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THE PROTECTION OF THE ECOLOGIC ENVIRONMENT OF THE GREEN CORRIDOR IN THE LOWER REACHES OF THE TARIM RIVER

Cheng Qichou (程其畴)

(Xinjiang Institute of Geography, Chinese Academy of Sciences, Urumqi 830011, PRC)

ABSTRACT: The Green Corridor in the lower reaches of the Tarim River is not only a unique natural landscape in desert but also an important passageway. Nowadays, the ecologic environment of the corridor is getting worse and worse due to man's economic activities and the lack of knowledge of the importance of the environment, which is one of is the three environment problems in Xinjiang. The corridor is in great need of planning and managing.

KEY WORDS: Tarim River, Green Corridor, ecologic environment

I. INTRODUCTION

The Tarim River is always the focus of world attention for its special location among famous mountains and deserts and its name—the Water of Life.

The Tarim River is a famous inland river in the world, located in the Tarim Basin, Xinjiang, covers an area of 198×10^3 km^3 and runs 2,200 km from the origins of the Yarkant River to the Taitmar Lake. The Tarim River, as we call it, is the river which runs from the confluence of the Aksu River, the Yarkant River and the Hetian River to the Taitmar Lake. It is the mainstream of the Tarim River 1,280 km long. In the early years, all bigger tributaries could join the Tarim River and drain into the Lop Nor finally. Later, because of the influence of human activities, especially the development of the large-scale reclamation after 1958, the most tributaries were limited to Tarim into the Tarim River and today no other branches have water to the Tarim River except the three rivers mentioned above. Besides, water is cut off in the Daxihai Reservoir at the lower reaches, the extension of the Tarim River has been controlled (Fig.1).

The alluvial plain of the Tarim River has potentialities of exploitation for its warm

climate, great energy and rich natural resources of water, soil, grassland and *Diversifolia* schrenk forests for agriculture. In recent years, it has been proved by petroleum prospecting that there are plenty of oil and gas in the alluvial plain of the Tarim River and it is worthy to be exploited.

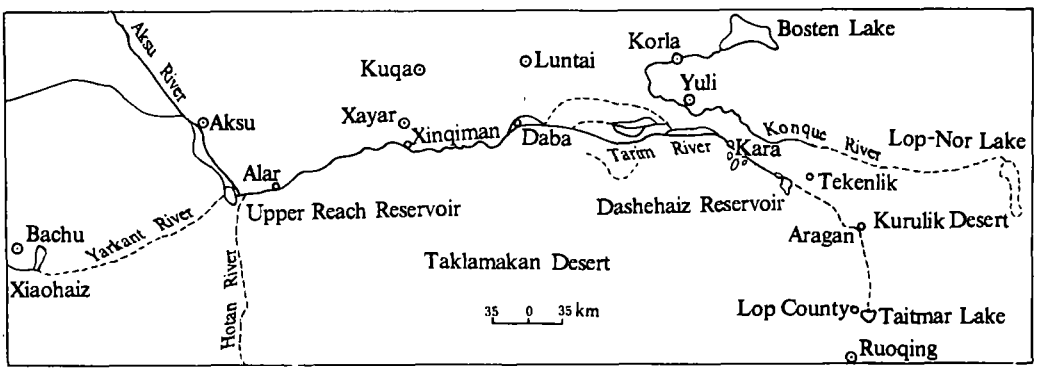

Fig.1 The water system map of the Tarim River

The Tarim River runs between the alluvial plain on the south side of the Tianshan Mountains and the Taklimakan Desert and provides a natural defence to the attack of desert on the north side of the river. Because of too many branches, water in the middle reaches of the river is overflowing and where xeric, psammophytic and halophytic desert vegetation are growing. All these form the unique natural landscape of the arid areas in our country. Among this vegetation the old luxuriant *Diversifolia schrenk* is one of the important shelter belt in Xinjiang, and also one of the large ecosystem in the Tarim Basin and the major distribution of *Diversifolia schrenk* forests in the world. The population in this area is less than one billion and livestock about 24 billions, but water consumption in the middle reaches is great, that is more than $20 \times 10^8 m^3$ per year. The reason is manifold, for instance, it is lack of basic water conservancy facilities, herdsman dig up the river bank to water their grassland so that a great amount of water flowing from the dug places to rivers, depression and lakes. The production and ecology have been greatly influenced. How to harness the middle reaches becomes the main problem of the Tarim River.

The lower reaches of the Tarim River covers 437 km from Gala to Taitmar Lake, it runs between the Kuluk Desert and the Taklimakan Desert so that a belt-like alluvial plain is formed which is about 10–20 km in width. The coming water has always been plentiful and there such vegetation as *Diversifolia schrenk*, reed and red willow has been well growing on both banks of the river. It has been the haunt of various animals, and the natural "Green Corridor" has been formed southwards through the east part of the Tarim Basin, covering 1–5 km long. The Tarim River play an important role not only in applying abundant natural resources for agriculture, forestry and animal husbandry, but also in regu-

lating the water amount on different areas, therefore, three Green Corridor has been formed from north to south on the vast areas of the Tarim River. Especially, the Green Corridor in the lower reaches of the Tarim River is an important passage which connects Xinjiang with inland provinces. It serves both economic and strategic functions. However in the recent thirty years, there exist intricate contradictions between the upper and lower reaches for lack of overall plan on exploitation and utilization of the resources of the Tarim River and for lack of knowledge about the importance of keeping ecologic balance in the areas and corridor passage so that the resources of the areas are becoming poorer and poorer and the ecologic environment is getting worse and worse. Therefore, we should make out plans and take urgent measures.

II. THE PROTECTION NECESSITY

In ancient times, the alluvial plain of the lower reaches of the Tarim River used to be the green areas distributed by a large quantity of forest and grass where rivers and lakes were joined together. The ancient city, Loulan was located here. People who lived in the areas opened up wasteland and grew crops. Up to the end of the last century and the beginning of this century the whole lower reaches had a lush growth of forest and grass, together with all kind of stock. But in the 1930s and 1940s of this century, especially in the last 30 years, because of manmade factors, the groundwater level has been dropped with bad water quality and declined forest vegetation as well as serious land desertification. The mainstreams of the Tarim River which covered 246 km long from Yengisu was cut off after 1972. The groundwater level at the south of Aragan dropped to 7—10 m, while in the 1950s it was 3—5 m, which was beyond the set line of groundwater level in which natural vegetation would grow. The mineralization of groundwater was generally increased to 1—3 g/ L. The content of fluorine in the water was 2.6 mg/ L which greatly went beyond the standard for drinking water. During the years from 1958 to 1978, the area of natural *Diversifolia schrenk* forests were lessened to 70%. In Aragan, the surviving and well—growing forests just made up 20% and the dead forests were 30%. The green defence facing the Kuluke Desert which was several hundreds km long has been disappearing. Every year the Green Corridor is swallowed by desert at the speed of 3—5 m, and sand is formed in the Green Corridor. A great deal of fixed dunes are being developed into the shifting ones. The areas of the corridor are getting smaller and smaller, on some sections which are southwards from Aragan, the Kuluke Desert and the Taklimakan Desert have been joined together. However, the dead vegetation will be alive provided with water and flood and the green vegetation belt will always be on the edge of the desert to stop or slow down the development of sandification. From 1984 to 1985, the local government managed to regulate water from the middle reaches of the Tarim River and the Kongque River to water the vegetation in the Yengisu area by the Daxihai Reservoir.

In Han and Tang dynasties, the Green Corridor was the main passage of the famous "Silk Road" in our country, and now it is the Korla–Ruoqiang Highway and later the Qinghai–Xinjiang Railway will be built here. It will become an important passage that connects the Tarim Basin and Xinjiang with inland provinces. Now the highway is being seriously damaged by desert and maintenance is not easily done. According to the investigation on the Korla–Ruoqiang Highway which was made by the author in July 1983 and 1987, the number of the damaged places by desert has gone up from 90 to 168, among those 20 places are quite seriously damaged. The five teams in charge of road maintenance had been withdrawn one after another because it was very difficult to get drinking water. At present, only three teams are there. In order to unlock the Korla–Ruoqiang Highway, we should take measures to protect the Green Corridor in the lower reaches. Otherwise, there will be great influences on the economic development of the southern areas of the Tarim Basin and the stability and unity of minority nationalities.

The five-state farms which are located along Gara and Tiekanlik section have 16×10^3 ha of cultivated land. Much land had been deserted because of the water shortage and desertification, so the production scale has been reduced. The area is not only the frontier base for harnessing the sections in the middle and lower reaches of the corridor, but also the only supply base for agricultural and animal products. To develop the production of the area is quite profitable for opening the railway and having high economic efficiency.

III. THE POSSIBILITY FOR THE PROTECTION

The environment in the lower reaches of the Tarim River is getting worse and worse due to the improper policies taken on the exploitation of water resources and human activities. Having known the reasons and causes, we should change and improve the environment conditions gradually. The key is water resources. From 1950s till now, water has been kept at the level of 50×10^8 m^3, although water amount of the Tarim River has been decreasing. The water at the lower reaches was reduced from $13.3 \times 10^8 m^3$ in the 1950s to $1.4 \times 10^8 m^3$ in the 1980s nearly nine tenths because there was great loss in the middle reaches and in lower sections of the upper reaches, with more than 300 places dug, and increasing year after year. The way to solve these problems should be as follows: to take unified management on water resources of the Tarim River, to set up water conservancy facilities to assure the water amount in the lower reaches by the overall plan of the water distribution. In the former period of time, the protection and harness should be forced on strengthening and developing the agricultural and animal husbandry production of the five state farms and improving the ecologic environment. By conveying water and controlling desertification, the vegetation in the areas from Tieanlik along the river will be getting alive. Certain amount of water should be kept on the open fields and forests in which railway will be built. The artificial forest belts for guarding roads should be made to guarantee the opening of the railway. By con-

verging water, the mineralization of groundwater will be cut down so that people who live near the highway could get drinking water by drilling wells.

To strengthen the upper sections and to recover the middle sections and construct the lower ones are the fundamental policies for the protection and harness of the Tarim River, first from the highway eastward then westward step by step by focusing on the protection and recovery of natural vegetation and planting trees, grass on proper, sections and applying certain mechanical appliances.

In the upper sections, the five state farms from Gara to Tiekenlik should stress their production on agriculture and forestry, and set farm scale by main water resources. In order to have sufficient water for irrigation, we should build the second projection of the main canal from Korla to Tarim and regulate the water amount of the Kongque River to the lower reaches of the Tarim River.

In the middle sections, vegetation is gradually brought into life due to the short time for cutting off the water supply in the canal from Tiekanlik to Aragan and the rising of groundwater in recent years. In the areas near Yengisu, we must set up the forestry base for creating good conditions for harness sections in the middle and lower reaches.

In the lower sections, the natural vegetation in the areas from Aragan to Lop County is declining, some even have turned into desert, landscape. Therefore, water must be irrigated here. The ecologic environment could be improved as long as water can be found, and the dying natural vegetation could also be saved in combination with artificial forests and machinery for controlling sand.

IV. DISCUSSION

Seventy per cent of water amount of the Aksu River, the main source of the Tarim River, comes from the boundary of the Soviet Union. It is a notable factor to lessen water amount of the Tarim River. The water of the Aksu River which empties into the Tarim River will be decreasing because of the need of its own reaches and the water of the Hetian River has the tendency of decreasing. The reaches of the Yarkant River is lacking of plentiful water resources. According to the above estimation, the water resources of the Tarim River may be $42-45\times10^8m^3$ in recent period and $40-42\times10^8m^3$ in the near future. That is to say, it is impossible and unrealistic to enlarge the water sources of the rivers to empty into the Tarim River. We can conclude that the declining of water resources of the Tarim River is an inexorable trend. It becomes a urgent problem to control its decline or to limit it to certain extent. If the decline is great it would be unfavorable to the lower reaches and harmful to the overall situation.

In order to protect the ecologic environment of the Green Corridor in the lower reaches of the Tarim River, water amount of the river should be regulated and distributed. According to the calculation, the water amount in recent period in Gara is $12-15\times$

10^8m^3 in the near future. The water to be consumped in the areas of Gara–Tiekanlik is $6\times 10^8m^3$ in the recent period, and $5\times 10^8m^3$ in the near future including the water consumption in the areas of Gara–Ashemuye. The water amount can be kept between $5–9\times 10^8m^3$ by falling water from the Daxihai Reservoir. The main irrigation water used in the fields should come from the Kongque River from $1.5\times 10^8m^3$ now to $2.5–3\times 10^8m^3$. In principle, water needed by ecology in the Green Corridor can come from the upper reaches.

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