Climate Adaptation and Resilience Finance Opportunities in China

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Executive Summary (Working version)

Climate change has evolved from potential threats into real-world crises. The climate related extreme weather events impact human health, infrastructure, ecosystem, and the functioning of socioeconomic activities. Mitigation measures alone are no longer sufficient to address the dynamic and compounding climate physical risks. The society needs to take urgent adaptation measures and enhance climate resilience to minimize the climate impacts on sensitive industries and vulnerable populations. However, the first Global Stocktake revealed that global progress on climate adaptation is lagging, with developing countries alone facing an annual adaptation finance gap of $187 to $359 billion.[1] As public finance alone is insufficient, mobilizing private sector has become a pressing priority.

Over the past decade, climate risks have rapidly spilled over natural ecosystems to the economic system. As climate change intensifies, the climate risks faced by different regions and key industries in China will continue to rise:

- **Northwest China**: Compound extreme precipitation and snowmelt floods exacerbate ecosystem vulnerability, creating cascading impacts on water resources, agriculture and animal husbandry, tourism, and alpine ecosystems.
- **Northeast China**: The increasing frequency of heavy rainfall and floods, coupled with thawing permafrost, threatens infrastructure safety and intensifies risks to agriculture and public health.
- **Southwest China**: Increasingly severe seasonal droughts are placing pressure on industries of agriculture, tourism, and transportation.
- **North China**: An increase in total precipitation, combined with limited river regulation and storage capacity, is intertwined with urban heat island effects and the spatial-temporal mismatch of water resources, posing threats to energy and food security.
- **South China**: The frequent co-occurrence of typhoons, heavy rainfall, and storm surges has sharply increased the vulnerability of urban lifeline systems (water supply, energy, and transportation).
- **Central China**: The coexistence of abrupt shifts between droughts and floods, along with heatwaves, places dual pressures on public health and agricultural production.
- **East China**: A combination of multiple risks—including sea-level rise, intensified typhoons, extreme precipitation, and urban waterlogging—highlights the climate risks in coastal economic zones where assets are concentrated.

At the national level, a policy framework for climate adaptation has been established. Financial regulators such as the People's Bank of China and the National Financial Regulatory

[1] UNEP. Adaptation Gap Report 2024. 2024. https://www.unep.org/resources/adaptation-gap-report-2024

Administration have successively issued guidelines on environmental information disclosure and have incorporated climate risks into the macro-prudential management process. However, the private sector participation still faces numerous bottlenecks, such as difficulties in quantifying physical risks, identifying adaptation projects or activities, implementing viable business models, and capturing project benefits.

Against the background, this study takes stock of existing financial gaps, estimating adaptation investment needs, prioritizing investment choices in regions and industries, and introducing nine domestic and international cases, aiming to provide recommendations and references for scaling up adaptation investment and financing and enhancing socioeconomic climate resilience.

I. How Green Finance Supports Climate Adaptation Activities

Internationally, the identification of climate adaptation activities has been gradually clarified. Multilateral Development Banks (MDBs), the Climate Bonds Initiative (CBI) and other financial institutions have released relevant classification methodologies. Currently, the focus of China's green finance is on climate mitigation. The newly revised *Green Bond Endorsed Projects Taxonomy (2025 Edition)* incorporates climate mitigation label for the first time, but it does not separately highlight support for adaptation activities. Typical adaptation measures are primarily scattered across fields such as ecological protection, restoration, and utilization; green upgrading of infrastructure; and green services.

This study conducts a comparison analysis of relevant international standards and China's domestic green finance standards. **The results show that China's green finance system already supports activities in agriculture, forestry, animal husbandry, and fishery; manufacturing; water production and supply; construction; and water conservancy, environment, and public facilities management that can make a substantial contribution to climate adaptation**. However, the support for necessary adaptation measures in industries such as electricity and heat production and supply; transportation, storage, and postal services; information transmission, software, and information technology services; finance; education; and health and social work remains insufficient.

Table 1. Comparison of MDBs Adaptation Activity Examples/Climate Bonds Resilience Taxonomy (CBRT) with the Green Bond Endorsed Projects Taxonomy (2025 Edition)

Industry	Division	Field/Theme	MDB Example*	CBRT	Green Finance Taxonomy (2025)
A. Agriculture, Forestry, Animal Husbandry, and Fishery	01. Agriculture	Agriculture Production, Crop Farming	●	●	●
	02. Forestry	Forestry	●	●	●
	03. Animal Husbandry	Animal Husbandry	●	●	●
	04. Fishery	Fishery	●	●	●
	05. Professional and Auxiliary Activities for Agriculture, Forestry, Animal Husbandry, and Fishery	Agricultural Irrigation	●	●	●
C. Manufacturing	30. Manufacture of Non-metallic Mineral Products	Manufacturing, Agricultural Product Processing	●	●	●
	33. Manufacture of Metal Products			●	
	34. Manufacture of General-Purpose Machinery			●	
	35. Manufacture of Special Purpose Machinery			●	
D. Production and Supply of Electricity,	44. Production and Supply of Electricity and Heat	Energy, Electricity (including renewables)	●	●	○ (Supports distributed energy)

Industry	Division	Field/Theme	MDB Example*	CBRT	Green Finance Taxonomy (2025)
Heat, Gas and Water		Transmission and Distribution	•	•	
	45. Production and Supply of Gas	Thermal Energy	•	•	
	46. Production and Supply of Water	Water Supply	•	•	•
		Wastewater Treatment	•	•	•
		Seawater Desalination	•	•	
E. Construction	47. Construction of Houses and Buildings	Construction, Urban Development, Rural Development	•	•	
	48. Civil Engineering Construction	Construction, Transportation, Urban Development, Rural Development	•	•	•
	49. Building Installation	Construction, Urban Development, Rural Development	•	•	•
G. Transport, Storage and Post	53. Railway Transport	Transport, Agricultural Product Logistics	•	•	
	54. Road Transport				

Industry	Division	Field/Theme	MDB Example*	CBRT	Green Finance Taxonomy (2025)
	55. Water Transport				
	57. Pipeline Transport				
	58. Multimodal Transport and Transport Agency				
	59. Cargo Handling and Storage	Cold Chain	•	•	
I. Information Transmission, Software and Information Technology Services	63. Telecommunications, Radio, Television and Satellite Transmission Services	ICT	•	•	
	64. Internet and Related Services				
	65. Software and Information Technology Services			•	
J. Finance	66. Monetary and Financial Services	Banking	•	•	
	68. Insurance	Insurance	•	•	
L. Leasing and Business Services	72. Business Services	Tourism		•	
M. Scientific Research and Technical Services	74. Professional and Technical Services	Technical Services, Disaster Risk Management	•	•	•

Industry	Division	Field/Theme	MDB Example*	CBRT	Green Finance Taxonomy (2025)
	75. Promotion and Application of Scientific and Technological Achievements	Technical Services	•	•	
N. Water Conservancy, Environment and Public Facilities Management	76. Water Conservancy Management	Water Resource Management, Sea Dike Flood Control, Coastal Flood Control	•	•	•
	77. Ecological Protection and Environmental Management	Ecosystems, Mining, Disaster Risk Management	•	•	•
	78. Public Facilities Management	Solid Waste Management, Urban Development, Rural Development, Social Protection	•	•	•
P. Education	83. Education	Education, Culture and Awareness	•	•	
Q. Health and Social Work	84. Health	Health	•	•	

Reference: Multilateral Development Banks (2022), "Joint Methodology for Tracking Climate Change Adaptation Finance".

II. Financial Needs, Market Opportunities, and Investment Priorities for Key Adaptation Sectors

According to estimates, between 2026 and 2030, the average annual financial need for adaptation measures in key climate sensitive sectors will be as high as RMB 2.023 trillion, accounting for approximately 1.2% of China's annual GDP, with a total cumulative demand exceeding RMB 10 trillion over the five-year period. Specifically, the adaptation finance needs are particularly prominent in sectors such as water conservancy, environment, and public facilities management; transportation, storage, and postal services; production and supply of electricity, heat, gas, and water; health and social work; agriculture, forestry, animal husbandry, and fishery. Furthermore, China's average annual financial need for strengthening the climate resilience of its infrastructure reaches RMB 1.16 trillion, accounting for about 57% of the total adaptation finance demand. Within this, the adaptation need for energy infrastructure is approximately 14%, while transportation infrastructure (including urban lifelines like pipelines) accounts for about 30%.

Table E2. Average Annual and Total Adaptation Finance Needs for Key Sectors in China (2026-2030)

Key Adaptation Sector (Industry)	Adaptation Finance Share*	Average Annual Adaptation Need (2026-2030) (RMB 100 million)	Total Adaptation Finance Need (2026-2030) (RMB 100 million)
Water Conservancy, Environment and Public Facilities Management	10%; 80%	11761.341	58806.71
Transport, Storage and Post	5%	2515.928	12579.64
Health and Social Work	15%	1668.231	8341.157
Production and Supply of Electricity, Heat, Gas and Water	5%	1642.39	8211.949
Agriculture, Forestry, Animal Husbandry, and Fishery	5%	1514.355	7571.776

Key Adaptation Sector (Industry)	Adaptation Finance Share*	Average Annual Adaptation Need (2026-2030) (RMB 100 million)	Total Adaptation Finance Need (2026-2030) (RMB 100 million)
Scientific Research and Technical Services	10%	561.966	2809.831
Information Transmission, Software and Information Technology Services	5%; 10%	523.437	2617.184
Construction	10%	43.232	216.16
Total		20230.8811	101154.4

For Water Conservancy, Environment and Public Facilities Management, the adaptation finance share is 10% for the sub-sectors of Water Conservancy Management and Public Facilities Management, and 80% for Ecological Protection and Environmental Management. For Information Transmission, Software and Information Technology Services, the adaptation finance share is 5% for Internet and Related Services and Software and Information Technology Services, and 10% for Telecommunications, Radio, Television and Satellite Transmission.

Within the framework of the Sustainable Development Goals (SDGs), the average annual adaptation finance need for fields such as the blue economy, nature and ecological conservation, renewable energy, climate-smart agriculture, and green buildings is approximately RMB 807.14 billion by 2030. Among these, the nature-based investment and financing sector related to forests and other ecosystems has the largest adaptation finance need, averaging RMB 455.56 billion annually, and exhibits the most significant co-benefits with climate adaptation. The blue economy sector also has an average annual adaptation finance need exceeding RMB 150 billion.

As a crucial financial risk transfer tool, climate insurance needs to further leverage its function in capital supply and risk sharing to provide coverage and compensation for extreme weather events and related risks exacerbated by climate change. It is projected that by 2030, China's climate insurance market will reach a scale of RMB 220 billion, capable of covering approximately 50% of existing natural disaster losses (reaching the global average). However, in a scenario where climate risks in 2030 double compared to 2015 levels, the coverage rate of climate insurance may only be around 37%.

Regarding key regions for adaptation investment and financing, this study conducts an analysis based on two dimensions: market capacity (i.e., regional adaptation demand and market maturity) and policy priority (i.e., regional policy support and ecological importance). Four types of regions have been identified:

- **Priority Areas**: These areas have both significant market demand for adaptation investment and financing and good market environment, with strong synergy with the existing adaptation policy framework. They can serve as key areas for promoting adaptation investment and financing at the current stage. These include Shandong, Sichuan, Henan, Jiangxi, and Hubei.
- **Market-Driven Areas**: These areas have a favorable market environment where the private sector and market mechanisms can play a leading role in adaptation investment and financing. These include Guangdong, Zhejiang, Jiangsu, Hunan, and Anhui, which are economically developed provinces in the Yangtze River Delta and Pearl River Delta.
- **Public Support Areas**: These areas hold a key position in China's food production, ecological security, and protection of cultural and natural heritage. The public sector needs to focus its efforts on these areas, playing a pioneering and guiding role in adaptation investment and financing. These include Hebei, Yunnan, Shaanxi, Inner Mongolia, Guangxi, Chongqing, Shanxi, Guizhou, Gansu, Xinjiang, and Qinghai.
- **Proactive Preparation Areas**: These areas can actively prepare for future adaptation investment and financing. These include Beijing, Fujian, Shanghai, Liaoning, Jilin, Heilongjiang, Tianjin, Hainan, Ningxia, and Xizang.

In terms of key industries, the study, based on industry characteristics, comprehensively identifies **agriculture, forestry, animal husbandry, and fishery; health; production and supply of electricity, heat, gas, and water; and transportation, storage, and postal services as priority areas for adaptation investment and financing**. These major industry categories cover multiple sub-sectors such as hospitals, residential social work, energy supply and distribution, tap water production and supply, sewage treatment and reuse, urban transportation, and postal and courier services, which are highly correlated with key adaptation areas like urban and human settlements, infrastructure, and health and elderly care.

Table E3. Overview of Key Regions for Adaptation Investment and Financing in China and Recommended Adaptation Measures

Region Type	Provinces	Recommended Adaptation Measures
Priority Promotion Regions	Shandong, Sichuan, Henan, Jiangxi, Hubei	Upgrading urban drainage systems, strengthening climate resilience of lifeline infrastructure (power distribution, urban pipeline networks, roads, etc.), scientific allocation of water resources, green buildings, sustainable agriculture.
Market-Driven Regions	Guangdong, Zhejiang, Jiangsu, Hunan, Anhui	R&D and application of adaptation technologies, green buildings (insulating materials, smart water systems, etc.), sea dike and coastal flood control, intelligent and digital transformation of transport vehicles and infrastructure, upgrading of hospital services.
Public Support Regions	Hebei, Yunnan, Shaanxi, Inner Mongolia, Guangxi, Chongqing, Shanxi, Guizhou, Gansu, Xinjiang, Qinghai	Ecological restoration, soil and water conservation, watershed management, ecological agriculture (three-dimensional, mixed cropping, agricultural technology training).
Proactive Preparation Regions	Beijing, Fujian, Shanghai, Liaoning, Jilin, Heilongjiang, Tianjin, Hainan, Ningxia, Tibet	Strengthening monitoring, early warning, and disaster prevention and reduction management; improving the public health and epidemic prevention system; carrying out monitoring, assessment, and public information services.

III. Comprehensive Assessment of the Benefits of Climate Adaptation Activities

For investors, a scientific and accurate assessment of the comprehensive benefits of climate adaptation activities is crucial. Currently, in the process of global climate governance, the assessment indicators for the Global Goal on Adaptation (GGA) are being streamlined. At the project level, the Triple Dividend of Resilience (TDR) approach can serve as a core framework for assessing adaptation benefits. This model comprehensively considers the potential losses avoided through adaptation measures (the first dividend), the structural development benefits induced by adaptation measures (the second dividend), and the gains in ecosystem services, quality of human settlements, and health and well-being (the third dividend). When conducting benefit assessments for specific projects, project proponents, investors, or third parties can select methods such as quantitative measurement, qualitative matrices, or case studies based on data availability, industry, and project characteristics to perform

calculations for different scenarios. Furthermore, because the characteristics of the triple dividends (avoided losses, induced economic benefits, and social and environmental co-benefits) vary, the composition of dividends may differ significantly across industries and project types, thus allowing for different financing models (as shown in Table E4).

Table E4. Key Adaptation Sectors and Financial Support Models Based on Triple Dividend Analysis

Adaptation Field (Example)	**Dividend Type**	**Suitable Investors**	**Common Incentives**	**Financing Model**
Water Resources & Infrastructure	First Dividend	Government finance, MDBs	Fiscal appropriations, policy-based interest subsidies, development-linked funds	BOT/PPP + Fiscal-linked funds
Agriculture & Food Systems	Second + Third Dividends	Private sector, responsible investment institutions, green funds	Project finance, blended finance, green credit	Performance subsidies + Agricultural funds
Urban Renewal & Retrofitting	Second Dividend	Private sector, infrastructure funds, medium- and long-term government bonds	PPP models, BOT contracts, project finance	Green loans/bonds + Responsible investment funds
Public Health & Early Warning Systems	Third Dividend	Multilateral climate funds, green funds, responsible investment institutions	Fiscal appropriations, performance-based rewards, blended finance	Public funds + Blended concessional finance from multilateral sources

IV. Innovative Financing Models for Climate Adaptation

The study selects nine representative case studies to showcase and analyze feasible solutions, investment and financing models, and stakeholder participation methods

based on actual climate risks and challenges. These cases aim to provide a reference for implementing climate adaptation actions and enhancing climate resilience in key areas. The cases include: the sponge airport construction at Beijing Daxing International Airport; Qingdao Bank addressing coastal water crises through blue finance; Junceair International supporting a wastewater treatment project based on a physical climate risk assessment; the International Finance Corporation (IFC) using fintech to empower weather index insurance; the Guangdong-Hong Kong-Macao Greater Bay Area introducing catastrophe bonds to attract private capital; Ma'anshan Rural Commercial Bank supporting ecological restoration to enhance regional climate resilience; blue bonds supporting the construction of the Qingdao Bofa Seawater Desalination Plant; the Bank of Jiangsu enhancing the climate resilience of a mining area through an Ecology-Oriented Development (EOD) model; and the use of the "Building Resilience Index" to assist in the climate resilience assessment and financing of housing in Mexico.

V. Policy Recommendations

Government, financial regulators, financial institutions, and other stakeholders need to work synergistically, advancing the development of adaptation investment and financing in China from multiple dimensions, including policy formulation, standards improvement, capital guidance, and capacity building.

For Policymakers:

1. **Strengthen Top-Level Design and Policy Integration**: It is recommended to strengthen the alignment between the key areas of the National Strategy on Climate Change Adaptation 2035 and specific industries, clarifying the implementation points for each industry in climate adaptation. Relevant competent authorities can formulate industry-level adaptation action guidelines, detailing adaptation goals, tasks, and measures down to specific industrial and business links, and use this as an important basis for local governments to formulate their regional climate adaptation action plans.
2. **Enhance Cross-departmental Collaboration and Data Sharing**: It is recommended to establish a multi-party coordination mechanism with the participation of key departments such as meteorology, finance, banking, ecological environment, housing and urban-rural development, agriculture and rural affairs, and foreign affairs, while also incorporating climate science experts, research institutions, industry associations, social organizations, and representatives of relevant enterprises.
3. **Leverage Fiscal Funds**: It is recommended to include climate adaptation projects within the scope of support for fiscal instruments to leverage more private capital. In the new round of ultra-long-term special government bonds and central budget investments, further strengthen the identification and

support for projects with significant climate adaptation benefits, especially in the areas of building and municipal infrastructure equipment renewal, and facility renovation in environmental protection and resource recycling.

For Financial Authorities and Regulators:

1. **Improve the Green Finance Standard System**: It is recommended to label adaptation-type projects in the existing green finance catalogue and gradually expand the scope of support to adaptation measures in other climate-sensitive industries. Re-identify and label the adaptation functions of activities in fields such as water and wastewater treatment, food and agriculture, ecological resource management, coastal and riverside infrastructure, and urban-rural construction, clarifying their role in enhancing climate resilience. At the same time, expand the identification of adaptation-type projects in highly climate-sensitive industries such as manufacturing, transportation, energy, electricity and heat production, trade, financial services, and public health.
2. **Strengthen Climate Physical Risk Identification and Information Disclosure**: It is recommended that financial regulators formulate unified technical guidelines, clarifying the definition criteria for adaptation-type projects and the measurement dimensions and methods for adaptation effectiveness. This will guide financial institutions to reasonably reflect adaptation contributions in credit approval, risk pricing, provisions, and capital measurement, thereby enhancing the risk management capabilities of institutions and lowering the entry barrier for market participants.
3. **Enhance Risk Sharing Mechanism**: It is recommended that financial authorities formulate and implement a climate adaptation action plan for the insurance industry, clarifying the core role of the insurance industry in climate risk diversification and transfer, and strengthening collaboration with financial institutions such as banks, securities, and reinsurance companies, as well as industrial sectors, to form a multi-party risk-sharing protection system.

For Financial Institutions:

1. **Integrate Climate Physical Risk into the Entire Investment and Financing Process**: Financial institutions should systematically incorporate physical climate risk identification and response mechanisms into their due diligence, project evaluation, and approval processes in accordance with regulatory guidelines.
2. **Adjust Investment and Financing Strategies Tailored to Local Conditions**: Financial institutions can explore innovative adaptation investment and financing paths in different regions based on their own strategic positioning and regional characteristics. In the process of implementing projects, they can refer to domestic and international adaptation

project classification standards and operational guidelines to provide practical support for the improvement of China's standard system.

3 **Strengthen Product Innovation and Effectiveness Disclosure**: Financial institutions should actively carry out financial product and mechanism innovation related to climate adaptation, enhance the ability of financial services to adapt to the transition, and strengthen the assessment and information disclosure of project adaptation benefits.