

# Present Situation and Development of Ecological Environment in Tarim Basin

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**Abstract:** As an important ecological and economic development zone in Xinjiang, the protection and development of ecological environment in Tarim Basin is not only related to the economic development of Tarim Basin, but also to the overall economic development of Xinjiang. Based on this, this paper mainly analyzes the present situation of ecological environment in Tarim Basin, and puts forward some suggestions on how to promote the development of ecological environment in Tarim Basin. It is also hoped that this exploration can provide reference and suggestions for the development of ecological economy in Xinjiang.

## 1. Introduction

With the increase of population and the development of social economy, the excessive disorderly development and inefficient utilization of water resources in the Tarim River Basin have resulted in the decrease of water flow to the main stream year by year, the deterioration of the water quality in the dry season of the main stream, the disconnection of the lower reaches of the river and the drying up of the lakes. Large areas of natural *Populus euphratica* died. Soil desertification and salinization are becoming more and more serious, and ecological environment is worsening day by day, which has become the main factor that restricts the sustainable development of social economy and ecological environment.

The development of the ecological environment in the Tarim River Basin is not only related to the economic development of the Tarim River Basin, but also to the overall economic development of Xinjiang. The development of the ecological environment in Tarim has become an insurmountable strategic problem for the social and economic development of Xinjiang. If we continue to ignore the protection and development of the Tarim River and the ecological environment, it is a threat to the social and economic development of the whole Xinjiang. At present, how to further protect the Tarim River and the ecological environment, and develop the economy of Xinjiang, is an important subject worthy of further study.

## 2. Analysis on Ecological Environment Protection of Tarim Watershed in the Past

### 2.1 Significant benefits of water conservation in the ecological environment

The construction and reconstruction of various anti-seepage channels, the reconstruction of plain reservoirs and the completion of groundwater development projects have gradually perfected the irrigation systems of various irrigation areas in the river basin, and the degree of water saving has been greatly improved. In order to improve the utilization coefficient of water system in each irrigation district, the irrigation area of “four sources and one stem” saved about 2 billion liters of water, and the plain reservoir was rebuilt, saving about 22.1 billion liters. The water source of each irrigation area was 460 million liters, 51.5 billion liters surface water was replaced, and the water saving was 50 million liters in the project of returning farmland and fencing. A total of 2.722 billion liters of water was saved.

### 2.2 Enhanced water delivery capacity in the lower reaches of the Tarim River

The construction of Tarim River main river levee and various kinds of control, water sluices and water diversion sluices has effectively controlled the phenomenon of flood overflow in Tarim River upper and middle reaches and disorderly diversion. The lower reaches of Hotan, Yerqiang and

Tarim rivers are dredged, and Lake Taitema is renovated so that the water from the upper reaches can be transported more smoothly to the lower reaches. From 2001 to 2015, the source flow to the main stream of the Tahe River has averaged 4.555 billion liters for many years. Since 2000, ecological water transport has been carried out for 16 times to the lower reaches of the Tarim River, and the total amount of ecological water discharged by Daxihaizi is 480.8 billion liters. With an average discharge of 320 million over the years, the water head reaches Lake Taitema for 12 times, and the maximum is more than 350km of lake surface, ending the history of nearly 30 years of continuous drying of the lower reaches of the river.

### **2.3 The effect of spring drought recharge in Tarim Basin is obvious.**

Since it was built and put into use seven years ago, the recent comprehensive control project, the Xiabandi Water Conservancy Project, has not only abandoned 16 plain reservoirs, but also provided a strong guarantee to ensure that the Yerqiang River can transport 330 million liters of ecological water to the lower Tarim River. It provides 190 million liters of spring drought for the irrigation area of the lower reaches of Yerqiang River every year, effectively alleviates the phenomenon of water shortage in the lower reaches of spring drought, and provides a strong support for the sustainable development of local social economy and ecological environment.

### **2.4 Gradual improvement of main stream ecology**

From the comprehensive management in recent years, Tarim has realized the Tarim River flowing to Taitema Lake for more than 10 consecutive years, and the lake surface has reached 350 square kilometers. The groundwater level within the scope of 1km on both sides of the river has been restored, and the salinity of water quality has decreased. There are now 21310000 mu of natural forest and grass vegetation and *Populus euphratica* forest in the main stream of the Tarim River, 12.47 million mu of which have been protected and initially restored after the implementation of the project. The ecological plant species 88 groups increased from 17 species to 46 species, and the desertification area decreased by 105 thousand mu. At present, wild animals are often seen on both sides of the river downstream, and the downstream green corridor is gradually gaining vitality.

## **3. Analysis of Current Situation of Ecological Environment in Tarim Basin**

### **3.1 Fragile ecological environment**

The natural oasis and artificial oasis in the Tarim River basin only account for 25% of the basin area, and the other areas are desert and desert area. The evaporation is strong, the drought is windy and sandy, the ecological population is single, and the resistance and stability are poor. When the river is short of water, the soil on both sides of the bank tends to desert. When the river has abundant water, the groundwater level along the coast rises and the soil tends to salinization. Especially in the lower reaches of the Kongque River, the lower reaches of the Hotan River and the lower reaches of the Yerqiang River have not been carried out with systematic governance, and the ecological environment is extremely sensitive and fragile.

### **3.2 Unreasonable structure of water use in the basin**

Agricultural irrigation water accounts for more than 95% of the total water consumption and that of the second and tertiary industries only accounts for less than 5% of the total water use. Because the water is far less than the production efficiency of agriculture industry and services, the limited water resources in agriculture is inefficient, it is difficult to fundamentally change the backwardness of the rural economy. In the most scarce arid desert areas of water resources, 98% of the water is used in inefficient agricultural development., which cannot achieve water resources and ecological environment and sustainable development. Moreover, the efficiency of water use in agricultural irrigation is low. For example, the average gross irrigation quota of 26400 m<sup>3</sup> / hm<sup>2</sup> in Alar irrigation area of Tahe River is much higher than that of the whole and southern Xinjiang.

### **3.3 Inadequate water conservancy facilities in the basin**

Because the source and stream of the Tarim River are mainly supplied by glacier melting snow, the annual runoff distribution of the Tarim River is very uneven, resulting in the incongruity of the process of water coming and water demand. Every year, the amount of river water in flood season accounts for about 70% of the annual runoff, and the flood period is large and lasting for a long time. In the non-flood spring ploughing season, it is precisely the peak season of agricultural irrigation. At this time, the water demand accounts for more than 30% of the annual water demand, while the river water volume accounts for only 6% of the annual runoff. Due to the fact that there is no permanent control project for the water intake in the basin, no seepage prevention measures have been taken in the canal, some water conservancy projects are restricted by the condition that the water conservancy works are out of repair and running with disease, etc. In the case of insufficient water supply and increased water consumption, the water consumption in the watershed often accounts for a large amount of water for the ecological environment, coupled with the man-made destruction of natural vegetation, leading to a serious deterioration of the ecological environment.

### **3.4 Improper exploitation and utilization of water resources in watersheds**

Watershed planning is an important basis for water resources management. For a long time, it is difficult to guide water conservancy construction because of the lagging of watershed planning, which leads to the lack of overall consideration in the development, utilization and management of water resources. Groundwater management has formed the situation of “blooming everywhere.” On the other hand, the past planning only takes into account economic and social water use, lacking ecological water use considerations, resulting in a wide range of groundwater table decline, surface vegetation deterioration. In recent years, because the surface water in the basin has taken the total amount control measures, individual water in irrigation area has taken the measures of exploiting groundwater to supplement the question of the insufficient supply of surface water. The formation of machine wells for the purpose of drought resistance has become a measure to increase the total amount of water resources. In essence, while basically constructing farmland water conservancy, implementing high efficiency water saving, implementing groundwater utilization and improving water efficiency, it cuts off the supplement of groundwater from canal and fields. Such unreasonable exploitation and utilization of the “blocking up and fetching down” in the groundwater has caused the gradual deterioration of the basin environment. The anthropogenic factors of desertification are unreasonable management activities and unreasonable land use, resulting in too much land pressure. In the Tahe River Basin, the lack of unified management of water resources, disorder of water use, over-exploitation and serious waste of water are the important factors leading to desertification of land and deterioration of ecological environment.

## **4. Countermeasures of Strengthening Ecological Environment Protection in Tarim Basin**

### **4.1 Strengthening the legal Protection of the Ecological Environment of the Tarim River**

The lack of unified management of water resources, disorder of water use, over-exploitation and serious waste of water are some of the important factors leading to the decrease of water quantity and the serious deterioration of ecological environment in the lower reaches of Tarim River. Most of the rivers in the Tahe River Basin are remote, scattered and along long lines, and only relying on water administration supervisors according to administrative laws and regulations cannot timely and effectively investigating water theft, water snatching, water crowding ecological water and other water cases. Therefore, the water conservancy public security in the Tarim River basin can be set up, and police stations can be set up in the counties and cities along the Tarim River basin to be responsible for the public order in the river reach and to handle illegal public order and criminal cases in accordance with the law, maintaining the security and normal water order of important water conservancy projects in the basin.

#### **4.2 Establishment of a scientific and reasonable compensation mechanism for ecological water use**

Water resources fee is levied on region or basin with excessive amount, or individuals with excessive water quota according to the progressive price increase system of water resources fee, or water charge is levied according to “water fee progressive price increase system”. For regions or basins with total amount of savings or individuals with saving water quota, the government should buy back the water rights according to the price of the water right transaction, and punish the relevant units and individuals by the administrative means such as informing and criticizing, investigating the leading responsibility and so on. On the other hand, ecological water incentive compensation fund should be established for ecological protection, water resources protection, water resources management and incentives for water-saving units, thereby encouraging water conservation, the establishment of water-saving society.

#### **4.3 Strict land development and control of indiscriminate cultivation and deforestation in the Tahe River Basin**

It is strictly prohibited to expand irrigation areas and increase water consumption in the name of returning farmland to forests and grassland, ecological construction, land consolidation, saline-alkali land improvement, structural adjustment, and so on. In addition, a joint law enforcement working group composed of environmental protection, water conservancy, forestry and other departments, should be formed to carry out joint law enforcement work on the situation of disorderly exploitation of land in the river basin. According to the relevant laws and regulations, the illegal reclamation of wasteland, ecological water and the ultra vires examination and approval should be seriously investigated.

#### **4.4 Effective development and utilization of water resources in accordance with the carrying capacity and allocation of water resources in river basins**

On the basis of water resources carrying capacity and water environment carrying capacity, the research on water resources carrying capacity, ecological water consumption, water resources allocation and long-term planning of water resources utilization are carried out. In order to provide scientific basis for the rational allocation and efficient utilization of water resources in the basin, the production, living and ecological water use should be arranged as a whole within the carrying range of water resources.

### **5. Conclusion**

The construction of ecological environment in Tarim River Basin is not only related to the sustainable development of the basin, but also related to national unity, social stability and economic development. The ecological environment management of the Tahe River Basin involves many aspects such as water resources, land resources, biological resources, and desertification degree and so on. It is a complex, arduous and long-term systematic project. Starting from the management of water resources, we should take various measures to accelerate the formation of space layout, industrial structure and production and life style in the basin to save resources and protect the environment. We will earnestly strengthen the sense of responsibility and urgency in doing a good job in environmental protection and strive to achieve sustainable development of water resources and ecological environment in watersheds.

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