The Situation and Strategy of China's Water Security

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1. China's Water Security Situation

China attaches great importance to water conservation construction resulting in worldwide renowned achievements. The completion of *Three Gorges Program*, *South-to-North Water Diversion Program*, *Xiaolangdi Reservoir on Yellow River* and other important water projects has increased the total number of reservoirs to 98,000.

Consequently, major rivers and lakes have been efficiently managed. As a result, both rural and urban water supply have been remarkably improved. In addition, irrigation and water conservancy system has been established, as the acreage of effective irrigated farmland has reached 937 million *mu*. On the other hand, the water conservation has been constantly improved and ecological construction with water and soil conservation as its centerpiece has been accelerated. Generally, with 6% fresh water and 9% farmland of the world, China not only fed 20% of the world's population, but also laid foundations for the rapid social and economic development of the nation.

1. China's Water Security Situation

As the social and economic development accelerates and global climate change intensifies, china water security problems arises. Grave challenges listed below are to be met .

1. Intensified water shortage restricts the social and economic development. China is relatively short of water resources, as its per capita water resources only 28% of the world average. The national total water consumption each year is about 620 billion cubic meters and water shortage volume is about 50 billion cubic meters in average year. For a rather long time, China's water demand will sill be on the rise, a fact stretching on China's water supply and demand. The pressure on water supply will be growing.

1. China's Water Security Situation

2. intense water pollution and deterioration intensify the water shortage. As the national sewage waste emission increases, the total waste has reached 78.5 billion tons in 2012. The volume of contaminants in some rivers has exceeded carrying capacity of the waters. Generally, the intensification of water pollution has yet to be contained. In some region, people find it hard to get potable water from rivers.

3. Frequent water disasters intensifies the threat of floods and droughts. Due to extreme weathers, the frequency and severity of flood and droughts grow in recent years. In the last two decades, economic loss induced by floods accounted for more than 1% of the annual GDP and the reduction in grain yield induced by droughts 7% of the total grain output.

1. China's Water Security Situation

4. water ecology deteriorated with overdevelopment of some rivers. National soil erosion reaches 2.95 million square kilometers, accounting for 30% of national acreage. Some inland rivers in northwestern China has been developed to the extreme capacity and some even overdeveloped. The area of underground water over-draft area has reached 230 thousand square kilometers.

Challenges for the national water security are grave. At the present stage, floods, droughts and water pollution have become the bottleneck for the sustainable development. In the long run, these challenges, if not properly handled, will impact China's long term development.

2.Reasons behind the Water Security Challenges

1. China has a large population and limited waters with uneven geographic water resources distribution. Water and land resources are hard to match each other. Northern regions, with 40-60% of territory, farmland and population, only have 19% of the national water resources. On the other hand, regions at the downstream of seven major rivers, enjoying 1/3 of the total population and 1/2 of the economic scale, often suffer from floods.

2. Rapid industrialization and urbanization in the past three decades enhances energy consumption and emission. Challenges for environment and resources emerged intensely compared with those happened in different stage of the long-term industrialization and urbanization of developed countries.

2.Reasons behind the Water Security Challenges

3. The extensive development of China's economy causes wastage and low-efficiency for water usage. Backwardness of urban drainage system and illegal occupation of lakes has caused inefficient flood discharge, which intensifies the urban waterlogging. For now, the water consumption of each 10,000 *yuan* industrial added value is 2-3 times of advanced level of the world. The coefficient of efficient usage of irrigation water is 0.52, way lower than 0.7-0.8 world advanced level.

4. Water conservancy construction lags behind and social investment for it is insufficient. Many projects are construed with low standards, insufficient enablers and flawed systems. Accumulated problems for water conservancy construction is one deficiency for China's infrastructure construction.

2.Reasons behind the Water Security Challenges

5. Pricing mechanism for water usage needs improvement. The price level is relatively low, which not only limits its role as leverage restricting irrational water usage, but also affects the normal maintaince and operation of water projects. The water right system needs improvement; market for water usage need further growth; and the role of market in distributing the water resources is yet to be fully played. Laws and regulations regarding water resources also need improvement, as some rules are too rigid making themselves hard to be enforced to punish violators.

6. Stronger effect of global climate change intensifies challenges caused by China's geographically uneven water resources distribution. Heavy rainfall, super typhoon, severe droughts in regions and other extreme weathers increase. As they are harder to be coped with and prevented from, these threats are growing.

3. The Overall Plan to Ensure the Water Security

Following the principle of accelerating the reform of economic development mode and ecological construction, we formed a overarching plan to control demands, contain pollution, develop resources, balance water conservation with discharge to attain the comprehensive management. The strategic target is to ensure absolute safety for potable water, keep floods generally controllable, improve the efficiency and quality of water consumption and enhance the lake and river ecology. We prioritized water conservancy facilities in the national infrastructure construction, improved the water management as a strategic measure to achieve the economic restructuring, and further the reform to drive the scientific development of water conservancy. We focused on tackling major water security problems to establish a water security system with Chinese characteristics.

3. The Overall Plan to Ensure the Water Security

1. Putting people first to ensure the safety of potable water and flood prevention as the centerpiece of the work. We will adapt to local conditions, balance the rural and urban demands, ensure the water supply and improve the quality for potable water, so that all rural and urban residents can enjoy safe and clean water. As for flood prevention, we will balance water conservation with flood discharge, emphasize on preventing and mitigating measures before disasters, combine project measures with non-project ones. We will also improve the flood prevention and mitigation system so as to ensure the safety of the people.

2. Taking comprehensive measures to prioritize water conservation and pollution control. We will save water before the supply stage and control pollution before emission. We will also form the conception that water conservation means emission reduction and emission reduction means pollution control. Water conservation, thus, will inform all processes of social and economic development as well as people's life, so that a water conservation society will be formed.

3. The Overall Plan to Ensure the Water Security

3. Keeping people-water harmony to focus on the protection and recovery of water ecology. We will establish complete water ecology prevention principles step by step, so that we can conduct prevention and development at the same time. We will set a scientific plan for the development scale of water resources in order to distribute water for living, production and ecological protection in a appropriate manner. We will give full play to ecological and environmental functions of waters by recovering natural state, so as to maintain the health of waters.

4. Innovating the mechanism to facilitate combination effect of the government and the market. We will give full play to the market being a decisive role in resources distribution. To this end, we will further the reform of water pricing; we will also improve the water right mechanism, the water market, paid usage mechanism for water resources, water ecological compensation mechanism and a binding-and-encouraging mechanism for water supply, demand, conservation and pollution control.

3. The Overall Plan to Ensure the Water Security

5. Technology as the driving force to tap the potentials in ensuring the security. We will further emphasize the key role of technological innovation in water management and conservancy. We will intensify the input for scientific and technological research of the climate change mitigation, flood and drought prevention, water conservation and informationization for water conservancy. We will also enhance the input for technological research of sea water desalination, reclaimed water recycling, cloud water application and ecological restoration. We will strive to achieve new breakthroughs in major scientific and technological researches for water conservancy

4. Strategies to Ensure the National Water Security

1. Stringent water management to establish a water conservation society. We will implement stringent water management mechanism to control the water usage volume, so that by 2030 the national water usage will be controlled within 700billion cubic meters. We well establish a restricting mechanism in which water will determine the development scale, industrial development direction and rural and urban planning. We will also promote water conservation in industry, agriculture and people's life in order to increase the efficiency of water usage. We will improve the management of water function zone by approving pollution carrying capacity of waters, so that the aggregate emission into rivers and lakes will be controlled. At the same time, we will enhance the governance of spot source and non-spot source pollution, establish a cooperative control mechanism between rivers and regions, so that the water pollution will be better prevented and controlled. We will enhance our governance over the underground water over-draft in North China Plain and other places to balance the usage and supply of underground water.

4. Strategies to Ensure the National Water Security

2. Optimizing the water resources distribution to ensure the water supply for urban and rural areas. We will accelerate water source project construction to achieve the balanced development between urbanization and regional development. To this end, we will orderly promote these key water source projects of various scales by scientific planning. We will also enhance the development of non-traditional water source such as sea water, reclaimed water and brackish water and integrate them into the uniform arrangement. We will also promote the channel between lakes and rivers to ensure the water supply for key regions and cities. In addition, we will improve the water supply system for rural and urban areas by implement a patch of key projects, which aim to renovate the supplying network. Lastly, we will accelerate safe drinkable water program for rural areas by promoting the concentrated supply for villages the uniform supply for rural and urban areas and enhance the protection of drinkable water source, so that the drinkable water security will be ensured.

4. Strategies to Ensure the National Water Security

3. Improving the flood prevention and mitigation system to enhance the capacity to prevent flood. We will promote a comprehensive system with river dikes as foundation, controlling links as centerpiece and flood retarding basins the guarantee by implementing projects and non-project measures. We will also increase cities' capacity to cope with floods and waterlogging by preventing irrational occupation of rivers and lakes, blocking of rivers and water discharge space in the urban development, so that floods can be duly discharged. At the same time, we will accelerate the construction and renovation of diversion pipes for rainwater in urban areas, and utilize rainwater resources by promoting the *Sponge City Program*. We will also enhance the risk management of floods, improve the warning and forecasting system, make flood risk maps for key regions and establish a flood insurance system in order to improve the emergency management capacity.

4. Strategies to Ensure the National Water Security

4. Promoting water conservancy facilities for farmland to ensure the food security. We will step up water conservation renovation and enabler construction in large and mid-sized irrigation areas to attain high standard farmland regardless of floods. We will promote efficient irrigation featuring water conservation by constructing a serious of these areas of scale. At the same time, we will promote the construction of channels on the lower end of irrigation areas. Once these capillaries in the farm land works, the last mile challenge for irrigation will be solved. We will also construct *Five Small Water Conservancy Project* according to local conditions to achieve the rainwater harvesting and water-saving irrigation. Lastly, we will improve the governance over soil erosion in key areas, enhance the comprehensive management of slope croplands, promote emergency water source project for droughts and establish emergency water storage mechanism for rare droughts.

4. Strategies to Ensure the National Water Security

5. Furthering reform and innovation to improve the water security mechanism. We will reduce administrative examination and approval for water, while improve the supervision over them. We will also establish a water pricing mechanism based on market by improving the mechanism of paid usage of water resources and water ecological compensation mechanism. At the same time, we will establish a national water right mechanism, improve regulations over usage right of water resources, initiate the water right trade program, promote a steadily growing mechanism for water conservancy investment. By the further opening of water conservancy project construction market, investors who meet the standards will be encouraged to participate in the course. Lastly, we will prioritize the formulation of laws and regulations concerning farmland water conservancy, water conservation, underground water management and management of rivers and lakes, so that administrative supervisions over water resources will be better conducted.

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