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Investigation and analysis on environment pollution of typical countryside in zhengzhou suburb

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ABSTRACT

The rural environment pollution has been the key and difficult point of environment protection in our country, and there are many influence factors for environment pollution. This paper proposes countermeasures and suggestions aiming at the rural household refuse and sanitary sewage pollution based on the investigation of household refuse and sanitary sewage in 5 typical villages of Zhengzhou suburb.

KEYWORDS

Typical countryside, Environment pollution, Household refuse, Pollution control.

INTRODUCTION

In recent years, in the process of constructing new countryside and ecological villages, the usage rate of tap water is rising yearly, family bathroom and household water for toilet flushing begin popularizing, which provides the great convenience for farmers' daily life, and meanwhile promotes the clean and tidy environment in villages, but which also causes a large increase of rural sanitary sewage and household refuse in this drainage basin, furthermore, it presents the trend of increasing yearly.[1]In most countryside villages, the existing situation is that sanitary sewage and household refuse are untreated although they have been conveyed.[2]For this purpose, the question of how to control the pollution of rural sanitary sewage and solid refuse effectively has been a problem that can't be ignored in countryside of Zhengzhou suburb.

GENERAL SITUATION OF COUNTRYSIDE IN ZHENGZHOU SUBURB

Basic Information of Zhengzhou Countryside

Zhengzhou is located in the central China and the provincial capital of Henan province. For the past few years, the villages in Zhengzhou suburb changes with the development of Zhengzhou. The internal spatial pattern of villages in outskirts of a town is changing, and the traditional form of villages collapses step by step with its development. Many villages in Zhengzhou suburb is in the process of new rural construction, so the problems of removing, environment and drinking water safety are particularly outstanding. The emphasis of this investigation and survey pays close attention on issues of source of water, sanitation, environment, latrine pit, irrigate and the usage of pesticide and chemical fertilizer faced by villages in Zhengzhou suburb in recent years. The scope of this investigation is limited to villages of six districts in Zhengzhou.

TABLE 1 : Basic Information of Zhengzhou Countryside

Type	Zhongyuan District	Erqi District	Guancheng District	Jinshui District	Shangjie District	Huiji District
Villagers' committee (number)	46	45	37	61	30	50
Countryside households (Ten thousand)	2.3	2.18	2.06	3.24	1.38	3.71
Number of population (Ten thousand)	8.6	9.06	8.02	12.34	4.65	13.24
Farmer (Ten thousand)	0.6	1.78	1.62	2.97	0.59	4.24

Selection of typical villages

This investigation selects 5 typical villages, which located at four corners of Zhengzhou downtown respectively. These 5 villages are selected based on whether there is a river near villages, basic location, high or low terrain and whether it is in the new rural construction, and they are Fanzhuang Village in Huiji District, Zhouzhuang Village and Jiagang Village in Jinshui District, Xiaoweihe Village in Guancheng District, Changmiao Village in Erqi District.

INVESTIGATION ON BASIC INFORMATION OF TYPICAL VILLAGES

(1) Fanzhuang, where is located in Jialu River basin, near 107 national road, and Yellow River and Suoxu River to its north, is a typical transition village in new rural construction. The area of Fanzhuang Village is about 500mu, and it has the small living area with about 40 households. Fanzhaung Village is located in the northern suburbs of Zhengzhou, and it's a typical village being closing to road.

The water supply of village is concentrated model without paying any water rate to the government. In the village, there is no underground drainage facility. The terrain of villagers' houses is higher than streets' by 0.5meters, so the waste water can be discharged to the street and road directly from the outfall of every house, which causes the poor street environment. In addition, most of toilets are latrine pits, and the septic-tanks are set for treatment. Since the water quality of Suoxu River is better with a small amount of debris, there are fish and shrimp in it.

The facilities collecting household refuse in the village is imperfect. Although the specialized cleaner and colleting facilities collecting household refuse have been set, and the household refuse will be carried away at fixed periods, the burning marks can be seen on the facilities collecting household refuse, and the garbage, such as plastic bag, is stacked at both end of road and some blind sides, as well as the garbage (sponge) dumped by factory optionally can be seen near the path of village.

Environmental publicity has not been conducted in the village, and a small amount of people pay attention on environmental publicity. There are almost no poultry breeding and livestock husbandry, so the village is quiet without any noise pollution.

(2) Zhouzhuang is located in Liulin Town of Huiji District, near Zhongzhou Avenue. The area of it is about 1500mu, and the living area is loose with 230mu. There are 80 households, and the village has relative property and distinctive rural characteristics. About 15% industrial enterprises and individual workshops exist in the village. Jialu River flows past the village. Matougang sewage treatment plant is in the west of the village, and the water after treatment will be discharged into Jialu River..

The leading industry of village is some small processing plants, including the processing of steel and wood furniture, and the plants of processing by-product near the small processing plants often can be seen, such as processing of bits of wood, etc.

The pollution of sewage and household refuse can be seen near the road of village. Since there is no sanitary sewer in the village, the road almost is submerged by raining water in raining days. The latrine pit and septic-tank have been used by most of families, so other sanitary sewage will be discharged to the surface of street directly. Fourth more, the local government has not arranged the cleaner and garbage collection truck.

(3) Jiagang Village is located at Zhengdong New District, near Jinshui East Road, and it is a typical model of new rural construction. This village is rebuilt from the former Jiagang Village. There are about 150 households, and most of residents are native villagers. There are some alien workers because of vacancy of many houses after native villages move into community, and meanwhile alien workers is rising. The management model and hardware of village is similar to city community. Dongfeng River flows past Jiagang Village.

The infrastructure of Jiagang Community is sound with impeccable water supply, drainage system. The drinking water is from centralized water supply, and the sanitary sewage is discharged into Wangxinzhuang sewage treatment plant through sewage pipe network. There are many dustbins and garbage trucks, and the sanitation worker cleans the garbage on the ground frequently, therefore the environment is better.

(4) Xiaoweihe Village is located in the southeast of Zhengzhou, Guancheng District, and the area of it is about 1000mu. The living area is about 200mu with 75 households. In front of the village, Wei River flows past, and the water in Wei River is clear and has excellent riverway design and afforestation. However, a certain extent of pollution has been caused by the garbage in the river because the river is near village.

At the entrance of village, there is a garbage collection point, which is garbage collection pool with $100m^2$. According to the reflection of villagers, the garbage is carried away by truck assigned by village committee, but the cleaning cycle is 1 week to 15 days, so some organic refuse begin to decay, causing the odorous smell at the entrance to a village.

There is no sewage flowing over the surface of road because of the impeccable sewage collection system. In addition, the water is supplied by village committee intensively.

(5) Changmiao Village is located in the southwest suburbs of Zhengzhou, near connecting line between Zhengzhou-Shaolinsi Expressway and Hanghai Road. It lies between Changzhuang Reservoir and Jialu River, covering 500mu, thereinto, the living area is about 110mu with 40 households, so it is concentrated. The factory and workshop rarely can be seen in the village, and the garbage problem still exists, although it is a village with less city trace among investigated villages. The organic refuse is in the majority. Similar to other villages, there is sewage on the surface of road since no drainage facility is set in the village.

INVESTIGATION RESULT AND ANALYSIS

Analysis on basic information of people participating in investigation

In this investigation, 130 questionnaires were given out, and 122 were taken back, thereinto, 115 were effective. Among them, there are 54 men, covering 47% of total investigated people, and 61 women, covering 53% of total investigated people. The age distribution of respondent is shown in Figure1, the age range of this investigation is 15-69 years old, thereinto, people who are 31-69 years old covers 52%, who dominate families generally, hence it will be very important to understand their attitude on garbage disposal.

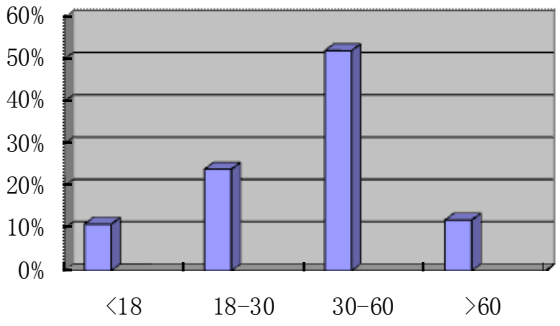

Figure1: Age Distribution of Respondents

The distribution of respondents' education level is shown in Figure2, the educational level of most of villagers is junior high school or under it, which is lower, so some certain difficulties exists in improvement of environmental awareness, and it will go against the communication of garbage classification and collection in the future, so the coordination with local villagers should be done perfectly.

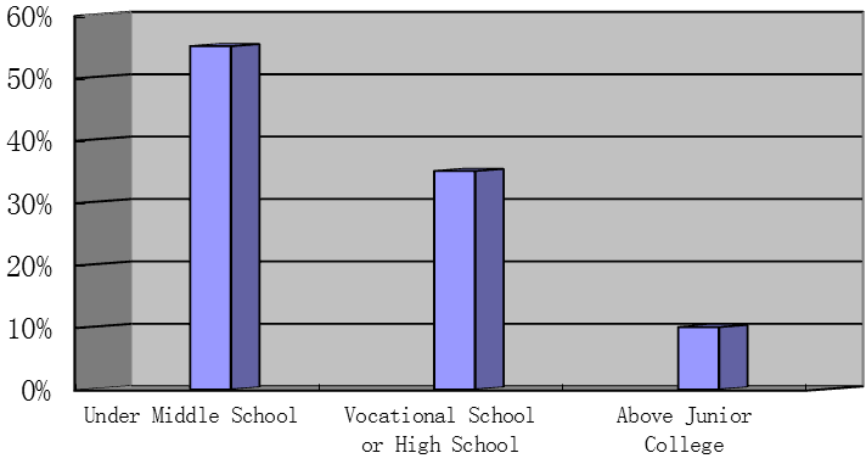

Figure 2 : Educational Level Distribution of Respondents

Analysis on the environmental awareness of residents

The environmental awareness of residents belongs to the category of superstructure, and it can reflect the current situation of investigated areas, cognition on environment issue from the public, environment protection disposition and environmental behavior in every respect, which can provide the basis of formulating the reasonable measures of environmental management. Hence, the investigation and research on environmental awareness of villagers is the important foundation of designing the management model of household refuse being adaptive to the situation of resettlement area.

The survey result shows that local villagers have the certain environment awareness and requirement. The investigation data on satisfaction for present rural environment is shown in Figure 3. While for the attitude of protecting the environment of villages, 87.5% villagers is dissatisfied; thus it can be seen that the environmental awareness of farmers emerges and strengthens gradually because the environment pollution influences the production and life of farmers increasingly, which offers the foundation of operating the control of rural environment pollution and implementing the comprehensive improvement of rural environment.

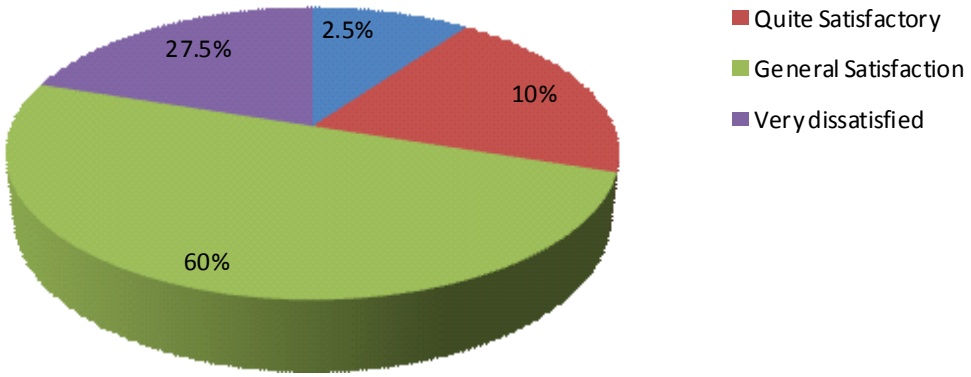

Figure 3 : Villagers' Satisfaction on Environment

Analysis on pollution situation of villages

Except for Jiagang Village, the pollution components of other villages are basically same, but the large difference in several term. The rural environment pollution of villages mainly is sewage and household refuse.

Analysis on household refuse composition of village

In the pollutant, the household refuse mainly includes resoluble organic matter, ash, plastic, cloth material and glass, etc, thereinto, the resoluble organic matter occupies more than 50%; the second place is ash and plastic, occupying 21.3% and 13.8% respectively. The proportion of organic composition already is close to other cities, which shows the rapid development of economic and life style of cities have influenced the surrounding villages largely. More ash maybe is caused by that the village still uses coals for fuel.

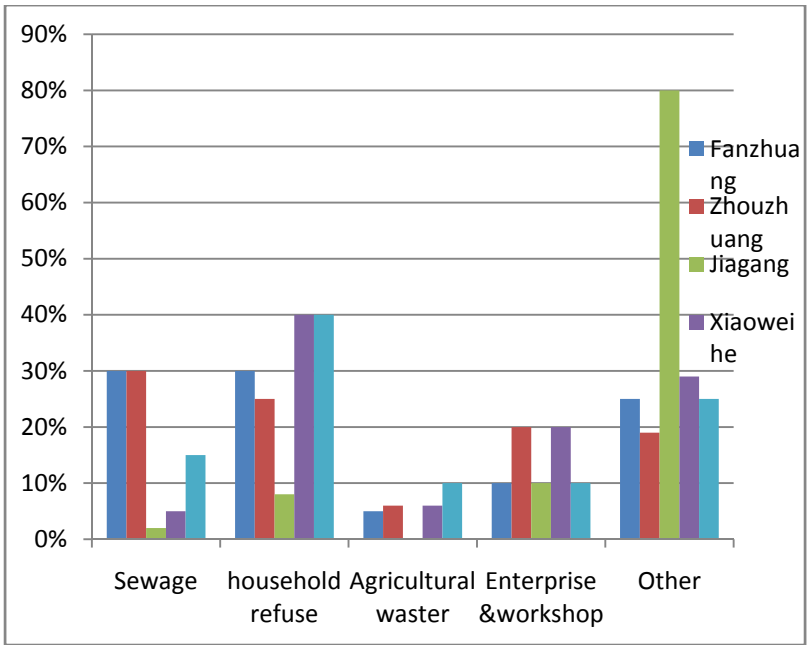

Figure 4 : Composition of Environmental Pollutant

TABLE 2: Physics of Household Refuse in 5 Typical Villages

Name	Physics Composition of Pollutant（%）					
	Resoluble organic matter	Ash	Plastic	Cloth material	Glass	Others
Fanzhuang Village	47.2	26.1	13.2	9.8	1.9	1.8
Zhouzhuang Village	54	25.1	14.5	5.5	0.8	0.1
Jiagang Village	65.0	8.4	17.6	7.6	1.1	0.3
Xiaoweihe Village	59.6	21.5	13.1	4.0	0.6	1.2
Changmiao Village	58.7	25.4	10.6	3.1	1.3	0.9

Water quality analysis of peripheral river of village

The selected and investigated villages are surrounding with river, use PH test paper to conduct the site test by taking the water sample from surrounding river, other samples are taken to the laboratory using sampling bottle for conducting COD, ammonia and nitrogen test, and the test result is shown in TABLE 3.

TABLE 3: Water Quality Analysis Result of 5 Typical Villages

Number	Name of village	Location	pH	COD_{cr}（mg/L）	NH_3-N（mg/L）
1	Fanzhuang Village	Suoxu River	7.5	220	17.0
2	Zhouzhuang Village	Jialu River	8.0	170	28.5
3	Jiagang Village	Dongfeng Rive	8.5	320	36
4	Xiaoweihe Village	Ying River	7.7	280	18.9
5	Changmiao Village	Jialu River	7.5	290	20.0

According to the site test, except Ying River, the water quality of these rivers cannot reach the standard of V class in *Environment Quality Standards of Surface Water*, so the situation of rural water area is not optimistic.

CONCLUSION AND SUGGESTIONS

Conclusion and Suggestions

(1) The new rural construction has not been conducted in Fanzhuang Village and Zhouzhuang Village, the collection system is incomplete, so the garbage pollution is serious, causing the serious pollution, which can't be ignored.

(2) The water pollution in villages of Zhengzhou suburb is very remarkable, and most of domestic sewage is discharged to the road or river near village directly because there is sewage disposal pipeline.

(3) The pollution from township and village enterprises in some district of Zhengzhou suburb is prominent, which should get more attention.

(4) The villagers have the certain environmental awareness, but the recognition on environment is not enough.

(5) The environmental management system is not incomplete in Zhengzhou suburb, and the activities and publicity of environment protection knowledge and the environmental workers are lacking.

(6) The villagers have the will to improve environment, hopes to perfect the sewage disposal pipeline and garbage collection facilities, have the desire to pay part of fees and labor for improving environment as well.

Suggestions

(1) According to the rural economic development condition and component of refuse in Zhengzhou suburb at present, the technology of garbage disposal in countryside villages must follow the principle of adjusting measures to local conditions, technical feasibility, economical and reasonable way to ensure small investment and low operating expense, thus realizing "harmlessness, decrement recycling of garbage".

(2) For the question of how to improve the rural environment management and environmental awareness of villagers, starting the rural environment protection work and strengthening the rural environment management should be suggested. At present, the issue concerned most by farmers is mending a cement road and perfecting environmentally protective facility from the investigation, therefore mending the road and environmentally protective facility should be an entry point in order to meet requirements of farmers. The construction of cement road also will avoid the national degradation of garbage caused by falling into soil, and then famers will be dissatisfied with the garbage problem, thus attach importance to it. In the process of concerning the environmentally protective facility, including drinking water, drainage pipeline, and famers will deepen the understanding on factors of water pollution, thus consciously adopting behavior of protecting the environment in their production and daily life.

ACKNOWLEDGEMENT

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