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Analysis of Rural Ecological Environment Governance in the Two-oriented Society Construction: A Case Study of Xiantao City in Hubei Province

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Abstract

In the process of building a two-oriented society, it is of reference significance to analyze the current situation of rural ecology and environment so as to build a two-oriented society and of realistic and practical significance to achieve coordinated development of three systems of rural society, economy and resource environment. With the case study of Xiantao City in Hubei Province, one of cities of comprehensive support reform pilot area of “two-oriented society”, this paper conducts investigation and research on local countryside. Through field investigation, typical survey and literature review, this paper learns about pollution and control situation of natural environment, social environment and ecological environment in the countryside of Xiantao, and analyzes the situation of rural ecological environment control in building a two-oriented society.

Keywords: Two-oriented society; Rural ecological environment; Construction

1. Introduction

With accelerated industrialization, urbanization and modernization of rural area, ecological environment problems in rural area are exposed more and more. The problems are more serious at some borders of urban and rural areas due to double pollution of industry and agriculture. As a major agriculture province, Hubei Province has a large rural population, so it is inevitable to meet with ecological deterioration and environmental disruption in local countryside. In December 2007, Wuhan City Circle was approved by the State Council as the comprehensive support reform base of national resource-conserving and environment-friendly society. It is a vital part of new socialist countryside to spare no effort to promote the building of rural ecological civilization and protect rural ecological environment, furthermore, it is also necessary to build “resource-conserving and environment-friendly” society for Wuhan City Circle. Under this context, it is of great significance to study ecological environment in the rural area of Wuhan City Circle.

2.1 Overview of local countryside

Xiantao covers 251991.26ha, the land area per capita is 0.17ha, and arable land predominates in the agricultural land, accounting for 66.36% of agricultural land area, with 0.09ha per capita, and is distributed in the villages and towns.

The arbitrary discharge of domestic garbage, domestic sewage, livestock husbandry waste and agricultural waste in countryside has always been downplayed. Meanwhile, livestock husbandry waste and agricultural straw have a low comprehensive utilization rate. And in some areas where modernization is faster, there exists such phenomena as mixture of urban and rural residential area and industrial area, infrastructure construction and environment management falling behind economic growth and urbanization level (TABLE I. for domestic non-point source pollution in countryside in the last three years).

Table 1 Investigation on non-point source pollution of domestic sewage and domestic garbage in countryside of Xiantao City in the last three years

Year	Rural population (10000 persons)	Domestic sewage output (t)	Domestic garbage output (t)
2005	106.5	62196000	310980
2006	106.53	62213520	311067.6
2007	107.29	62657360	313286.8

2.2 Overview of rural ecological environment

1) Main types of pollution

In the recent years, with the acceleration of industrialization and urbanization of Xiantao City, development zones and industrial park zones, especially chemical park zones, emerge in countryside and further speed up the shift of urban industrial wastewater, domestic sewage and refuse to countryside. (TABLE II for industrial sewage discharge of Xiantao in 2007).

Table 2 Industrial sewage discharge of xiantao in 2007

Sewage discharge amount m ³	Discharge amount of main pollutants					Other main feature pollutants	
	COD	Ammonia Nitrogen	TN	TP	Name	Discharge amount	
1081	2983.59	338.11	—	—	Cyanide	3.25	

In 2007, the total amount of solid waste from industrial and mining industry of Xiantao is 150000t, among which the output of industrial hazardous waste is 100t, disposal and utilization rate of industrial solid waste is 99%, and safe disposal rate of industrial hazardous waste is 60%.

It is found in investigation that nearly 13.22% villagers deem the local air quality as very poor, and 67.20% villagers regard the local air quality as average, indicating the seriousness of air pollution problem in these places.

Besides, unreasonable development of industrial and mining enterprises also occupies a large area of arable land of rural residents, greatly decreasing the vegetation coverage in countryside. Since the total

land area is limited, the great increase of industrial land is bound to cause great decline of arable land. According to the statistics, in recent years, the villagers suffer a decrease of arable land accounts for 84.8%, playing an absolutely dominate role.

According to the investigation, 43.92% villagers of Pengchang and Zhanggou in Xiantao hold that vegetation coverage decreases these years, indicating that it is necessary to further demonstrate and improve scientific nature and strength of local government's measures and policies in industrial development and land protection.

II) Situation of agricultural non-point source pollution

a) Crop production pollution

According to preliminary estimate, the amount of various crop stalks generated in Xiantao in 2007 is 6500t, total amount of animal excrete discharge is 3000000t; use of agricultural film is 3718t. However, the investigation shows that over 40% crop stalks are used ineffectively, annual remaining amount of agricultural film is 1859t, most large scale cultivation farms have no pollution prevention and control facilities, a large quantity of excrete and sewage is directly discharged into water body without effective treatment, causing serious environmental pollution. According to the statistics, annual application amount of pesticide in Xiantao is up to 5757t, that of fertilizer is 75268t, among which the application amount of nitrogen fertilizer is as high as 43394t, which of organic fertilizer only accounts for 25% of total application amount of fertilizer, utilization rate of fertilizer remains at a low level of 35%. (TABLE III. and TABLE IV for usage of fertilizer and pesticide in Xiantao in 2007).

Table 3 Usage of fertilizer in Xiantao in 2007

Item	Measurement unit	Data
Nitrogen fertilizer	t	13394
Phosphate fertilizer	t	8747
Compound fertilizer	t	20359
Total application amount of fertilizer	t	75278
The area of farmland using fertilizer	mu	1353171
Average dosage per unit	Kg/mu	55.62
The proportion of the farmland using fertilizer in total land area of the same type	%	95.9

Table 4 Usage of pesticide in Xiantao in 2007

Item	Measurement unit	Data
Total application amount of pesticide	Kg	5757000
The area of farmland using pesticide	mu	8747
Average dosage per unit	Kg/mu	5.2
The proportion of the farmland using pesticide in total land area of the same type	t	78.45

b) Livestock husbandry pollution

Recently, animal husbandry in Xiantao has embarked on the path of rapid development, husbandry method has gone through qualitative changes, and scale husbandry has become dominant. According to preliminary estimate the total discharge amount of livestock excretes in Xiantao in 2007 is 600000t. Most cultivation farms are deficient in storage and disposal of excrete and sewage, many large scale cultivation

farms have no pollution prevention and control facilities, a large quantity of excrete and sewage is directly discharged into water body without effective treatment, causing serious environmental pollution (TABLE V for pollution of Livestock husbandry in Xiantao in 2007).

Table 5 Pollution of Livestock husbandry and aquaculture in Xiantao in 2007

Husbandry type	Husbandry method	Wastewater discharge amount (t)	COD discharge amount (t/y)	Ammonia nitrogen discharge amount (t/y)
Animal husbandry (pig, hen, cattle)	—	531.44	5945.48	1195.74
	Pond cultivation	—	682.34	10.53
Aquaculture	Lake cultivation	—	27.54	0.42
	River and ditch cultivation	—	37.71	0.58
Other husbandry	—	—	16.67	0.25
Total amount	—	531.44	6709.74	1207.52

c) Aquaculture pollution.

Recently, with booming aquaculture in Xiantao City, rising proportion of high-yield and high-density aquaculture, cultivation water bodies are suffering from more and more serious pollution. Residual bait, decomposition of aquatic life dejection and corpus in the pond give rise to deterioration of water quality, incur abnormal change of N, P and other nutritive elements in the water and generate hazardous substances, causing sickness and even death of such cultivation subjects as fish and shrimp, hindering the development of Xiantao City aquaculture (TABLE V for the investigation of aquaculture pollution sources in Xiantao City in 2007).

River pollution will further lead to deficiency of water for industrial and agricultural production and living. As regards lake pollution, about 44.97% villagers deem local lake pollution as serious.

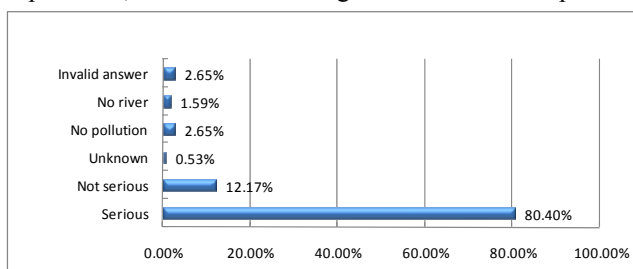


Figure 1 Pengchang and Zhanggou villagers' recognition of local water pollution in Xiantao

d) Situation of drinking water safety in countryside

Due to the existence of dual structure of urban and rural development, water supply in countryside is inferior to urban and industrial water supply in priority, with coexistence of lack of water in source and quality. According to preliminary statistics, the coverage of tap water in countryside is less than 40%, only

14% villages has water supply facilities, with low-quality water instrument and inefficient water supply, simple treatment facility, a rural pollution of about 551040 suffer unsafe drinking water, leading to epidemic in some rural area and causing the occurrence of mottling of teeth, calculi and dermatosis in some areas. As shown by sampling and analysis of underground water and drinking water of 17 villages and towns, the ferro manganese content of a half samples exceeds the standard for drinking water.

3. Reasons behind current situation of ecological environment in countryside of Xiantao

3.1 Random discharge and rejection of domestic wastewater and domestic garbage in countryside

The population of residents in villages and towns in Xiantao City is about 1100000, distributed in 17 towns (farms) and urban-rural fringe area across the city. At present, none centralized treatment plant for domestic sewage and innocuous treatment plant for domestic garbage are provided in the villages and towns except that a centralized sewage treatment plant is building in Sanfutan Town and Miancheng Town. 32000000t domestic sewage and 200000t domestic garbage produced by rural residents per year are directly discharged into surrounding environment without any treatment, causing serious pollution of surface water and underground water.

3.2 Over-standard discharge of a large quantity of livestock husbandry wastewater of high concentration

In recent year, livestock husbandry of Xiantao City is developing rapidly. According to the data of the first pollution source censor in 2008, the pig population in 2007 is 220000 heads, the population of chicken and layers is 2000000, and annual output of livestock husbandry wastewater is about 3000000t, COD discharge amount is 3000t, equal to the total industrial COD discharge amount of the city. As Xiantao City has not delimited areas to forbidden and restrict husbandry, livestock husbandry farms exist everywhere, increasing the difficult of environmental supervision, most livestock husbandry farms discharge over-standard pollutants wantonly, which becomes another important source of water pollution in countryside.

3.3 Improper use of pesticide, fertilizer and agricultural film

According to Xiantao statistical yearbook, the total application amount of fertilizer in countryside of the city in 2007 is 75268t, total application amount of pesticide is 5757t, and total use of agricultural film is 3718t. Given an effective utilization rate of 35%, the loss of fertilizer in farmland across the city in 2007 is 48924.2t; loss of pesticide is 3742t. Given a comprehensive utilization rate of 50%, the residual amount of agricultural film in farmland across the city in 2007 is 1859t. Great loss of pesticide and fertilizer and a large quantity of residual agricultural film not only cause a waste of resources, pollution of soil and water bodies, but also threaten quality safety of agricultural products and damage biological diversity.

4. Problems and inadequacies of rural ecological environment Governance in Xiantao City

4.1 Deficient input in rural ecological environment protection and governance

Take sewage treatment plant as an example, it needs a large investment, but the township has not enough economic recourses to support the project inc construction; according to non-competiveness and non-exclusiveness of public products and externality principle, the township may subjectively prefer to input more financial resources into industrial enterprises which can promote economic growth of the town.

The ideal will cause a lack of staying power in rural ecological environment control. Incompleteness of original infrastructure has been finalized in initial planning of the town. To improve it, it is necessary to re-plan and re-lay drainage pipeline network, which is also a gigantic project.

4.2 Poor sustainability and practicability of project construction

Although Xiantao municipal government and the townships have enacted a series of policies and measures and launched environmental control projects, but many of the projects are prosperous at the beginning, lethargic in the interim period and unprogressive at last. It can be contributed to imperfect planning and supervision system of the project, as well as inadequacy or improper use of capital input. Besides, development form of rural economy determines the difficulty of equipment, people's awareness and economic capacity determines that even if the project is completed, the people may fail to afford it during operation.

4.3 Imperfect rural environmental protection and governance mechanism

Rural environmental protection mechanism and system have not been completely rationalized, leading to a lack of communication and exchange between relevant departments and serious confused management. Most townships have no special organizations and staff for environmental protection, environmental monitoring and environmental supervision has a small coverage in countryside, giving rising to the phenomena that pollution accidents are left unattended and environmental protection consultation is not available.

Moreover, restricted by human power, financial resource and conditions, environmental protection publicity is mainly conducted in urban area, publicizing and education is not really launched in rural area.

5. Suggestions and countermeasures of rural ecological environment Governance in Xiantao

5.1 Improving comprehensive decision of rural economic development and environmental protection

First of all, it is necessary to strengthen the duties of local governments and departments on all levels concerning rural environmental protection of the jurisdiction, industry and system, define the duties of resource development units and legal persons concerning ecological environment protection, practice strict assessment and reward and punishment system among all subjects of environmental protection liability.

Besides, all departments shall coordinate and assist with each other, actively cooperate with each other from a global and strategic perspective to establish permanently effective work linkage mechanism, forming work layout of definite division of work, powerful coordination, equal emphasis and co-administration.

5.2 Increasing social investment channels of environmental protection and input into rural environmental protection

First, the government establishes a special fund for sewage discharge of a certain proportion to be used in rural environmental protection, increase input into regional pollution control of key river basins and water sources, and strive for special fund for environmental protection from the national, provincial and municipal government. Second, the governments can adopt policy preference; prefer to give financial support to environmental protection projects and other enterprises with complete environmental protection facilities.

5.3 *Improving infrastructure of rural environment, addressing hot issues and difficulties concerning rural environment*

To promote the adjustment of rural industry structure and production mode, improve environmental infrastructure such as rural sewage and garbage treatment, make deliberate effort in application water source protection, livestock husbandry, agricultural non-point pollution control accelerate advancement of innocuous treatment technologies of rural domestic sewage, refuse, livestock husbandry pollution, establish and improve permanently effective environmental protection mechanism across the countryside.

5.4 *Strengthening grass-root environmental protection capacity and guidance of rural environmental protection by public opinions*

To gradually establish grass-root environmental protection organizations in countryside, launch environmental protection inspector system in township government, constantly strengthening rural environment supervision capacity; carry out publicizing and education of environmental protection knowledge at multiple levels and in various forms, establish the idea of ecological civilization, enhance the farmers' awareness of environmental protection, motivate the farmers' initiative to participate in rural environmental protection, promote healthy and civil style of production, living and consumption.

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