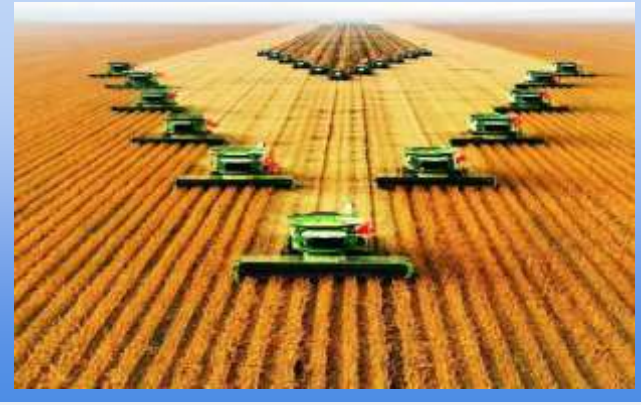
全球气候变化下松辽流域治理与中意流域结对合作情况

Management of the Songliao River Basin Under Global Climate Change and China-Italy Cooperation on Basin Twinning



水利部松辽水利委员会

Songliao River Water Resources Commission of Ministry of Water Resources

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Report Catalog

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Part I

流域概况

Overview of Songliao River Basin

Part I 流域概况 Overview of Songliao River Basin

松辽流域位于中国东北部，总面积124万平方公里，行政区划涉及黑龙江、吉林、辽宁、内蒙古、河北省五省（自治区）。

The Songliao River Basin is located in northeastern China, covering a total area of 1.24 million square kilometers. It encompasses Heilongjiang, Jilin, Liaoning, Hebei provinces, and Inner Mongolia Autonomous Region.

▲松辽流域行政区划图

Administrative Division Map of the Songliao River Basin

Part I 流域概况 Overview of Songliao River Basin

松辽流域**地貌的基本特征**是西、北、东三面环山，南濒渤海和黄海，中、南部形成宽阔的辽河平原、松嫩平原，东北部为三江平原。

The Songliao River Basin is topographically characterized by mountains on its western, northern, and eastern sides, with the Bohai Sea and Yellow Sea to the south. The central and southern regions form the expansive Liaohe Plain and Songnen Plain, while the northeastern part comprises the Sanjiang Plain.

▲松辽流域地形地貌图

Topographic map of terrain and appearance of the Songliao River Basin

Part I 流域概况 Overview of Songliao River Basin

松辽流域主要河流包含位列中国七大江河的松花江、辽河，以及黑龙江、鸭绿江等国际河流和独流入海河流。

The major rivers in the Songliao River Basin include the Songhua River and the Liaohe River, both of which rank among China's seven major river systems, as well as transboundary rivers and independent rivers flowing directly into the sea, such as the Amur River and the Yalu River.

▲松辽流域水系图

River system of the Songliao River Basin

Part I 流域概况 Overview of Songliao River Basin

松辽流域处于温带大陆性季风气候区，多年平均降水量在300mm～1000mm之间，东部较多，西部较稀少，6～9月占全年的70%～85%，洪水多发频发。

The Songliao River Basin is located in the temperate continental monsoon climate zone, with a multi-year average precipitation ranging from 300 millimeters to 1,000 millimeters. Precipitation is relatively abundant in the eastern part and scarce in the western part, and the rainfall from June to September accounts for 70% to 85% of the annual total, increasing the risk of annual flooding events.

▲中国季风分区图

Map of China's Monsoon Regions

Part I 流域概况 Overview of Songliao River Basin

松辽流域水资源总量占全国总量的7%，水资源分布呈现北多南少、东多西少、边缘多腹地少的特点。

Total water resources in the Songliao Basin account for 7% of China's national total. Resources are distributed unevenly, with greater abundance in the north and east compared to the south and west, and more water available in border regions than in the central hinterland.

黑龙江（Heilongjiang River）

浑河沈阳段（Shenyang section of Hun River）

Part I 流域概况 Overview of Songliao River Basin

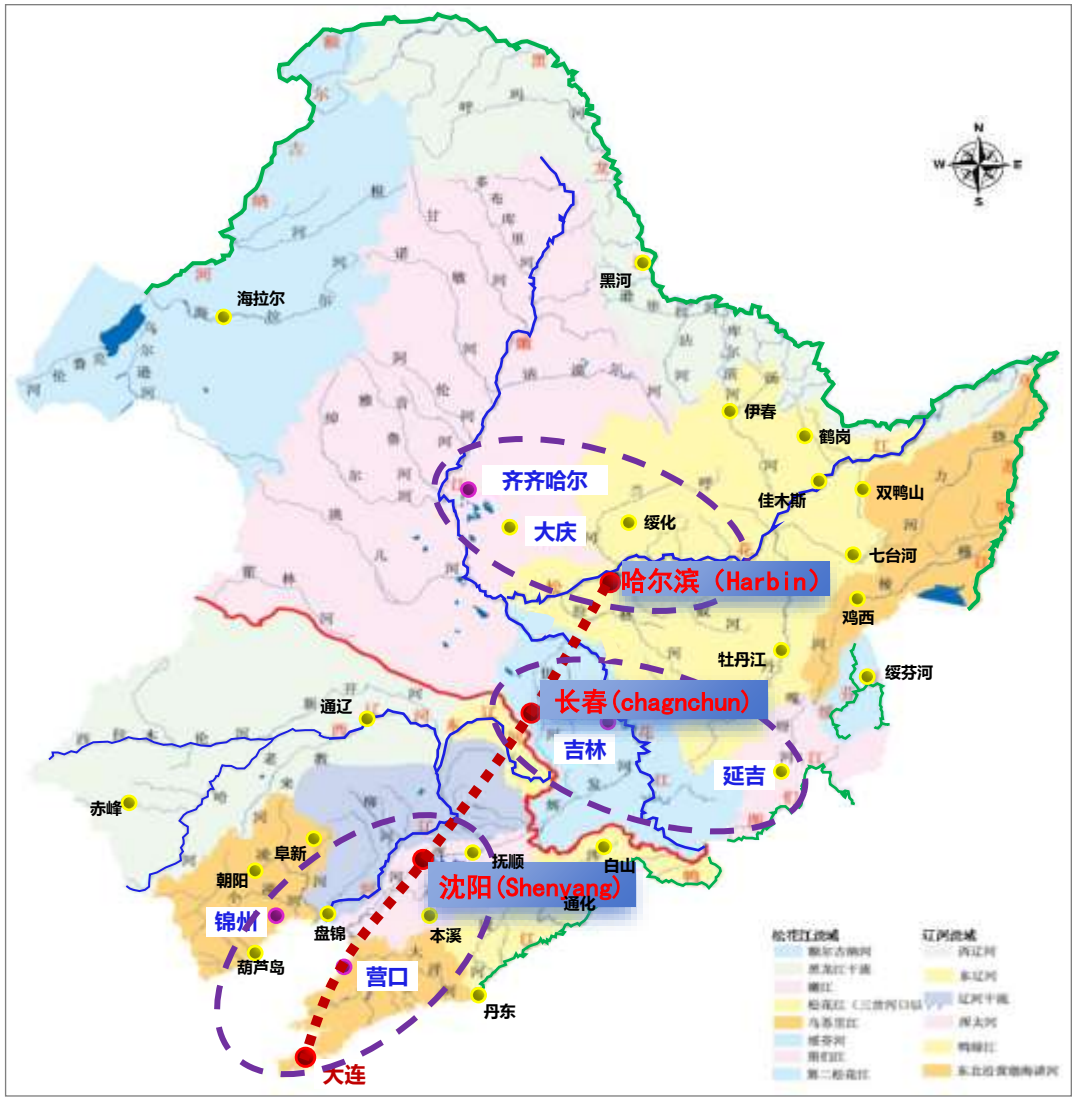
松辽流域现有耕地面积5.6亿亩，占中国耕地总量的近1/3，年均外销粮占全国的40%，在保障国家粮食安全中具有重要战略地位。

The Songliao River Basin currently has 560 million mu of cultivated land, accounting for nearly one-third of China's total cultivated land area. Its annual grain output for external supply makes up 40% of the national total, endowing it with an important strategic position in safeguarding China's food security.

Part I 流域概况 Overview of Songliao River Basin

松辽流域水资源与经济发展、生产力布局匹配不平衡，腹地三大平原是经济产业发展集聚区，人口约占全流域60%，经济总量占70%以上，水资源量仅占41%。

However, there is a mismatch between water resources distribution, economic development and industry layout across the basin. The three major plains in the hinterland are clusters of economic and industrial development, where the population accounts for about 60% of the entire basin, the economic aggregate makes up over 70%, while the water resources only account for 41%.



▲流域水系与主要城市群分布图

Map of River Basins and Major Urban Agglomerations

Part II

全球气候变化带来的影响

The Impact of Global Climate Change

Part II 全球气候变化带来的影响 The Impact of Global Climate Change

在全球气候变化背景下，一方面，流域**极端天气事件**明显增多，沿海地区台风频繁、局地暴雨增强，**洪涝灾害风险加剧**。

Against the backdrop of global climate change, on one hand, extreme weather events in river basins have significantly increased. Coastal regions are experiencing more frequent typhoons and intensified localized heavy rainfall, leading to heightened risks of flooding and waterlogging events.

Songhua River Basin-wide flood (2021)

Recorded-breaking flood on the Raoyang River (2022)

Super Typhoon Doksuri triggers Lalin River record flood (2023)

Typhoon Gaemi forces Fengman Reservoir’s largest flood since 1933 (2024)

Part II 全球气候变化带来的影响 The Impact of Global Climate Change

另一方面，流域腹地河湖生态环境退化，河道生态损坏、湖泊湿地萎缩、草场退化、地下水超采等问题日益突出。

On the other hand, the ecological health of rivers and lakes in the basin's hinterland is deteriorating. Key issues include degraded river ecosystems, shrinking wetland habitats, grassland desertification, and overexploitation of groundwater.

Degradation of river and lake ecological environment

Severe water shortage in Xianghai Wetland

Shrinking of lakes and wetlands

Grassland degradation

Part III

流域治理主要举措

Key Measures for River Basin Management

Part III Key Measures for River Basin Management

1. 持续提升流域水旱灾害防御能力 (Continuously Improving the Capacity for Preventing Flood and Drought Disasters in River Basins)

完善流域防洪工程体系。2013年松花江大水以来，全面实施嫩江、松花江干流治理工程和蓄滞洪区达标建设，建成辽河干流防洪提升工程，加快实施中小河流治理和山洪灾害防治。

Enhancing integrated flood control infrastructure across the basin. Since the severe floods in the Songhua River in 2013, we have completed full-scale rehabilitation projects on the main streams of the Nenjiang River and Songhua River and the standard-compliant construction of flood detention and retarding basins, completed the flood control enhancement project on the main stream of the Liaohe River, and accelerated the implementation of small and medium-sized river regulation and mountain flood disaster prevention and control.

Fengman Reservoir flood discharge

Main stream embankment rehabilitation for the Nenjiang River

Ecological emergency water replenishment

Part III Key Measures for River Basin Management

1. 持续提升流域水旱灾害防御能力 (Continuously Improving the Capacity for Preventing Flood and Drought Disasters in River Basins)

扎实推进雨水情监测预报体系，初步建成覆盖全流域的水文站网。科学实施水工程统一联合调度。

Steadily advancing the rainfall and water regime monitoring and forecasting system. We have initially established a basin-wide hydrological monitoring network and now implemented joint flood control operation of large reservoirs.

流域水旱灾害防御系统平台
Flood and Drought Disaster Prevention System Platform

汛期应急水文测报
Emergency hydrometric survey and reporting during flood season

封冻期流量测验
Ice-covered period flow measurement

Part III Key Measures for River Basin Management

2. 有序推进流域水网重大工程建设 (Steadily Advancing the Construction of Major River Basin Water Network Projects)

协调推进流域、省、市、县级水网建设规划编制。立足流域整体和水资源空间均衡，加快实施流域水网骨干工程和水源调蓄工程建设，进一步完善区域水资源配置和灌溉供水保障体系。

We have coordinated the development of water network construction plans at the basin, provincial, municipal and county levels. Based on the overall conditions of river basins and the spatial balance of water resources, we accelerate the implementation of inter-basin water transfer projects, and water source regulation and storage projects , and further improve the regional water resources allocation and irrigation water supply guarantee system.

Part III Key Measures for River Basin Management

3. 不断强化流域水生态治理与保护 (Continuously strengthening the governance and protection of the river basin water ecology)

加强流域水资源统一调度。断流27年的西辽河干流实现全线贯通，流域生态基流得到有效保障。有序实施母亲河复苏行动，西辽河、洮儿河等6条母亲河全部实现全线贯通。

Strengthening the unified management of water resources in the river basins. The main stream of the West Liao River, which had been dry for 27 years, has achieved full-length flow restoration, and the ecological base flow of the basin has been effectively guaranteed. We steadily carry out the Mother River Restoration Initiative, with all 6 major rivers including the West Liao River and Taoer River realizing full connectivity.

Chao'er to Liao River Water Diversion Project: Replenishing water to the West Liao River

Taoer River achieves full connectivity.

Part III Key Measures for River Basin Management

3. 不断强化流域水生态治理与保护 (Continuously strengthening the governance and protection of the river basin water ecology)

加快实施小流域综合治理和东北黑土区侵蚀沟治理；推进三江平原、松嫩平原、辽河平原及辽西北地区、西辽河流域地下水超采治理。

We have accelerated the implementation of comprehensive management of small watersheds and gully erosion control in the black soil region of Northeast China; we push forward the control of groundwater over-extraction in the Sanjiang Plain, Songnen Plain, Liaohe Plain, northwestern Liaoning, and the West Liao River Basin.

三江平原(Sanjiang Plain)

松嫩平原(Songnen Plain)

辽河平原(Liaohe Plain)

西辽河(West Liao River)

Part III Key Measures for River Basin Management

4. 扎实开展数字孪生水利建设 (Solidly advance the construction of digital twin water conservancy)

编制数字孪生松辽建设实施方案，开展数字孪生嫩江、数字孪生尼尔基工程建设，深化“松辽委水利一张图”业务应用，为流域管理工作提供数据服务与成果应用支撑。

We have developed the implementation plan for the construction of the digital twin Songliao, carried out the construction of the digital twin Nenjiang River Basin and digital twin Nierji projects, deepened the use of the "Songliao Water Conservancy Single Map" platform to deliver data services and operational support for basin management.

全景数字嫩江平台(Digital Nenjiang Platform)

尼尔基综合决策支持系统(Nierji Reservoir Comprehensive Decision Support System)

Part III Key Measures for River Basin Management

5. 不断提高水资源利用效率和效益 (Continuously improving water use efficiency and productivity)

严格落实水资源刚性约束制度，推动用水总量控制指标逐级分解落实，完成18条跨省江河流域水量分配方案，实施其中17条河流的年度水资源调度，推动各省区及时修订和完善用水定额。

We have strictly enforced the rigid water resources constraint system and promoted the step-by-step decomposition and implementation of the total water consumption control targets. We have finalized water allocation plans for 18 inter-provincial river basins, and annual water resource scheduling has been carried out for 17 of them. We also promoted timely revision and improvement of water quotas in various provinces and regions.

Part III Key Measures for River Basin Management

6. 全面提升流域协同治理管理能力 (Comprehensively enhancing the capacity for coordinated governance and management of river basins)

建立松花江、辽河流域省级河湖长联席会议机制，水行政执法与检察公益诉讼协作机制，形成流域协同治理格局。推动流域跨省区域水权交易。持续深化与高校、科研院所的交流合作，推动流域水利科技创新。

We established two key collaborative mechanisms across the Songhua and Liao River basins: a provincial-level joint conference for river and lake chiefs, and a coordination framework between water law enforcement agencies and public interest procuratorial authorities. This has created a unified, cross-provincial governance model for managing shared water resources. We promoted cross-provincial water rights trading. We have deepened collaborative exchanges with universities and research institutes to drive innovation in water conservancy technology .

Part IV

中意流域结对合作情况介绍

Overview of Paired Cooperation between China and Italy in River Basin Governance

Part IV 中意流域结对合作情况介绍 Overview of Paired Cooperation between China and Italy in River Basin Governance

- 2025年3月25日，松辽委召开会议研究中意流域结对合作项目，确定洮儿河流域为结对流域，并初步确定与意大利波河流域管理局的合作意向内容。
- 2025年5月19日至23日，松辽委派员赴意大利参加欧洲—流域组织国际网络第22届国际会议。

- On March 25, 2025, the Songliao River Water Resources Commission convened a workshop to advance the China-Italy paired river basin cooperation project, designated the Taoer River Basin as the paired basin, and initially identified the contents of cooperation intentions with the Po River Basin Authority of Italy.
- From May 19 to 23, 2025, the Songliao River Water Resources Commission sent a delegation to participate in the 22nd International Conference of the European River Basin Organizations International Network in Italy.

Part IV 中意流域结对合作情况介绍 Overview of Paired Cooperation between China and Italy in River Basin Governance

会议期间，中方代表团与流域组织国际网络秘书处、波河流域管理局举行会谈，就洮儿河与波河流域结对合作事宜深入交换了意见，就协议文本草案初步达成共识，商定各自履行国内报批程序。

During the conference, the Chinese delegation held talks with the Secretariat of the International Network of River Basin Organizations and the Po River Basin Authority. Both sides engaged in detailed discussions on the paired basin collaboration reached initial consensus on the draft agreement text, and agreed to complete the respective domestic approval procedures.

Part IV 中意流域结对合作情况介绍 Overview of Paired Cooperation between China and Italy in River Basin Governance

会后，松辽委与波河流域管理局进一步完善合作谅解备忘录内容。目前，正抓紧推进备忘录签署，并按照约定内容开展合作交流活动。

After the meeting, the Songliao River Water Resources Commission and the Po River Basin Authority further refined the content of the Memorandum of Understanding on cooperation. Currently, efforts are underway to expedite the signing of the memorandum and to conduct cooperative exchange activities in accordance with the agreed terms.

汇报完毕！

Thank you for your attention!

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