

The influence of water source protection zone delimitation on development in Huanren Manchu Autonomous County

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Abstract. Under the background of rapid urbanization and industrialization development, in order to satisfy the increasing demand of residents for domestic water, the establishment of water source protection zone is the most effective way to protect water resources at present. However, the influence on the social and economic development could not be ignored. The article analyzes the influence of the delimitation of water source protection zone on economy such as ecological migration, urban municipal pipe network construction, rural drinking water and urban water supply. The impact on economy like industrial enterprises, agricultural planting, livestock industry, aquaculture, tourist industry were also mentioned. The article triggers the exploration of the way to realize the coordination and sustainable development of economy, society, resources and environment

1 Introduction of *Huanren Water Resources Protection Zone*

With the acceleration of urbanization and industrialization, drinking water sources are threatened by various factors. The safety of water quality is closely linked to people's livelihood and social stability[1]. The protection of drinking water sources has become a hot issue in global research[2]. The most effective way for protecting water source is to establish water source protection area, our country has formed a complete legal system[3]. In the process of water source protection, it is critical to divide the scope of protection area[4].

As an important ecological barrier and strategic reserve of water resources in Liaoning province, Huanren Manchu Autonomous County undertakes the ecological functions of water conservation, soil conservation, biodiversity protection and water supply regulation and storage. It provides a large number of ecological products and services such as water resources for 23 million people in 12 cities of Liaoning province, with an annual water supply of nearly 4 billion m³. Huanren has an important strategic position in the sustainable development of Liaoning economy and society[5].

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2 The Influence of the delimitation of water source protection zone on society

After the designation of the protection zone, it is necessary to accelerate the protection of water source to ensure the safety of water quality. However, it has a significant impact on the economic and social development of Huanren, which is mainly manifested in the following:

2.1 Impact of ecological migration

The water source protection area covers 65 villages (communities) in 9 towns (Sub-district Office), including Huanren Town, Erpengdianzi Town, Hualai Town, Heigou Town, Gucheng Town, Muyuzi Management Committee, Yahe Town, and Baguacheng Sub-district Office, involving a total population of 173,000 people, accounting for 54.24% of the total population of the county. Among them, there are 961 households and more than 4000 people involved in the first-level protection area of Huanren Reservoir. In order to reduce the pollution of Huanren reservoir and ensure the safety of water quality in the water source protection area, it is necessary to carry out ecological migration about the residents in the first-level protection area gradually within five years, with an annual investment of 130 million yuan. (\$700,000 per household)

2.2 Impact of urban municipal pipe network construction

The length of the rainwater and sewage confluence pipe system network is more than 60 kilometers, including the old city, wine industry park and Xijiang New City, which has a serious impact on the water quality safety of the Hunjiang River water transmission channel, so it is necessary to transform the drainage pipe network to realize rainwater and sewage diversion. In addition, it is necessary to build rural sewage collection devices in the villages of Beidianzi, Gucheng, Heigou, Erpengdianzi and Hualai within the protection zone, with a total investment of about 120 million yuan and an annual operating cost of 8 million yuan.

2.3 Impact on rural drinking water and urban water supply

After the expansion of the water supply area, the water quantity and water level of the Hunjiang River declined, which directly affected the drinking water of 148 villages in 7 towns, involving the total population of 120,000. Therefore, it is necessary to rebuild and transform the water supply facilities. The elevation of the water intake comes from the water supply project decreased from 289 meters to 265 meters, which cannot meet the demand of water supply. Therefore, it is necessary not only to reconstruct and expand the water supply project of the county, but also to build the water supply pipeline for the relocated enterprises.

3 The influence of the delimitation of water source protection zone on economy

3.1 Impact on industrial enterprises

In order to ensure the safety of water sources, some measures should be taken to the enterprises in the protection area, which will have a great impact on the industrial

development. On the one hand, the ban of the five enterprises in the second-level protection zone will require an investment of more than 700 million yuan (excluding land relocation fees). In addition, there is an immeasurable loss of production caused by the relocation of enterprises. On the other hand, according to the relevant approval from government, the development of industrial enterprises in the protection zone is strictly restricted. In addition to the elimination or relocation of existing enterprises, the construction projects of new enterprise are also suspended, which has a significant impact on the economic development of Huanren County.

3.2 Impact on agricultural planting

There are 289,000 mu of agricultural planting area (249,000 mu of arable land, 40,000 mu of orchard) in the water source protection area, there are 68,000 mu of cultivated land in the second-class protection zone (all of them are in the second-class protection zone of Huanren Reservoir). The cultivated land in the quasi-protection area is 181,000 mu (Huanren Reservoir, 57,000 mu, Hunjiang River water channel, 124,000 mu). In order to reduce the pollution of the water source area of Huanren Reservoir, the cultivated land within the protected area needs to be strengthened management and the industrial transformation should be promoted, which will cause some losses to farmers. To solve the difficulties. First of all, we need to implement organic cultivation technology entirely. In order to ensure water quality and avoid pollution, on the basis of banning pesticide and chemical fertilizer, according to the standards of organic cultivation, six technical measures were taken such as increasing organic fertilizer, transforming low-lying acid soil (quick lime), biological control (corn Boer), biological pesticide control, physical control (insecticide light, yellow plate) and straw returning to the field. In order to ensure the water quality is not polluted, on the basis of banning pesticides and fertilizers, according to the standards of organic cultivation, six technical measures have been taken, such as increasing the application of organic fertilizer, transforming low-lying acid soil (quick lime), biological control (corn Boer), biological pesticide control, physical control (insecticide light, yellow plate) and straw returning. Secondly, it is also necessary to accelerate the process of industrial transformation. According to the requirements of the protection zone, our county needs to improve the development level of "one county, one industry" through industrial transformation. Within 5 years, 70,000 mu of wine grapes will be developed outside the protection zone, while 50,000 mu of Chinese herbal medicine, 1,500 mu of facility vegetables, 30,000 mu of open vegetables will be developed.

3.3 Impact on livestock industry

In fact, there are 722 livestock farms or farmers which are in poor environment in the water source protection area. The construction of feces storage rooms, sewage pools, treatment facilities for sick and dead livestock and poultry, and disinfection facilities are not up to standard, leading to serious pollution of the river into Huanren reservoir. In order to ensure the safety of water quality, it is necessary to invest in the construction of standard seepage-proof storages and sewage pools, treatment facilities for sick and dead livestock and poultry, and disinfection facilities. Therefore, it is necessary to build standard manure storage rooms, sewage tanks, diseased and dead livestock and poultry treatment facilities and disinfection facilities on farms.

3.4 Impact on aquaculture

At present, there are 44 cage breeding households in Huanren Reservoir, with an area of 320,000 square meters (annual output of 1.2 million kilograms of fish fry and 9 million kilograms of adult fish), a total area of 20,000 mu (annual output of 2 million kilograms) for enclosure farming, and a total area of 2,500 mu (annual output of 1.25 million kilograms) for cofferdam pond, with an annual output of 215 million yuan. However, Cage farming, cofferdam farming and related ancillary facilities have been banned after the reserve was designated.

3.5 Impact on tourist industry

Huanren is rich in tourism resources, with a total area of scenic spots of 672.5km², more than 55% of the total scenic spots of Benxi City. As early as 2013, the county received 7.418 million tourists, and the total income of tourism industry was 7.53 billion yuan (\$33.7659 million in foreign exchange). Among them, Huanlong Lake Scenic Area received 1.401 million person-times in 2013, accounting for 40.4% of the total person-times of sightseeing, vacation, leisure and entertainment in the county. It is the most important part of Huanren's development strategy of "Revitalizing the county through tourism". After the delineation of the water resources protection area, the ecological environment of Huanren has been improved significantly. However, Huanlong Lake scenic area is facing the fate of being banned, which will have a significant impact on the development of the tourism industry of the whole county. At the same time, employment opportunities and government tax revenues are also affected.

4 Conclusion

With the rapid development of urbanization in China, the demand of residents for domestic water has increased gradually. Therefore, the work of water conservation area is critical, and it has a significant impact on the social and economic development of the region.

On the basis of adhering to the principle of environmental protection as a priority, the relationship between economic development, social progress, ecological and environmental protection should be carefully treated. The goal of realizing the coordination and sustainable development of economy, society, resources and environment is achieved through promoting the balance of population, resources and environment and the unification of economic, social and ecological benefits.

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References

1. Wang, F., et al., Fractal Features of Soil Particle Size Distribution on Water Source Conservation Areas under Different Measures of Ecological Restoration. *Journal of Soil and Water Conservation*, (2009) .
2. Wang, R., et al., Cleaner agricultural production in drinking-water source areas for the control of non-point source pollution in China. *Journal of Environmental Management*, **285**(3): p. 112096(2021) .
3. Xi, Z., Study on legal Institution of Drinking Water Sources Protection. Northeast Agricultural University.

4. Aimin, W., Study on Ecological Compensation System of Source Water Protection Areas. Shandong Agricultural University.(2016)
5. Zhao, Z., Development of ecological industry in Dahuofang drinking water source protection area. Agriculture and Technology.