat for many large diadromous fish species. Within the city, there are large expanses of woods, green spaces, rivers, lakes, and farmlands that serve as ecological patches for a wide range of city wildlife to inhabit. Thanks to natural environmental endowments and all the efforts of nurtured development and conservation, a unique biodiversity landscape has been achieved in Shanghai.

Strategic, Policy and Economic Linkages of Biodiversity

白鷺

03



After decades of legal system development, China has established a legal and regulatory system covering all factors of biodiversity conservation. Within the overall national framework for biodiversity conservation and in light of the realities of local biodiversity resources, Shanghai has rolled out a series of legal and regulatory documents involving local

biodiversity factors that form an extensive institutional framework for biodiversity conservation. In line with the top strategy Shanghai Biodiversity Conservation Strategy and Action Plan (2012-2030), biodiversity factors have increasingly been included in the city's urban construction plans, economic development plans, and financial policies.

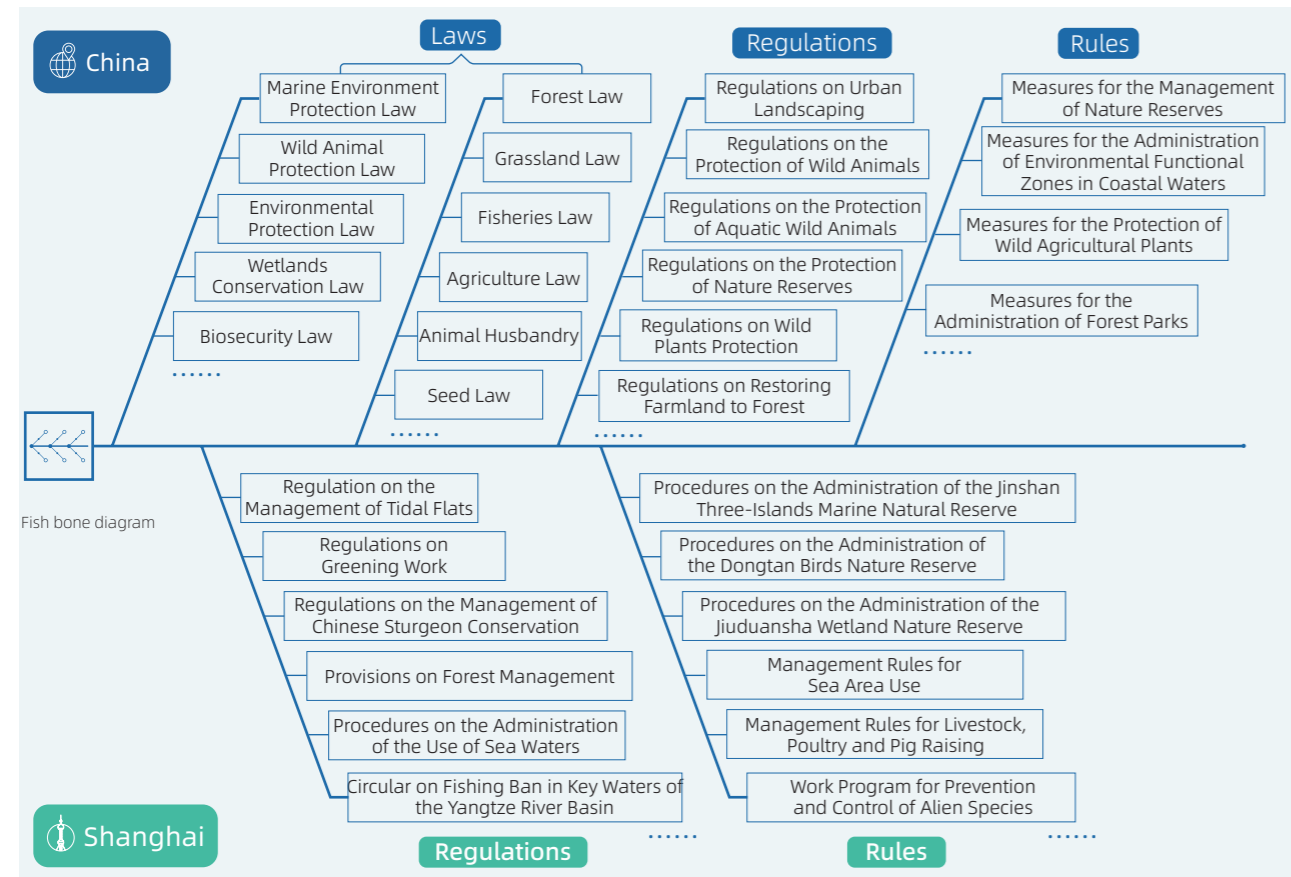


Figure 1 Legal and regulatory framework diagram for biodiversity conservation in China and Shanghai



黄腹山雀, 三有动物

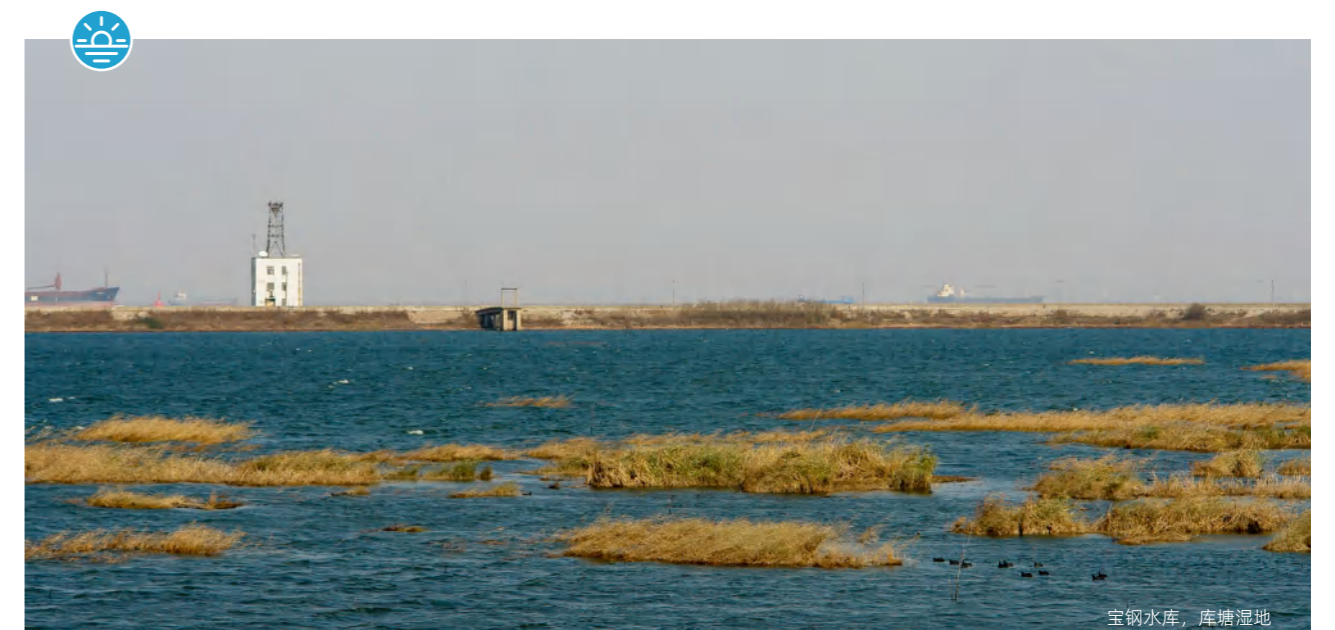
A study on Shanghai's green GDP was conducted by relevant research institutions in 2018. The study established a green GDP accounting system for resource consumption, environmental damage, and

ecosystem service functions (ESFs), among other factors, and assessed the city's gross ecosystem product (GEP). This study drew the following conclusions:

1. The total functional value of Shanghai's ecosystems, including forests, wetlands, and farmlands, rose steadily. Within this overall trend, there was a rise in the functional value of forests and a decline in that of wetlands.

2. Environmental purification was the main function among Shanghai's ESFs, accounting for about half of the total functional value, with little variation over the years. The value of environmental purification was about RMB 13.5 billion during the 12th and 13th Five-Year Plan (FYP) periods.

3. Shanghai's ESF per unit of forest area increased overall. Meanwhile, ESF per unit of wetland area declined steadily, and ESF per unit of the cultivated area had a relatively low value. There has been no study on expenditures on biodiversity in the past.



宝钢水库, 库塘湿地

⁵Liu Xin, Wang Lei, et al. Requirements for reduction of pesticides and fertilizers under the Convention on Biological Diversity and our countermeasures and suggestions. Journal of Ecology and Rural Environment, 37 (9), 2021: 1129-1136.

Key Drivers for Biodiversity Change

牛背鹭 - 三有动物



04

4.1 | Positive and Negative Trends in Shanghai's Biodiversity Conservation

Positive aspects in Shanghai's biodiversity conservation include: improvements in policies and working mechanisms for conservation, research and monitoring capabilities, and eco-environmental conservation systems, as well as notable achievements

in strengthening international cooperation and public engagement. Negative aspects include: a failure to fundamentally curb the decline of biodiversity, threats to biodiversity posed by invasive alien species, and shortcomings in biodiversity stewardship.

4.2 | Analysis of Biodiversity Drivers under the DPSIR Model

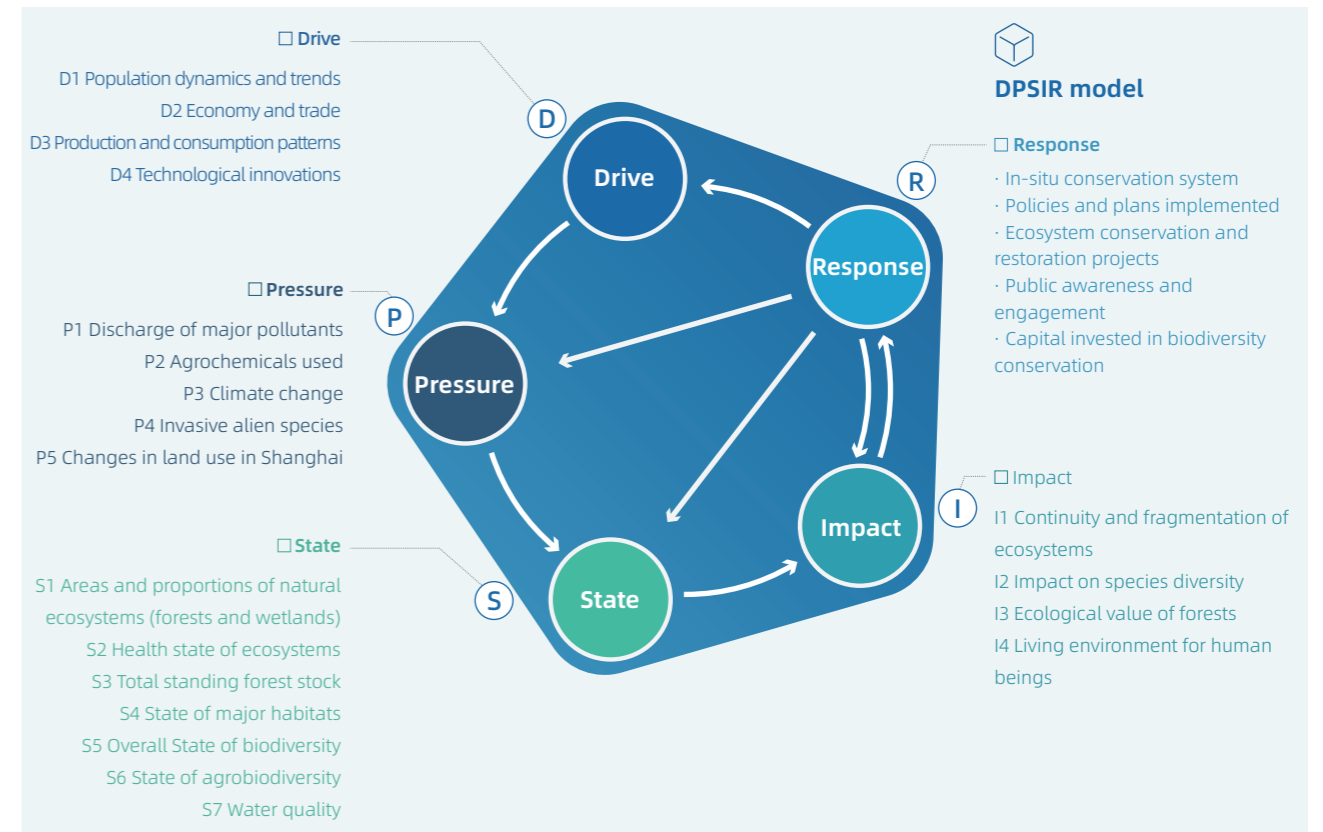
The approach of the DPSIR conceptual model is that the "pressures" imposed by human activities upon natural resources and the environment can change the "states" of the environment and the quality and quantities of natural resources. At the same time, human society would "respond" to such changes through environmental, economic and other policies to mitigate the impacts of human activities on the environment

and maintain the sustainability of the ecosystem. Given its systematic and comprehensive features, this model can monitor the continuous feedback mechanisms between indicators and serve as an effective means to look for causal chains between human activities and environmental impacts. As a result, the DPSIR model is widely recognized and used.

Biodiversity evaluation indicators under the DPSIR model

Target layer	Criterion layer	Indicator layer
Biodiversity	Drivers (D)	D1 Population dynamics and trends
		D2 Economy and trade
		D3 Production and consumption patterns
		D4 Technological innovations
	Pressures (P)	P1 Discharge of major pollutants
		P2 Agrochemicals used
		P3 Climate change
		P4 Invasive alien species
		P5 Changes in land use in Shanghai
	States (S)	S1 Areas and proportions of natural ecosystems (forests and wetlands)
		S2 Health state of ecosystems
		S3 Total standing forest stock
		S4 State of major habitats
		S5 Overall State of biodiversity
		S6 State of agrobiodiversity
		S7 Water quality
	Impacts (I)	I1 Continuity and fragmentation of ecosystems
		I2 Impact on species diversity
		I3 Ecological value of forests
		I4 Living environment for human beings
Responses (R)	R1 In-situ conservation systems	
	R2 Policies and plans implemented	
	R3 Conservation and restoration projects for ecosystems	
	R4 Public awareness and engagement	
	R5 Capital invested in biodiversity conservation	

4.3 | Analysis of Changes in Drivers for Biodiversity Conservation in Shanghai



The DPSIR feedback mechanism

In light of the above indicators and the feedback mechanisms between indicators, we can sum up the following main drivers for changes in Shanghai's biodiversity:

4.3.1 Land expansion and changes in land use due to urbanization

Since the start of China's economic reforms in the late 1970s, with a rapidly growing population and breakneck socioeconomic development, Shanghai has experienced massive land expansion and changes in land use to meet the ever-changing needs of residents. In the early period of these reforms, changes in Shanghai's land development and use were concentrated in downtown areas. By 1990, such changes had shifted to the suburbs, represented by Pudong New Area. After 2000, changes in land development and use shifted from the inner suburbs to the outer suburbs. As Shanghai is a coastal city, the development of its outer suburbs requires changes in the use of sea waters and coastal land, including coastal habitat change, tidal flat reclamation, offshore aquaculture, mariculture, bottom trawling, and land reclamation. During the

process, the expansion of urbanized environments from downtown areas to the suburbs and extensive construction of railways and highways made habitats in the city markedly fragmented and made gene flows between living organisms harder, leading to a decline in biodiversity. Later, along with structural changes in the economy, awareness of ecological value increased. Other cities across China also developed rapidly, and population growth flattened. Shanghai's urbanization process has levelled off, and the development of natural resources has diminished. The municipal government also worked out urban spatial plans focusing on ecological progress and established a range of nature reserves, wetland parks, and important habitats to reconstruct ecological green corridors to help restore the ecological environment.

4.3.2 Capital flows affected by mechanisms for realizing the market value of biodiversity assets

As different industries rely on and impact biodiversity to varying degrees, stakeholders are divided over the value of biodiversity, which makes the recognition, measurement, and appraisal of the value of biodiversity assets difficult. Moreover, robust mechanisms for realizing the monetary value of biodiversity assets are yet to be implemented, and might not be suitable for a range of biodiversity assets, so investors find it difficult to identify investment opportunities presented by biodiversity. As a result, government and social organizations have so far been leading biodiversity conservation. Fortunately, for the evaluation of a forest's ecological value, there is a cogent forestry standard—Specifications for Assessment of Forest Ecosystem Services. Having determined the value of its forests, Shanghai has given strong support to reforestation and rolled out a range of administrative measures for woodland conservation over recent years, including a subsidy for returning farmland to forests. As a result, Shanghai's forest coverage and standing forest stock have been growing, bringing about a rise in the ecological value of forests. This rising value, in turn, attracts more investment in both forest ecosystem conservation as well as in the maintenance of planted forests.

Take Chongming Island as an example. Based on the UN's Blue Carbon Report and the blue carbon research in

developed countries, Shanghai has actively assessed the carbon sink value of the coastal blue carbon ecosystem according to local conditions, especially the carbon sink potential and value of the blue carbon ecosystem in Chongming Dongtan. Salt marsh, the only type of coastal blue carbon ecosystem in Shanghai, is known for considerable carbon sink potential, as a result of its high vegetation coverage. In particular, the study on the organic carbon sink/source of Chongming Dongtan International Wetland showed that the core carbon sink indicators, such as the net ecosystem exchange (NEE) and the net primary production (NPP) of plants in the salt marsh of Chongming Dongtan were at a high level, with a strong carbon sink function. In the future, Shanghai can learn from the successful experience of forestry carbon sink, rely on China-certified emission reduction programs, and foster China's blue carbon sink trading market in Shanghai at an appropriate time to further enhance the economic carbon sink value of the coastal blue carbon ecosystem. Meanwhile, the city is expected to establish an appropriate blue carbon compensation mechanism, control the reclamation intensity, and further strengthen the conservation and restoration of the blue carbon system, in an effort to maintain the sustainable development of the coastal blue carbon ecosystem in Shanghai.

4.3.3 Changes in natural resource utilization due to the changing relationship between humanity and Nature

With population growth and social progress, the relationship between biodiversity and human development has undergone changes over time. Shanghai, for one, including Pudong, was almost above sea level more than 600 years ago. At that time, Wusong River and Huangpu River converged into the sea and thus functioned as important waterway connecting inland counties and ports. Therefore, Shanghai gradually became the core of maritime trade in Jiangsu and Zhejiang. The exploitation of natural resources mainly centered on its trade function, and the operation of digging canals and rivers was throughout the port opening history for hundreds of years. Over a century ago, due to the rise of the global industrial revolution, Shanghai became China's industrial manufacturing center, thanks to its unique geographical and economic advantages. As a result, a large number of factories and production resources were rapidly gathered in Shanghai, which once accounted for more than half of the country's industrial output. In the early days of the reform and opening up, the development of industry was beleaguered by the lack of industrial raw

materials and land for factory construction, as well as the shortage of energy. To solve these difficulties, Shanghai decided to take full advantage of its location at the estuary of the Yangtze River, asking for biological resources, mineral resources and energy from the East China Sea and reclaiming a lot of land by building dykes. Besides, with the improvement of fishing techniques, intensive fishing exacerbated the decline of fish stocks in Shanghai, evidenced by the increased proportion of small, young and low-value fish, and the decreased trophic level of fishery resources. The habitat encroachment and overexploitation of wildlife have caused sharp declines in biological populations and the depletion and degradation of biological resources. Meanwhile, as wildlife are economically prized for their medicinal, edible or ornamental value, which cause the overfishing or illegal hunting. For example, *Coilia ectenes*, known as the "most delicious fish in the Yangtze River", are declining in population due to chronic overfishing. In 2019, the Ministry of Agriculture and Rural Affairs banned fishing of bigmouth grenadier anchovy. However, the high economic value of wild

bigmouth grenadier anchovy keeps illegal fishing and purchase seen from time to time.

In the context of rapid globalization, the whole world has become a "community with a shared future". In light of this, to cope with the increasingly challenging ecological crisis, at the UN climate change conference in 2008 the then Secretary-General of the United Nations called for a "Green New Deal" (GND). The GND is intended to pursue both material and spiritual needs and sustainable, moderate consumption and a carrying capacity-based approach to sustainable development. Countries across the world responded positively to the GND. China has also actively joined the effort to make ecological progress. As the economic center of China, Shanghai has made pioneering steps

by developing eco-friendly industries, reducing energy and material consumption, protecting and restoring ecosystems, and developing a circular economy and low-carbon technologies, in an effort to balance economical, social, and environmental bottom lines. The shift in the relationship between man and nature is not only reflected in the steering of national and urban development direction at the government level, but also poses higher requirements for public engagement and a shift in consumption philosophies and material needs at the consumer level. The public need to realize that man has transformed from an "owner" to a "friend" of nature, and man's behavior has changed from "transforming and conquering Nature" to "regulating and adapting to Nature".

4.3.4 Environmental pollution and climate change due to human activities

Since the Industrial Revolution, global economies and societies have developed rapidly, with soaring GDP figures. Efficiency and high productivity have become development priorities for cities. The widespread use of chemicals in industrial and agricultural sectors and people's neglect of ecology and the environment have led to poorly managed discharge and emissions of pollutants. Before the reform and opening up, Shanghai had always been an important industrial base in China, suffering from serious "three wastes (waste gas, waste water and industrial residue)" and water pollution. Shanghai's environmental protection rose in response to the long-term industrial pollution. In the 1980s, Shanghai enterprises discharged 3.866 million tons of waste water every day, of which only 685,000 tons were treated. Urban water pollution tended to get worse. For example, the Huangpu River experienced an average of 146.3 days of "black and odorous" water per year in the 1980s, an increase of 99.5 days from the 1970s. Discharges of industrial wastewater and the use of pesticides have caused declines in the

quality of freshwater and seawater as well as severe eutrophication of some waters. Pollution has not only direct impacts on species and community structures, but also far-reaching impacts on biodiversity through polluted habitats. In particular, plastics, persistent organic pollutants, heavy metals and ocean acidification have harmed marine biodiversity.

Moreover, the Industrial Revolution led to the extensive exploitation of coal, and the resulting massive carbon dioxide emissions have had huge impacts on Earth's climate. Climate change has had obvious and increasingly serious impacts on the distribution, phenology, and population dynamics of species, species combinations, and the structure and functioning of ecosystems. Besides, Shanghai is located at the estuary of the Yangtze River, at the junction of the Yangtze River, the East China Sea and the land, making it vulnerable to sea level rise and extreme climate events as a result of climate change. The high concentration of population, resources and economies will further spread the damage caused by climate change.

4.3.5 Invasive alien species that come with port economy

Invasive alien species are also a driver for biodiversity changes. The number of invasive alien species in Shanghai, according to statistics, accounted for 37.9% of the national total. A large number of invasive foreign species has led to declining endemic species and ecosystem functionality. Of the 212 invasive alien species in Shanghai, 121 (57.1%) were introduced inadvertently, and 84 (39.6%) intentionally. Shanghai once brought in some animals and plants with ecological and economic benefits, but due to a lack of research and technical support, such alien species have caused a series of harmful consequences to the

ecosystems in Shanghai. At the same time, increasingly frequent international trade and the flow of people in Shanghai, an international trading port city, have also accelerated the problem of invasive alien species.

When some harmful alien species invade suitable areas, their populations will multiply rapidly, and gradually develop into the locally new "dominant species", seriously threatening the local ecological security. Meantime, they will have great impacts on the water content and other nutrients of plant soil, as well as the structural stability and genetic diversity of biomes, thus destroying the local ecological balance.

Review of Finance for Biodiversity

上海-金山



5.1 | Financial Instruments and Legal Policies

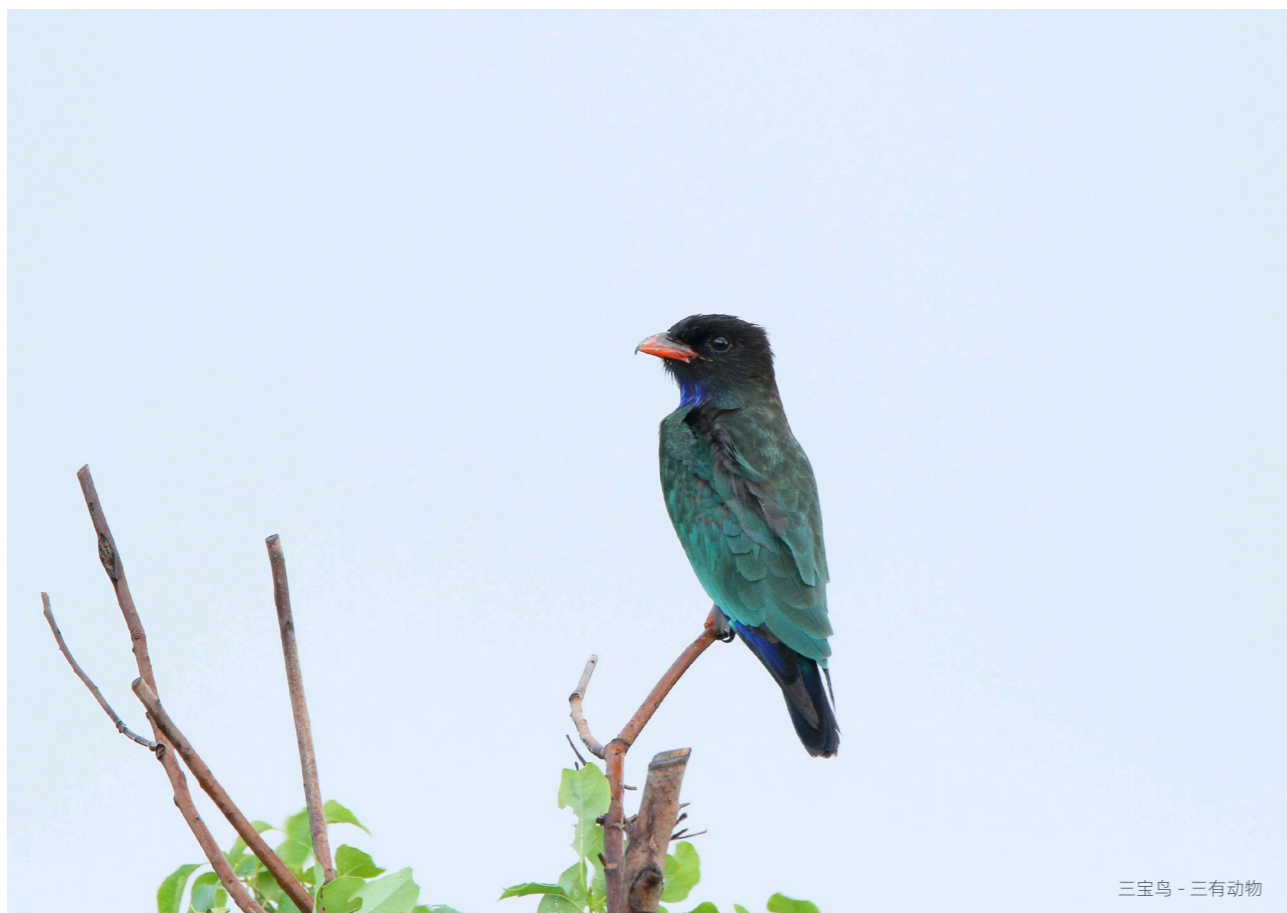
Financial instruments refer to the financial assets that can be traded in the financial market. They are written evidences to prove the availability of money between lenders and borrowers. Financial instruments are products tradable in financial markets, allowing for their different functions and purposes.

5.1.1 Policy-based financial instruments

At present, treasury-based financial instruments may involve the collection of taxes, input of fiscal expenditure, and policy of fiscal subsidies.

5.1.2 Market-based financial instruments

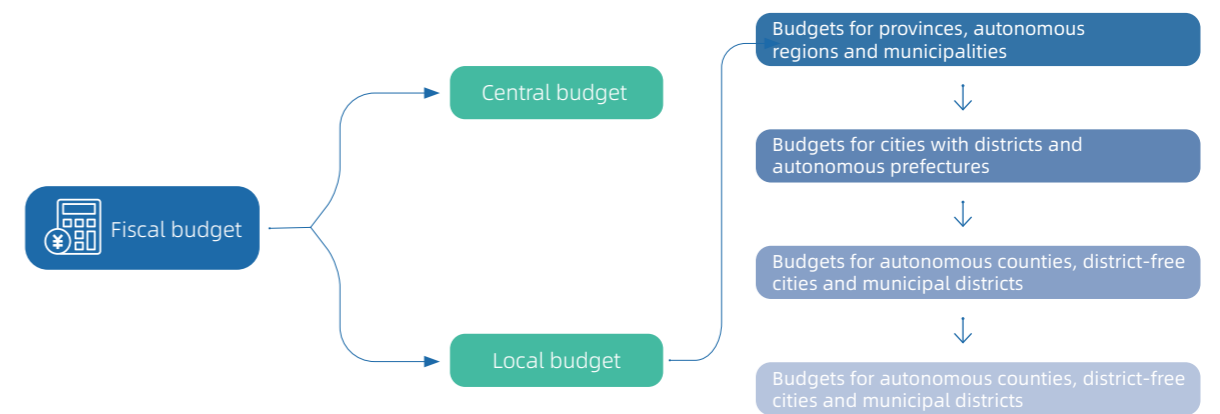
With the rapid development of Shanghai's local green finance market, investment and financing products and businesses conducive to biodiversity conservation have been first explored as an innovative sector, ending up with important results. The city has formed a multi-level and eco-friendly financial organization system, diversified financial products and services, and a market platform system for multi-channel integration of industry and finance and industrial transformation.



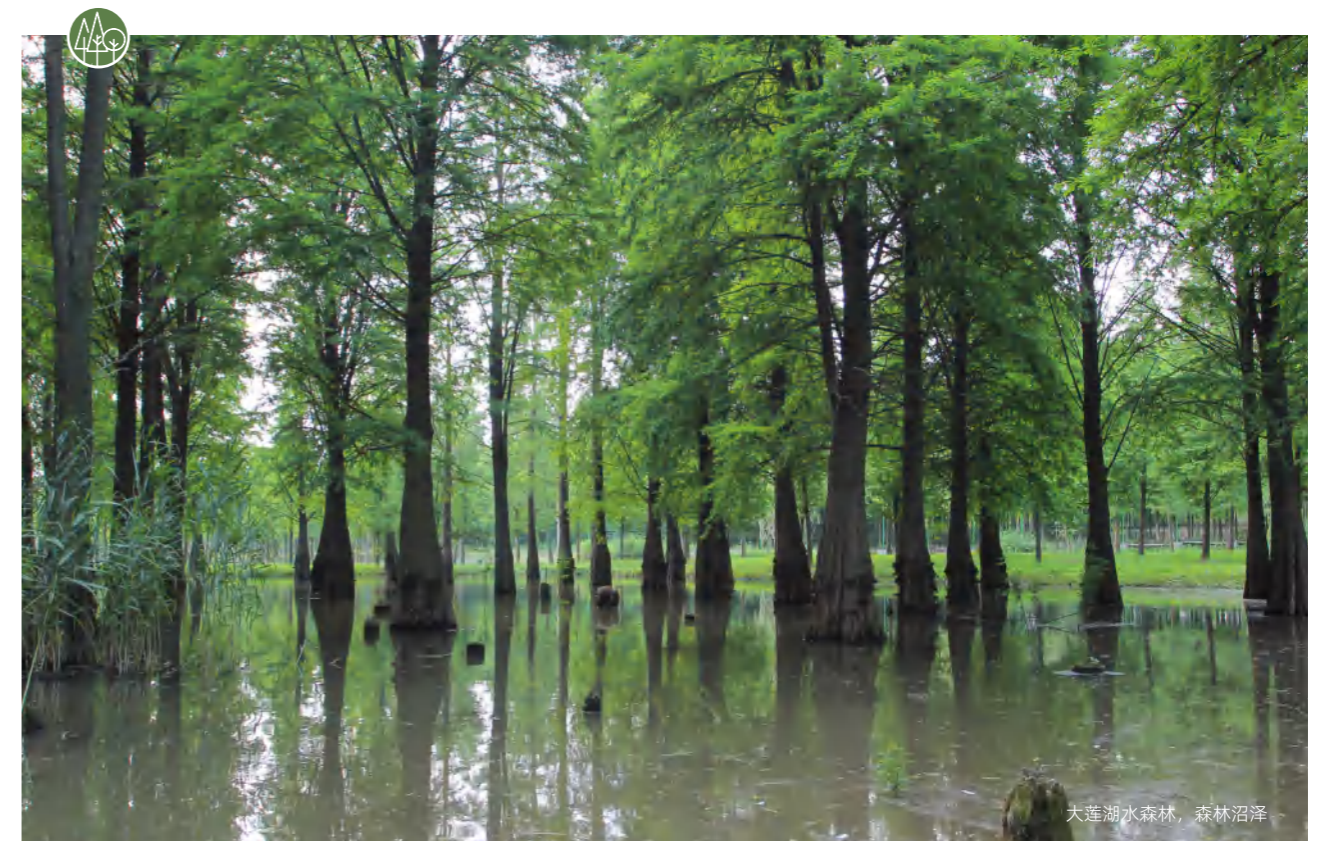
5.2 | Government budgeting process

5.2.1 Fiscal budget system

In accordance with the Budget Law of the People's Republic of China, our government budget structure system is established in the principle of the regime-specific budget. The government budget consists of the central budget and the local budget. The local budget encompasses the provincial (municipality directly under the central government, autonomous region, city specifically designated in the state plan), municipal, county (city, autonomous county) and township (town) budgets. Therefore, our budget system consists of five levels



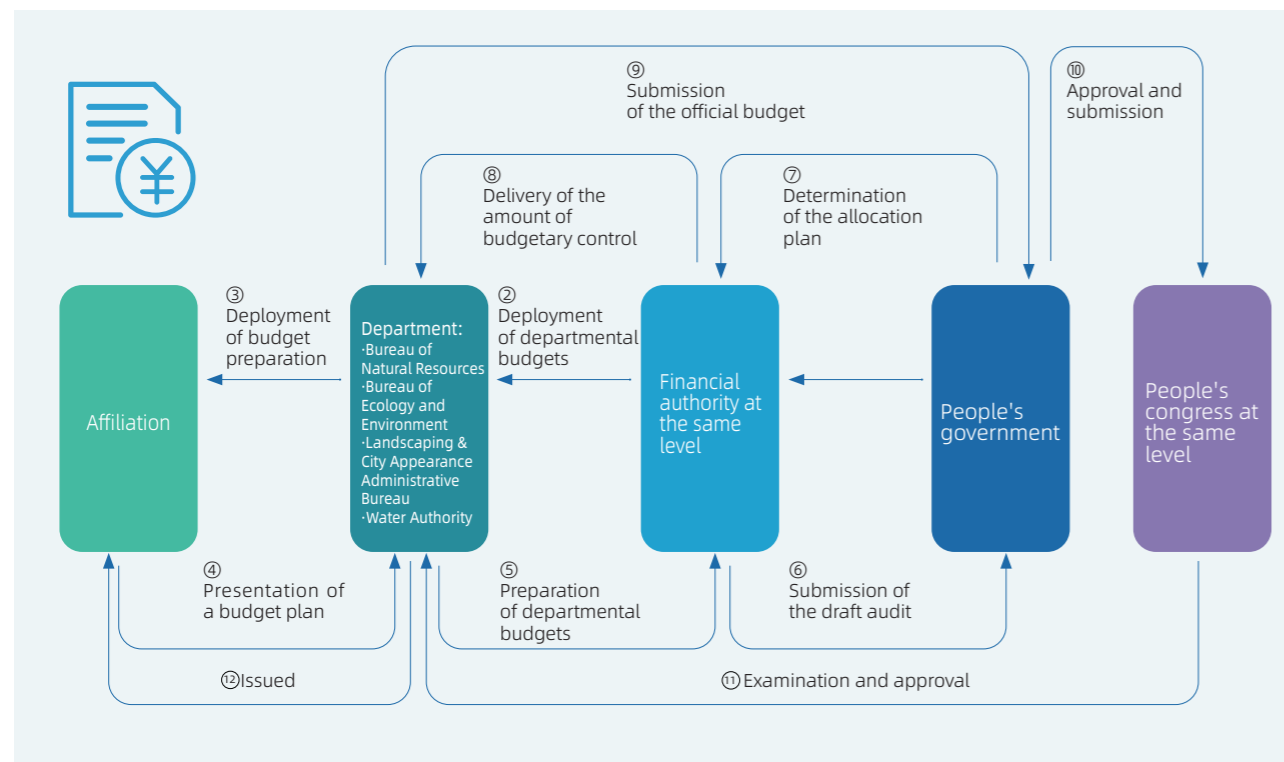
China's fiscal budget system



5.2.2 Fiscal budget management process in Shanghai

Normally, local governments start to prepare budgets for the next year in the middle of each year. Shanghai Municipal People's Government will give notice of budget preparation to the next level of government. Generally, by the end of September, each department shall prepare its own budget and submit it to the financial authority in line with the unified format of departmental budget preparation and reporting. The financial authority shall, before the end of October, conduct audits, put forward opinions on the allocation in conjunction with the departments with budget allocation functions, and submit the budget program to the municipal government for approval. By the end of November, the financial authority shall, on the basis of the expenditure budgets approved by the municipal government, determine the budget allocation programs by department and assign the amount of budgetary control to each department. Each department prepares

a formal departmental budget based on the amount of budgetary control received, and submits it to the financial authority in early mid-December. After reviewing and summarizing these budgets, the financial authority shall submit the draft local budget to the municipal government for approval before the end of the year. Every January, the financial authority sends the current year's draft budget to the Commission for Budget Affairs of the NPC Standing Committee. The Commission conducts advance reviews at the working level. In February, the financial authority submits the draft budget to the NPC's Financial and Economic Affairs Committee for review. In March, the NPC examines and approves the draft budget to officially finalize the statutory budget. The financial authority will give a written reply to each department within thirty (30) days after the approval of the draft.



Flow chart of fiscal budgeting in Shanghai

5.3 | Analysis on Expenditure and Revenue concerning Biodiversity Conservation

Allowing for the fact that expenditure and revenue related to biodiversity conservation are demonstrated from the standpoint of economic entities, this paper mainly collects and analyzes data and information from the perspective of government.

5.3.1 Expenditure on biodiversity conservation

Based on the statistics of financial expenditure in Shanghai, this Report classifies the expenditure on biodiversity protection into three categories: expenditure on environmental governance, expenditure on the protection of agriculture, forestry and water resources, and conservation of natural resources.

5.3.2 Revenue from biodiversity conservation

In addition to direct or indirect market benefits generated by biodiversity, the government also rolls out revenue-raising policies to promote biodiversity conservation as a way to compensate for the cost of protection and neutralize the externalities of biodiversity conservation. Among them, the setting of tax policy is the most direct source of revenue.



后滩湿地，河流修复挺水植物和水上森林景观

Institutional Analysis

金线蛙 - 市重点保护动物

06



6.1 Identification of Major Institutions

The management and economic behaviors of biodiversity conservation are integrated into the functions of government authorities, economic entities and social institutions duty-bound to represent the public at the design and implementation phase. Different roles can be distinguished in the identification of institutions.

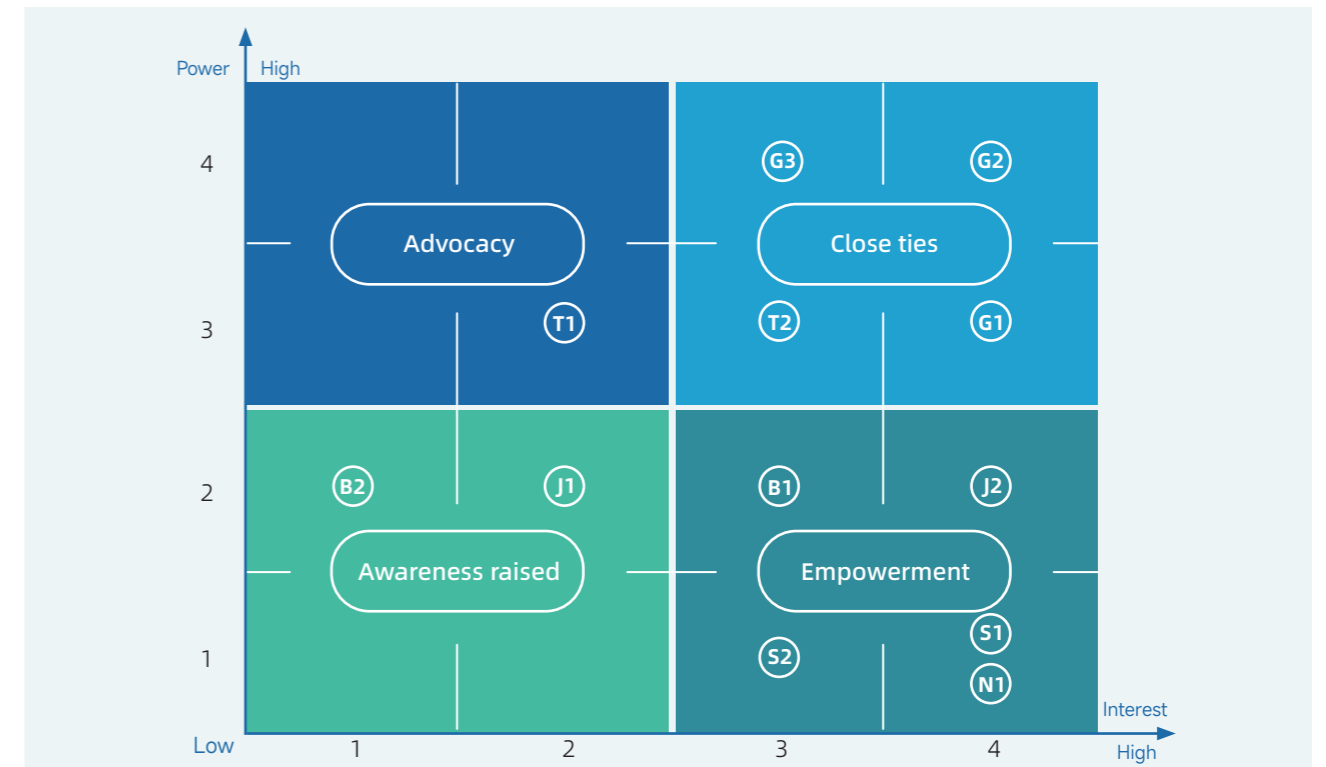
6.2 Analysis of Constraints and Influences between Institutions

On the basis of identifying different institutions, an analysis of the roles of institutions and their power and interest relations can lead to the basic situation of the interests of each role.

Target-based interests of biodiversity stakeholders

Type of stakeholder	Dominant type of interest	Description	Influence of biodiversity conservation targets on the stakeholder
Government	Leading executive agencies (G1)	Environmental benefits	Biodiversity conservation and ecosystem restoration
	Regulatory authorities (G2)	Social benefits	Increased public awareness and the right to know about biodiversity conservation
	Investment agencies (G3)	Economic benefits	Economic development and increased local household income, jobs, and fiscal revenue
Financiers	Non-profit foundations (J1)	Social benefits	Raising of social awareness through public engagement on asset communication platforms
	For-profit foundations (J2)	Economic benefits	Allocation of resources invested for high-quality returns
	Green finance banks (B1)	Economic benefits	Coordinated growth that matches green development targets
	Traditional banks (B2)	Economic benefits	Business expansion and profit realization
	Financial exchanges (T1)	Economic benefits	Increased transaction size for their own profitability
	Ecological resource exchanges (T2)	Economic benefits	Increasing the value of eco-environmental resources and products, thereby raising their own value

Biodiversity beneficiaries	Biodiversity resource developers (S1)	Economic benefits	Maximizing the financial value of ecological products	Benefiting the public's discovery of the value of biodiversity products
	Other businesses on the ecological industry chain (S2)	Economic benefits	Financial benefits for extended industries	Benefiting related extended industries' realization of economic growth or recovery
Social organizations	Non-governmental organizations (NGOs) (N1)	Social benefits	Greater public trust and social influence	Improving their moral image associated with the eco-environment and making them a medium for the public to consult with the government
		Environmental benefits	Better quality of the ecological environment	Benefiting their representation of the public to put forward demands for improving the ecological environment and biodiversity conservation



Power-Interest Matrix of Biodiversity Stakeholders



6.3 Stakeholder Participation Plan

The drivers and solutions for the participation of the closely tied government departments and environmental interest exchanges have been discussed in the previous sections. This section focuses on institutions in the “advocacy” and “empowerment” zones that can potentially become “closely tied” stakeholders.

6.3.1 For government: biodiversity mainstreaming

Contentiously incorporate biodiversity into different sectors, especially in the development and economic departments.

6.3.2 For financial institutions: a finance plan based on biodiversity investment risk management needed

A science-based review and feasible finance plan is needed for financial exchanges (T1) and state-owned traditional banks and insurance (B2).

Biodiversity-related investment risk management refers to various measures taken by financial institutions to identify, assess and resolve biodiversity risks to their portfolios. Biodiversity risk, as one of the environmental risks, constitutes ESG risks to financial institutions together with social and governance level risks and has gradually become part of the overall risk management in the financial sector.

6.3.3 For Biodiversity beneficiaries: raise awareness on biodiversity

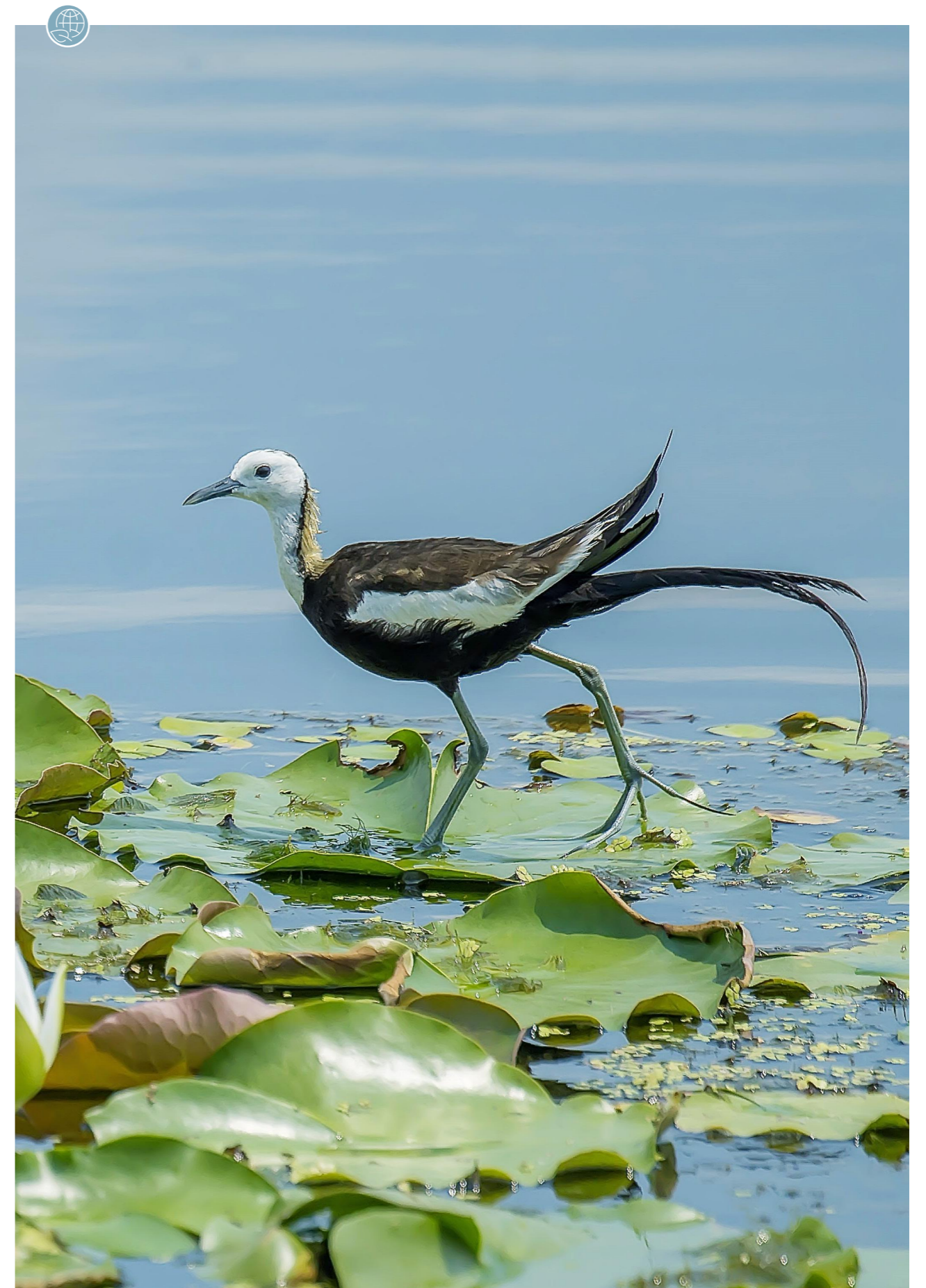
Raise awareness on biodiversity for beneficiaries from Media, University and research institutions, primary and high schools, farmers and fishermen and urban citizens, etc.

6.3.4 For social institutions: making good use of innovative technologies and platforms to attract traffic and enhance efficiency

Non-government institutions’ fund investment in China’s biodiversity conservation remains very limited compared with the government’s financial investment.



饰纹姬蛙 图为其蝌蚪。
市重点保护动物，体型微小，但在涵养林和苗圃林中大量存在。



Conclusions and Recommendations

崇明区东平镇

07

7.1 | Conclusions

In terms of policy system, biodiversity conservation structures have been formed both in China's top-level design and Shanghai's local policies, and the biodiversity conservation concept and requirements are not only reflected in the laws, plans and policies in professional fields but also in the urban master planning and economic planning. Based on the analysis, the drivers for biodiversity conservation in Shanghai include land expansion and changes due to urbanization, capital flows affected by mechanisms for realizing the market value of biodiversity assets, changes in natural resource utilization due to the changing relationship between humanity and Nature, environmental pollution and climate change due to human activities, and invasive alien species that come with the port economy.

In terms of fiscal policy, the government compensates for the expenditure on biodiversity conservation to some extent by collecting the environmental tax, resource tax and administrative expenses related to biodiversity conservation. The expenditure of the Shanghai government on biodiversity

conservation has shown a rising trend this year, with the largest proportion spent on forestry. As an international financial center, Shanghai's developed financial market has become an effective complement to its fiscal measures: green bonds, green funds, green loans, ecological and environmental interests trading, and various commercial products of financial derivatives have flourished in Shanghai and are clearly distributed in the building of Shanghai into an international finance hub in the future.

In terms of institutional analysis, Shanghai's government departments and environmental rights exchanges are the stakeholders most closely tied to biodiversity investment and financing, and other financiers and institutions are worthy of working on to potentially become "closely tied" stakeholders and are worthy of investing in further solutions.



后滩湿地，河流修复挺水植物和水上森林景观

7.2 | Policy Recommendations

7.2.1 Exploiting Financial Support from the Government

7.2.1.1 Increasing fiscal investment

It is recommended that local financial departments largely increase investment in the nature reserve system and include all national parks and other categories of

national nature reserves in the government's fiscal year budgets.

7.2.1.2 Establishing efficient, diverse ecological payment mechanisms

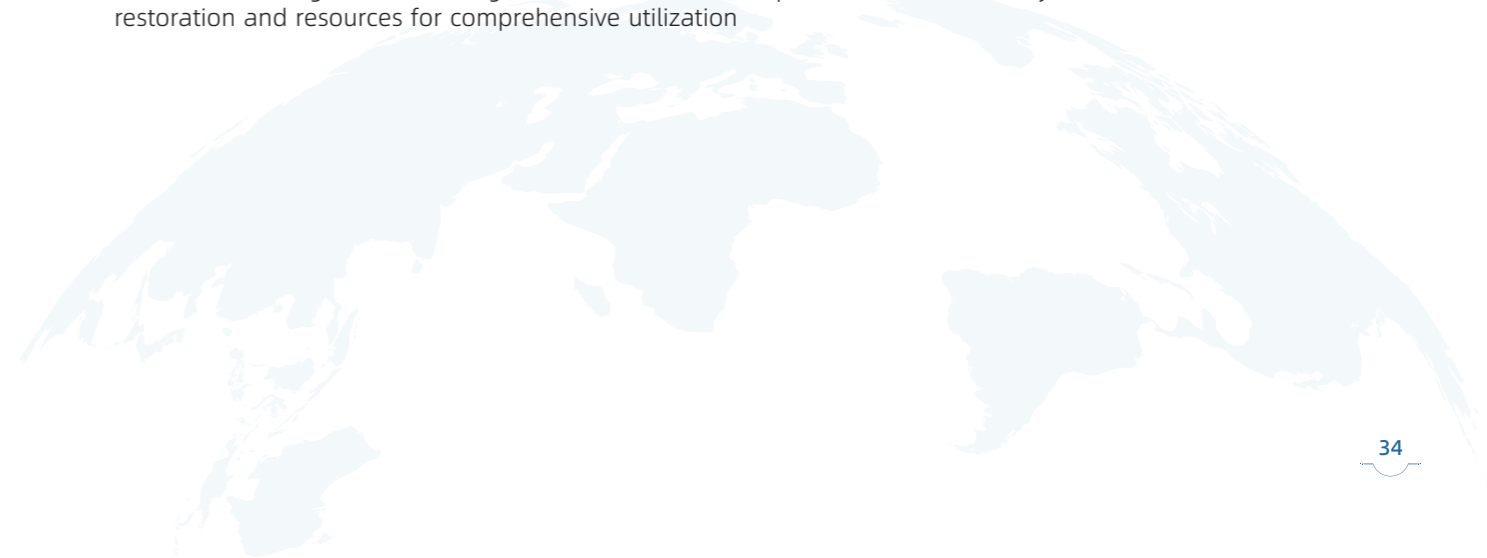
Under the existing guidelines, it's important to pay more attention to the practical problems encountered in concrete implementation, emphasize payment for beneficiaries and for those who suffer damage from the perspective of environmental economic logic, advance the establishment of a watershed upstream and downstream ecological payment system and try a more diverse payment mechanism that involves funds, material objects, manpower and technologies. In terms of vertical management, financial authorities could allocate funds to guide and encourage innovation in

diverse regional and watershed payment mechanisms and give priority to aspects that can attract social capital; in terms of horizontal management, measures can be taken to advance the confirmation and registration of natural resource ownership, stipulate the holders of property rights of natural resources assets, and reasonably define the rights and responsibilities involving assignment, transfer, leasing, mortgage and share buying, so as to provide clear criteria for the primary responsibilities for transactions and the use of financial instruments.

7.2.1.3 Further improving the green tax system

Since the implementation of the Environmental Protection Tax Law on January 1, 2018, the collection of the tax has effectively played restraining and encouraging roles, however, currently, the environmental protection tax mainly covers industries related to energy conservation, emission reduction and pollution control. Therefore, there is a need to improve tax support policies for key areas and weak links of ecological conservation and restoration as soon as possible, to provide tax incentives and preferences for enterprises that actively participate in biodiversity conservation and ecological restoration and raise taxes on enterprises that endanger biodiversity so as to restrain their production activities. It is recommended that the catalogues of ecological conservation/restoration and resources for comprehensive utilization

entitling enterprises to income tax preferences could be revised and the water resources tax reform could be implemented nationwide. Within a certain time frame, a regular source of government funding can be established to improve the central government's ability to guarantee ecological conservation expenditures, this regular source can reduce concerns from private investment, an exit mechanism from finance department need to be planned in advance. A certain proportion of the increase in existing tax on resource development is recommended to be used to support expenditure items most related to biodiversity conservation and ecological restoration. On the other hand, the government can support diverse tax exemption policies to incentivize the protection of biodiversity.



7.2.1.4 Improving the efficiency of the use of government funding by pay-for-performance for ecosystem restoration

The pay-for-performance contract mechanism can be established and promoted. This mechanism is a way for the government to procure services or manage project contracts. This mechanism can be used in the ecological restoration field to improve the efficiency of using government funding and realize higher cost-effectiveness. Further, this mechanism can attract private capital, thus expanding the breadth and depth of ecological restoration. This mechanism is mainly used in wetland/river restoration and water quality recovery. Under the pay-for-performance mechanism, central and local governments work with third-party service providers and make contractual payments based on project performance. Generally, only after the projects have achieved the expected quantifiable ecological

restoration results will the government pay the service providers or the investors of the projects. However, in practical application, certain variations are made in the contractual payment arrangements to arouse the enthusiasm of ecological restoration enterprises for participation, in which, the government will pay certain funds to the service providers after signing the contracts depending on the needs for initial investments of different projects. Further, third-party evaluation agencies are usually engaged to independently evaluate the performance of such projects. Pay-for-performance is not a market itself or strictly a market mechanism, however, the mechanism draws on and uses effective market rules to achieve project objectives more precisely and economically.

7.2.1.5 Optimizing existing agricultural subsidy policies

The synergy among agricultural subsidy policies and the coordination among related departments could be enhanced. It is recommended that the provisions on agricultural subsidies currently scattered in related laws and regulations of China could be coordinated, the synergy among existing agricultural subsidy policies could be enhanced, and coordination and information exchange among departments could be strengthened. China's current agricultural subsidy policies are implemented by different departments. Administration by multiple departments easily leads to difficulties in coordination and inefficient use of subsidies. In the meantime, some agricultural subsidies are implemented across multiple levels of government, which results in high costs. Therefore, unified administration and coordination will help improve and solve these problems. The impact of agricultural subsidies on the ecological environment could be systematically assessed. It is recommended that on the basis of the

national surveys and reports released in recent years on soil and water resources, the assessment and monitoring of the pressure of agricultural subsidies on the ecological environment could be added. In particular, further assessment could be conducted on the impact of current subsidies for agricultural means of production on environmental elements and biodiversity, with the assessment results to be disclosed. The use directions of agricultural subsidies could be optimized. It is recommended that the existing subsidy policies could be used to encourage the recovery of farmland fertility and the technology promotion and development of green agriculture (such as regenerative agriculture and water-saving agriculture). Such subsidies will help to protect limited environmental elements and improve environmental quality. It is recommended that the expansion of the coverage of green (agricultural) insurance could be piloted, to encourage farmers to gradually change their farming methods.

7.2.1.6 Bettering existing fishery subsidy policies

The implementation of existing fishery policies could be strengthened and the monitoring, evaluation and reporting related to policy effectiveness could be improved to ensure the achievement of established objectives. Fishery fuel subsidies are internationally recognized as an important cause of overfishing and sharp declines in marine biodiversity. Fishery fuel subsidies have been maintained at a high level in China. The Chinese government has introduced some policies to reduce the subsidies and control fishing intensity by reducing the number and power of fishing vessels, however, there is still a huge gap between the objective set in the 13th Five-Year Plan and the

actual amount of fishing, in other words, the objective was not achieved. It is recommended that the related content and specific objective of reducing fishery fuel subsidies could be added to the 14th Five-Year Plan and monitoring, evaluation and reporting related to policy implementation could be strengthened. In the meantime, the conservation of coastal and marine ecosystems could also be strengthened. It is recommended that the funds saved from the reduction of fishery fuel subsidies could be redirected to the protection and restoration of coastal wetlands, the establishment and management of marine nature reserves, propagation and release, the nurturing of

wild fishery resources and other measures and projects, funding in scientific research on marine resources could be increased, and background investigation, monitoring and reporting related to marine ecosystems and fishery

resources could be strengthened. Attention could be paid to the conservation and restoration of marine ecosystems and biodiversity on the basis of controlling the fishing of wild fishery resources.

7.2.1.7 Carrying out ecosystem services and gross ecosystem product (GEP) accounting

The GEP accounting method scientifically assesses and measures the eco-environment value. In practice, the accounting method is faced with challenges to its implementation. From a technical perspective, when carrying out physical quantity accounting of ecosystem products and services, there are multiple physical quantity accounting methods for the same indicator, therefore, the government needs to standardize and unify the accounting methods through policies. In the implementation process, basic data is fundamental to the accounting, however, related data is currently scattered in various government departments, including the development and reform commissions and agriculture, land, forestry, water, meteorology, ecology and environment, tourism, power and statistics departments, therefore, the data opening, sharing and coordination mechanisms need to be improved to support the accounting system in data. Further, the accounting system has high requirements for local governments and technical departments in terms of

basic data collection and management as well as related technical capabilities. Therefore, it takes long-term, systematic capability building and investment. The ultimate goal of the GEP accounting method is to incorporate ecological benefits into the economic and social evaluation system and make GEP one of the new performance indicators. To some extent, GEP can measure the effectiveness of ecological conservation measures implemented by government officials during their term of office or the impact of the one-sided pursuit of economic development on the eco-environment. GEP can also reflect the comprehensive equilibrium relationship between the ecological environment and economic development in a specific region. However, work remains to be done to further improve and promote the mechanism of using this indicator as a key one in the audit of outgoing leading officials or assessment of ecological conservation targets or green development performance.

7.2.2 Developing and Improving Market-Based Finance Mechanisms for Ecological Conservation and Restoration

7.2.2.1 Working out nature-based solutions (NbS) and developing carbon markets

It is recommended that NbS could be used as one of the important tools to strengthen the response to climate change and that NbS could be included in the next nationally determined contribution (NDC) update document, with the determined quantitative commitment about NbS proposed. The solution paths could emphasize the following aspects. Firstly, efforts could be made to strengthen inter-departmental communication and coordination and build a top-down NbS management mechanism. The synergy of NbS in multiple fields such as environment, society and economy could be assessed, and the National Leading Group on Climate Change, Energy Conservation and Emissions Reduction could be at the center of work to strengthen the collaboration between departments in NbS and promote related departments to make NbS one of the important paths to address climate change. Secondly, research on the theory, practice, paths and policies related to NbS could be increased to provide systematic solutions for decision-making and practice. The benefits and potential of different means of NbS could be assessed in aspects of climate

change mitigation and adaptation and other social, economic and environmental aspects in China, to identify preferred paths, make breakthroughs in key technologies and provide technical support for the scientific formulation of targeted policies. Thirdly, efforts could be made to enhance institutional capacity and safeguard measures and establish a sound carbon emission monitoring, reporting and verification (MRV) system. A three-dimensional data monitoring system that integrates remote sensing and ground stations could be established and a sound data and information sharing mechanism could be established to promote the collaborative governance of NbS in multiple fields. Technical talent training and institutional capacity building could be strengthened, regular information disclosure could be conducted, and reporting and verification capabilities could be enhanced.

Further, it's important to accelerate the development and improvement of the national carbon emissions trading market, actively cultivate market players, gradually expand the market coverage and enrich the trading varieties and methods.

Besides forest carbon sinks, wetlands, grasslands and other land use-related CCER carbon sinks ("green carbon" and "blue carbon") could be included in the national carbon emissions trading market as soon as possible, and enterprises included in emission control can be permitted to purchase "green carbon" or "blue carbon" credit to offset a proportion of their carbon emissions, so as to broaden the financing channels for ecological conservation and restoration through the carbon market.

7.2.2.2 Improving green finance system development

The support of green finance for biodiversity conservation and restoration could be strengthened. In the next stage of development, innovations in business models and financial products could be conducted to direct more funds of green finance to projects that can generate clear ecological benefits. For example, in the establishment of national parks, if the initial fund investment is so large that it may exceed the financial affordability, financial institutions can invest in the national parks through green financial products such as green credit, and they can subsequently get repaid through the government's purchase of services and with the cash flow generated by commercial operations such as recreation and visitor services in national parks. Financial institutions can also draw on international practical experience in green natural infrastructure to support watershed ecological conservation and coastal wetland protection through green finance and make natural ecosystems exert functions that are realized through engineering construction (such as water purification, flood regulation and storage and storm surge resistance). On the basis of the issuance of green bonds, financial institutions can gradually explore the design and issuance of blue bonds to support the conservation of marine ecosystems and the sustainable use of resources. In climate investment and financing, financial institutions could try to give consideration to natural ecological benefits (such as supporting the development of forestry carbon sinks) and achieve synergy between climate change mitigation and ecological conservation. Further, when the stimulus package is implemented after the pandemic, financial institutions could consider increasing their support for ecological conservation and restoration in their green finance business.

The green finance standard system could be improved. Related regulators could further unify and standardize green finance standards based on the existing green finance standards and explore the establishment of a green finance standard system that is "unified in China, in line with international standards

NbS-related standards and monitoring and metering systems could be researched and developed to lay the foundation for "green carbon" and "blue carbon" to successfully enter the national carbon emissions trading market for trading. These new standards could include biodiversity-related provisions, transparency and quantification to ensure the high quality of projects traded in the said carbon market.

and clear and implementable", so as to fully support biodiversity conservation investment and financing.

Information disclosure could be further standardized. In response to the current situation of insufficient and non-standardized information disclosure on financial institutions and green financial products, regulators could further strengthen and refine related information disclosure standards and evaluation and certification standards, especially information disclosure on the channeling of funds and environmental benefits. Regulators can scientifically develop the information disclosure framework and standards by drawing on experience from the internationally recognized "Task Force on Climate-related Financial Disclosures (TCFD)" and the recommendations under development on the "Taskforce on Nature-related Financial Disclosures (TNFD)". Operationally, regulators could also define the indicator system and methods for assessing environmental benefits and provide templates for information disclosure and reporting, so as to improve the quality and standardization of information disclosure.

Simultaneously with the development of environmental information disclosure requirements and other binding mechanisms, regulators could also improve related incentive policies and mechanisms. As green financial products often involve additional costs for certification and assessment and new management costs within financial institutions, compared to common financial products, green financial products do not have a comprehensive cost advantage. Therefore, regulators could formulate and implement supporting incentive measures, such as appropriately reducing the risk weight of green financial assets and providing discount interest, guarantees or subsidies to green bond issuers. From the market demand perspective, the government can consider introducing more incentive measures for investors, so as to cultivate market demand for green financial products to thus expand the development potential and liquidity of the market.

7.2.2.3 Strengthening the awareness and capacity of financial institutions in biodiversity risk prevention and control

Financial institutions could raise their awareness of biodiversity risk. The central bank and other major financial regulators could lead in conducting environmental risk (including biodiversity risk) analysis at the macro level and release clear policy signals to regulated financial institutions to emphasize the importance of conducting biodiversity risk analysis and drive financial institutions to conduct biodiversity risk analysis from the perspectives of physical risks and transition risks. The central bank and other financial regulators could draw on good practices in the world and stress test from environmental risks to determine the biodiversity-related risk exposure faced by the financial sector.

Financial institutions could be guided to progressively reduce financing for projects that harm biodiversity. On the basis of comprehensively assessing the biodiversity risks faced by their existing assets, financial institutions could strengthen biodiversity risk screening and assessment of new projects with reference to internationally recognized principles and standards for green investment and financing as well as

domestic guidelines for green credit, to gradually reduce financing for projects that harm biodiversity. In the event of inevitable biodiversity impacts and losses during project construction, financial institutions could urge construction enterprises to restore damaged ecosystems by taking necessary compensation and restoration measures.

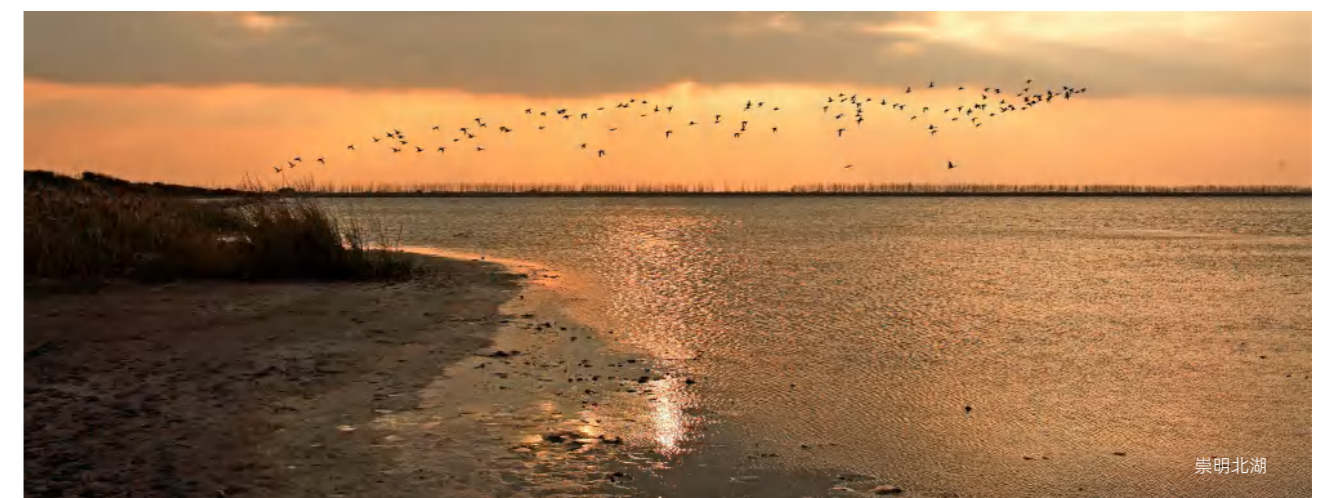
Financial institutions could train their own talents in environmental and biodiversity risk analysis and management as early as possible, develop related tools and increase the efficiency of using external expertise, to reduce excessive reliance on environment impact assessment reports during project risk assessment. Financial institutions could also designate dedicated persons in senior management to promote environmental and climate risk management, including biodiversity, gradually establish related objectives, policies and assessment indicators within themselves and integrate the management of environmental and climate risks into their business processes and investment and financing decisions.

7.2.2.4 Encouraging and mobilizing private capital and charitable funds

A favorable policy environment could be created to strongly encourage social commonweal organizations and charities to proceed with biodiversity conservation. According to the practice of social commonweal organizations and charities in various places, social forces can strongly complement the government's ecological conservation work, expand the channels for the government to listen to the voices of people and

promote local government departments to solve local ecological and environmental problems based on local conditions.

More opportunities could be created for social commonweal organizations and charities to try innovative ideas and methods (such as the Internet Plus) for nature conservation and promote public engagement in breadth and depth.



崇明北湖

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8.0 | References

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