WATER RESOURCES IN CHINA

MINISTRY OF WATER RESOURCES, PEOPLE'S REPUBLIC OF CHINA

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Located in the east of the Eurasia Continent and the west coast of the Pacific Ocean, China features a three-step-distributed terrain that gradually lowers from the west to the east. Its climate, markedly monsoon, registers hot and wet summers but cold and dry winters. Occurrence of consecutive wet years or dry years from time to time exposes China to frequent disastrous climatic events, of which floods, draughts and typhoons are natural hazards that affect China the most.

Freshwater resources in China add up to 2.8 trillion m^3, 6% of the global total, ranking No.6 in the world, next to Brazil, Russia, Canada, USA and Indonesia. China's per capita water resources, however, only stands at 2,100 m^3, 28% of the world average, making China one of the most water scarce countries in the world.

Water resources in China are distributed very unevenly in time and space, and with substantial intra-annual and inter-annual variations, i.e., 60-80% of

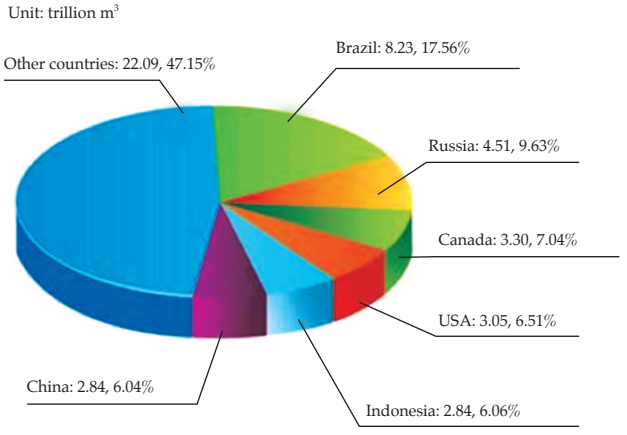


Fig. 1 Summary of water resources of some countries in the world

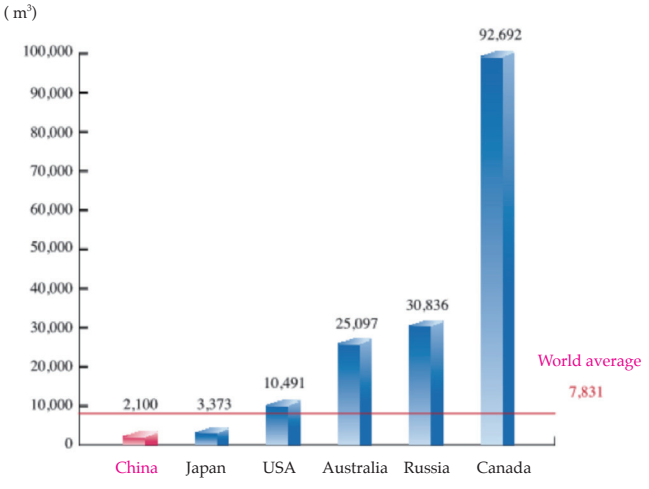
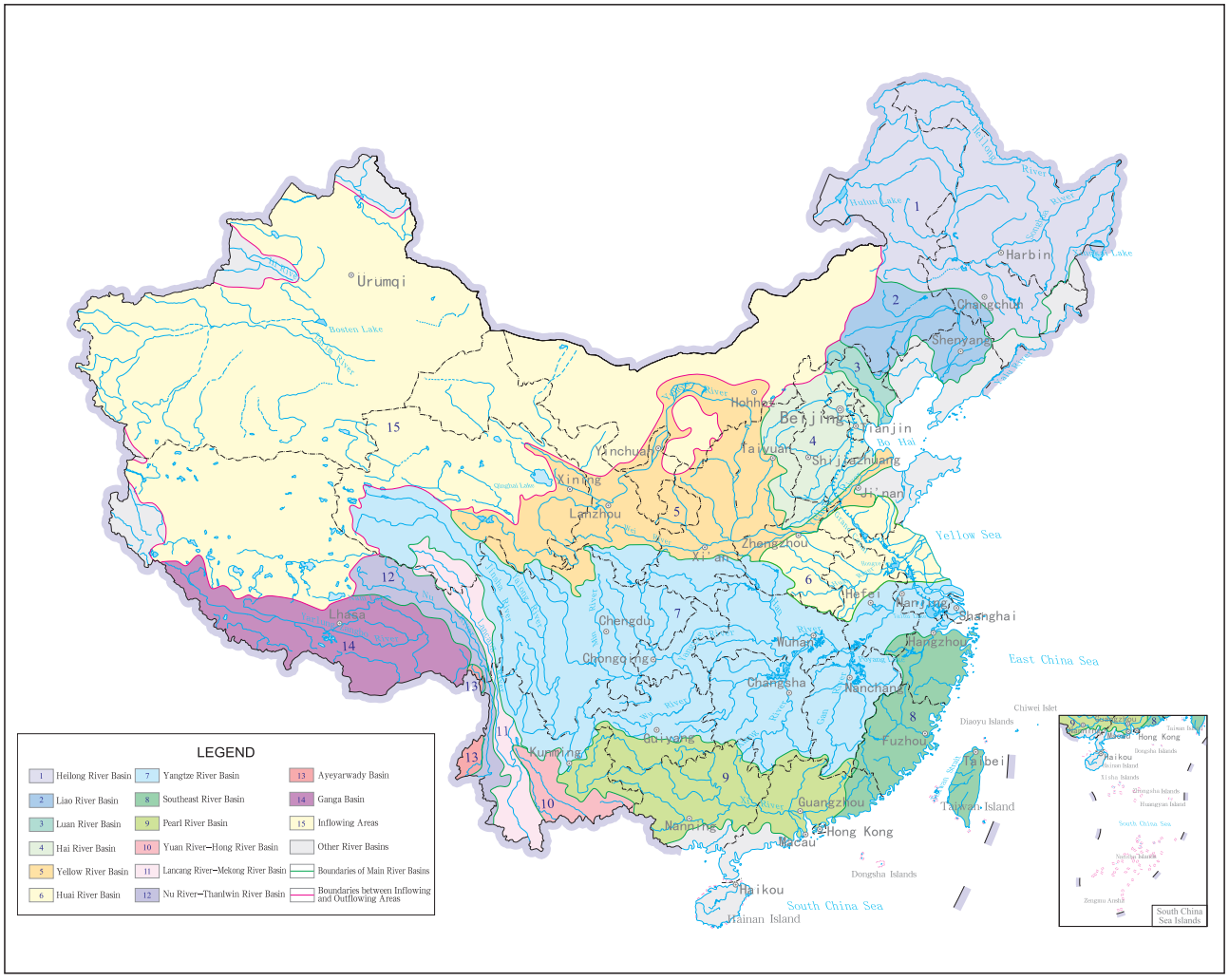


Fig. 2 Per capita water resources in China versus that of some other countries and the world average



China's river systems

the precipitation is concentrated in the flood season, which makes China very prone to spring draughts, summer floods and continuous flooding and draught. Moreover, the distribution of water, land and mineral resources mismatches the layout of production forces. Whereas South China is abundant in water, the north is very short of water resources. North China (north to the Yangtze River Basin) takes up 63.5% of the national territory, but only 19% of the national water resources.

According to the *Bulletin of the First National Census for Water*, as of 31 December 2011, China recorded 45,203 rivers with a basin area of 50 km^2 and above each and a combined length of 1.5085 million km. Of the numerous rivers, the Yangtze River, Yellow River, Huai River, Hai River, Pearl River, Songhua River and Liao River are collectively referred to as "the 7 major rivers" of which the Yangtze and the Yellow River are known as the main cradles of the Chinese civilization.

China is abundant in lakes. There are more than 2,800 lakes that hold more than 1 km^2 of water area all year round each and combine to 78,000 km^2 in total water area. Boyang Lake, Dongting Lake, Taihu Lake, Hongze Lake and Chao Lake are the five most famous fresh water lakes in China, while Qinghai Lake is the largest salt water lake in the country.

China is vast in territory, diversified in terrain, complicated in climatic conditions, and frequent

The Yangtze River, the third longest river in the world

in water and draught disasters. Throughout its 5,000-year-long history, the Chinese nation has always regarded water governance and water conservancy development as a major issue in governance and stability of the country. The development history of the Chinese nation, to some extent, is a history of water governance. Many renowned ancient water works such as Dujiang Weir, Lingqu Canal and the Beijing-Hangzhou Grand Canal are hitherto still serving important functions. They are glorious examples in the history of water governance.

Since 1949, especially since the reform and opening up, China has developed water conservancy on a large scale. The resultant fairly complete system of water works enables China to successfully respond to frequent water and draught hazards, and effectively guarantee flood control security, food security, water supply security and ecological security. For the 30-plus years since the reform and opening up, the Chinese economy has maintained a high annual growth rate of nearly 10%, whereas total quantity of water consumption has only increased slightly. In effect,

First excavated in 486 B.C., Beijing-Hangzhou Grand Canal was completed and navigated in 1293. With a total length of 1,794 km, it is the longest, biggest and oldest artificial canal in the world.

Hukou Waterfall on the Yellow River

China has ensured a national economic growth that is 3 times the world average, with only 60% of the world average per capita water resources. Moreover, while keeping water consumption for agricultural irrigation at zero growth for 30 consecutive years, the country has almost doubled its grain output. With only 6% of the world's freshwater resources and 9% of the world's arable land, China has fed about 1/5 of the world population, a marked contribution to world grain security.

With regard to guarantee of rural drinking water safety, China enabled 210 million rural residents access to safe drinking water during its 11th Five-Year Plan and has planned to address the problem of unsafe drinking water for 298 million rural residents and 41.52 million rural teachers and students in five years through the 12th Five-Year Plan. With 281 million rural population gaining access to safe drinking water in 2011-2014 and another 58.67 million in 2015, all rural residents will enjoy clean drinking water in due time.

For farmland water conservancy, China has 456 irrigation districts with designed irrigation area of 20,000 hectares each, recording a total irrigated area of 18.667 million hectares; and another 7,316 irrigations districts with designed irrigation area of 667~20,000 hectares each, coming up to 14.867 million hectares in total irrigated area. From the early days of the PRC to 2014, irrigated arable land expanded from 15.933 million hectares to 64.54 million hectares, irrigated forage land extended to 850,000-plus hectares, and total grain output grew from 113.20 million metric tons to 607.099 million metric tons.

The ethnic minority people taste "the Water of Happiness" in Dongxiang Autonomous County, Gansu Province

For flood control, draught relief and disaster mitigation, the *Bulletin of the First National Census for Water* indicates that China has 98,000 reservoirs with a combined capacity of 932.3 billion m^3 and total dike length of 413,700 km. At present, main sections of the major rivers in the country are all capable of preventing the most severe floods since 1949; flood prevention standard of important sea embankments are raised to higher than 50-year return; and small and medium rivers can all withstand ordinary floods. Moderately dry years will not expose industrial and agricultural production and ecological systems in some areas to severe adverse impacts as these areas can basically guarantee local urban and rural water supply.

In terms of development, utilization and protection of water resources, in 2014 total quantity of water supply and water consumption nationwide both recorded 609.5 billion m^3, comprehensive per capita water consumption stood at 447 m^3, water use per RMB10,000 GDP (current-year price) registered 96 m^3, and water use per RMB10,000 industrial value added (current-year price) was 59.5m^3. China will take further efforts to intensify its control over total water consumption, vigorously promote the construction of a water-saving society, effectively reinforce the development of an eco-friendly water civilization, make institutional improvement in water resources management, enhance basic capacity for management of water resources, realize the assurance role of water management, reinforce protection of water resources, and promote sustainable socioeconomic development via sustainable use of water resources.

In soil and water conservation, since 1949, China has placed under control an area of 10.47 million km^2 that had once suffered water loss and soil erosion, harnessed over 70,000 watersheds, built more than 1,000 ecologically clean watersheds, achieved ecological restoration via water and soil conservation for an area of 720,000 km^2, and covered more than 600 counties suffering severe water loss and soil erosion with the implementation of national water and soil conservation projects. Existing water and soil

The Standard Dyke of the Yellow River

Terraced paddy fields in Yunnan Province

conservation measures can reduce soil erosion by 1.5 billion metric tons per annum, increase water storage capacity by more than 25 billion m^3, and raise grain output by 18 billion kilograms.

In terms of development and management of small hydropower, by the end of 2014, over 47,000 rural hydropower stations were completed mostly being small hydropower stations, registering a total installed capacity of over 73 million kW, and power output of over 220 billion kWh in 2014, which is equivalent to substitution of 73 million standard coal and reduction of 183 million metric tons of CO_2 emission. At the same time, the ecological protection project that replaces fuels with small hydropower is in place. It not only addresses fuel problems of millions of mountainous farmers and improves their living standards, but also protects more than 300,000 hectares forests and restores the local ecological environment.

Qixi small hydropower station, Kaihua County, Zhejiang Province

In addition, the Chinese government makes continuing efforts to accelerate the process of rule-of-law water governance. In 1988, China promulgated the first basic law on regulation of water activities, i.e., the *Water Law*, which represents China's first step along the path of rule-of-law water governance. Hitherto, China has built in place a legal framework for water resources that centers round the *Water Law*, includes 4 laws, 19 administrative regulations, 55 departmental rules and over 700 local regulations and government rules. Water activities in all types have laws and regulations to comply with. Legislative and policy-making initiatives have codified the central government's guiding policy on water management and the philosophy of sustainable development, and at the same time defined the goals and tasks of water reform and development, and established a comprehensive water management system.

The Chinese government is actively executing the strategy on developing the water sector with science and technology. Among others, new and high technologies are made use of to reform traditional water management. Important achievements have been made in key areas including flood control, draught relief and disaster mitigation, comprehensive governance of major rivers, conservation and protection of water resources, rural water conservancy, construction of water works, and ICT development for the water sector. At present, water science and technology in China are up to advanced international standard in general, with individual areas such as sedimentation, small hydropower, dam technologies, and soil & water conservation already taking the lead in the world.

China has participated extensively in water-related international organizations and major international water events, and conducted in-depth bilateral water cooperation. Hitherto, the PRC Ministry of Water Resources (MWR) has established cooperative relations with more than 60 countries and regions, and concluded 68 agreements or memorandums of understanding on water cooperation. Such continuous expansion efforts have given rise to a layout of holistic, multi-layer and wide-coverage international cooperation and exchanges in water resources. Over the recent years, the Chinese water experts have held important positions in key water-related international organizations such as the International Commission on Large Dams (ICOLD), International Water Resources Association (IWRA), International Network on Small Hydro Power (IN-SHP), the International Commission on Irrigation and Drainage (ICID), and World Association of Soil and Water Conservation (WASWAC). Thanks to the support from the Chinese government, IN-SHP, the International Research and Training Center on Erosion and Sedimentation (IRTCES), WASWAC, and World Association for Sedimentation and Erosion Research (WASER) have set up their international headquarters or secretariats in China.

World Water Council 55th Board of Governors Meeting, Hangzhou 16-17 July 2015

Water is the foundation of survival, source of civilization and key to ecology. With a large population but limited water resources plus uneven distribution of water resources in time and space, China is confronted by arduous tasks in water saving, water governance, water management and development of water conservancy. Over the recent years, the Chinese government has explicitly put forward its guiding principles on water management for the new era, namely, "prioritizing water saving, spatial balance, systematic governance, and equal attention to conservation and development", with a view to actively implementing the mindset of water governance for sustainable development, speeding up the transformation from traditional to modern and sustainable water management, reinforcing water management, effectively ensuring water security, and promoting sustainable socioeconomic development with sustainable use of water resources. For the moment, China is striding towards the "two centennial goals" (to construct a well-off society on all fronts by the centennial of the Communist Party of China, and to build a socialist modernized country by the centennial of the PRC), and the China Dream on the great rejuvenation of the Chinese nation. As such, water reform and development has a long way to go.

The Chinese government will actively practice its water-governance mindset in the new era, whereby persistent focus will be placed on prioritizing improvements to people's livelihood, comprehensive consideration of various factors, harmony between Man and Nature, dominant role of the government, and reform and innovation. Vigorous efforts will be exerted to improve deficiencies, break through bottlenecks, enhance potentials, upgrade quality, and find effective solution to both new and old water problems. With all these, we hope that China will fundamentally reverse the backward situation of water conservancy development, establish a national system to safeguard water security, and thereby construct a well-off society on all fronts and accelerate the socialist modernization process with solid support and effective guarantee from water resources.

MINISTRY OF WATER RESOURCES

Ministry of Water Resources (MWR), the Chinese government department responsible for water administration, was founded in October 1949. On February 11, 1958, the 5th Session of the 1st National People's Congress promulgated decisions to consolidate Ministry of Water Resources and Ministry of Electric Power Industry into Ministry of Water Resources and Electric Power. On February 23, 1979, Ministry of Water Resources and Electric Power was separated into two ministries. After the institutional reform in 1982, Ministry of Water Resources and Ministry of Electric Power were combined again as Ministry of Water Resources and Electric Power. In April, 1988, the 1st Session of the 7th National People's Congress passed the institutional reform of the State Council to set up Ministry of Water Resources. Ministry of Water Resources was reorganized on July 22, 1988.

In accordance with the stipulations of the State Council of the People's Republic of China, the Ministry of Water Resources is given the following mandates.

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CHINA WATER

1. Ensure rational development and utilization of water resources; formulate water resources development strategies, plans and policies; provide draft legislations and promulgate water administrative rules and regulations; make integrated river basin management plans and flood control plans for major rivers and lakes. Make proposals of total investment and water projects with fixed assets and plans of national fiscal funds, review and verify fixed assets investment projects within the national plan and the scale of a yearly plan in accordance with the authorization granted by the State Council. Put forward and organize the implementation of water project investment plan of the Central Government.

2. Take overall consideration and secure domestic, industrial and ecological water uses; undertake integrated water resources management and supervision; formulate and supervise the implementation of national and inter-provincial development plans of water supply and demand and schemes for water allocation and supervise; organize and undertake survey and assessment of water resources, as well as survey of water-energy resources in accordance with relevant provisions; allocate water among major river basins, regions and key water diversion projects; implement water abstraction licensing system, charging system of water resource fees and systems of water resources assessment and flood assessment. Provide guidance for water supply of water sector and township water supply.

3. Take charge of water resource protection; organize and draft water resource protection plans, water function zoning in major rivers and lakes and implementation supervision; review and verify the capacity of pollutant load of water bodies; make proposals on the limit of total wastewater discharge; provide guidance on the protection of drinking water sources, exploitation and use of groundwater as well as management and protection of groundwater resources in the planned areas of cities.

4. Take charge of flood control and drought relief, and undertake day-to-day work of the Office of State Flood Control and Drought Relief Headquarters, including organizing, coordinating, supervising and directing the work of flood control and drought relief, regulating flood control and drought relief in major rivers and key water projects as well as emergency water allocation, preparing and implementing national

emergency plans for flood control and drought relief; provide guidance on emergency treatment of water hazards.

5. Take charge of water conservation; formulate water conservation policies, draft water-saving plans, develop relevant standards and give directions and promote the water-saving society campaign.

6. Provide guidance to hydrological work, including hydrological monitoring of water resources, construction and management of national hydrological station network, undertake monitoring of water quantity and quality of rivers, lakes and aquifers, publish hydrological data and water resources information, forecasting and national water resources bulletin.

7. Provide guidance to the management and protection of water infrastructures, water bodies and shorelines, control and development of major rivers, lakes, estuaries and coast beaches; give direction to the construction and management of water projects, organize and implement the construction and management of backbone or key projects with transboundary of provinces (autonomous regions or municipalities) and river basins; take charge of management of resettlement work of water projects.

8. Be responsible for control of soil and water losses by formulating soil and water conservation plans and supervision, implementing comprehensive measures for erosion protection and control, monitoring and forecasting and periodical notification, examination and approval of water and soil conservation plans of key construction projects, supervision and check and acceptance of water and soil conservation project, providing guidance to the implementation of national key water and soil conservation projects.

9. Provide guidance to irrigation & drainage and rural water supply by organizing and coordinating construction of farmland water facilities, construction and management of projects of safe drinking water supply and water-saving irrigation, coordinating water development activities in pastoral areas, and establishment of socialized rural water service system. Provide direction to the development of water-energy resources in rural areas in accordance with relevant provisions, and rural electrification and approach of small hydro-power development for firewood.

10. Be responsible for investigating illegal cases that violating water laws, mediate and arbitrate inter-sector and inter-province water disputes, provide guidance to the enforcement and execution of water laws and regulations; ensure production safety in water sector in accordance with relevant laws, safety of reservoirs and dams, supervision and management of construction activities related to water development, and supervision of water projects construction.

11. Management of water science and technology and International cooperation related to water issues, by undertaking quality supervision, drafting and promulgating technical standards, specifications and codes of the water sector and supervision of its execution; organize and implement scientific research and development projects in the water sector undertake international cooperation, and handle issues concerning transboundary rivers.

12. Other duties and responsibilities assigned by the State Council.

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