

Research Article

Environmental Factors Analysis on the Sustainable Development of Agriculture in China

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Abstract: With the rapid economic development, China's rural environmental protection has made positive progress, but some of the old and new environmental problems still exist, which restrict the sustainable development of rural areas. In this study, against the continuous development problems of environmental pollution in the rural areas, we identified a series of reasons that cause the decline of rural environment and serious pollution based on the analysis of the current status of rural environmental pollution and then we put forward some effective countermeasures against environmental pollution in rural areas, which are significant for the improvement of rural environmental protection and management and explore the laws of rural environment protection, accelerate the comprehensive management, with which bring rural to the goal of production development, affluent life and sound eco civilized areas, making the pace of building new socialist countryside will be faster and more stable.

Keywords: China's rural environmental protection, countermeasures, rural environmental problems, rural pollution

INTRODUCTION

CPC Central Committee and State Council attached great importance to rural environmental protection work, after years of effort, China's rural environmental pollution control and ecological protection has made positive progress. However, the current environmental situation is still severe in rural China, which can be divided into two categories, the rural non-point source pollution and the point source pollution, specifically including the unreasonable application of chemical fertilizers, pesticides, non-standard use, livestock over-development of the aquaculture industry, straw approach not in place, agricultural plastic film residue, rural life pollution and sewage and other industrial enterprises, etc.

Based on the realization of the party's congress proposed building a moderately prosperous society goal of the new requirements and the construction of the development of production, an affluent life, civilization, clean and tidy village and democratic management of the requirements of a new socialist countryside, 2020 China will basically formed a resource-saving and environment-friendly agricultural production systems, rural living and ecological environment will be significantly improved. The rural environment is closely related with people's lives, those who protect the rural environment with great significance. Rural environmental problems are seriously in China, which affect both health of farmers and seriously affect their basic survival and future livelihoods, directly by agricultural products to cause serious harm to the health

of urban residents. Vice Premier Li Keqiang has solemnly pointed out: "the ecological and environmental problems in rural areas which are not solved permanently, will shake the foundation of the three rural, hinder the pace of development and even affect the foundation of the survival of the Chinese nation (Yu and Zhao, 2009). In this study, we identified a series of reasons that caused the decline of rural environment and serious pollutions based on the analysis of current status and then put forward some effective countermeasures against these environmental pollutions.

CHINA'S RURAL ENVIRONMENTAL PROBLEMS

The rural environment involving farmer-centered to the farmers in terms of production, life, living the formation of a variety of natural and artificially transformed natural factors general term. Our rural environment facing the following problems:

Domestic pollution: Rural life with the population of 900 million, but the construction of waste treatment facilities is lacking, nearly 700,000 administrative villages across the country, the vast majority of which is not supported with the construction of pollution control measures and pollution control is basically blank. A lot of the garbage generated in the daily life of rural residents, the data shows that the rural per capita garbage is produced about 300 kg. Rural areas throughout the country annually produce about 80

Table 1: Results for 2006-2007 Ninghe potential NPS load (tones)

Pollution source	2006			2007		
	COD	TN	P	COD	TN	P
Fertilizer applied to field crops	0	2067.6	2715.75	0	1795.05	2656.59
Live stocks	10427.51	2024.1	641.79	10796.21	2106.11	659.180
Rural living	837.9300	87.190	10.100	839.4200	87.340	10.1100
Total	11265.44	4178.89	3367.64	11635.63	3988.5	3325.88

billion tons of sewage, 120 million tons of domestic garbage, animal urine and feces of pigs, cattle, chickens three categories amounted to over 2.7 billion tons of total emissions, all of which emission of COD more than five times of industrial and domestic sewage (Yu and Zhao, 2009). This garbage are lack of effective treatment and are stored in the open air or discharged directly into rivers, ditches, which is causing serious pollution of air, soil and water environment. There are more than 200 million mu of farmland wasted by the piling up of solid waste and damaged all over the country. Take Ninghe (a typical agricultural country, located in Tianjin) as an example, in recent years, livestock (pigs, chicken and cattle) production has expanded enormously. Between 2001 and 2007 the number of pigs has tripled and poultry quadrupled with 1.02 million pigs and 8.47 million chickens in 2007. Livestock waste treatment facilities are few. We estimated at about 60% is mostly outdoor composting of solid waste, often in unprotected areas, with liquid animal wastes flushed into nearby watercourses and composting manure running off to watercourses during rainfall events (Qiu, 2009). The potential pollution load is shown in Table 1.

Agricultural pollution: The most prominent pollutions in rural areas are fertilizer, pesticides and plastic sheeting during the agricultural production activities. For more and more denser people and less farmer land, the development of land resources has reached the limit. Chinese agricultural production is over-reliance on chemical fertilizers, pesticides, nitrogen fertilizer use compared to other major developing countries. China has become the most intensive use of fertilizers in agriculture, the per hectare fertilizer use is 10 times higher than those African countries. Especially since the 1970s, China began intensive use of fertilizers to increase agricultural production, the main lake, with nitrogen, phosphorus rich oxidation pollution, deteriorated sharply. Because the absorption capacities of crops to those fertilizers are diminishing, a lot of fertilizers flow into rivers and lakes. Another negative impact of overly intensive use of fertilizers is that may damage the fertility of the soil and land Stalinization. Fertilizers decomposition products, such as ammonia and nitrogen oxides can accelerate the global warming. At the same time, due to the marginal revenue of China's land is very large, the farmers often cannot resist the temptation to develop new arable land and destruction of forests and grasslands, leading to floods and droughts in many mountainous. In turn, the Stalinization of land and forest destruction causes more

loss of land and ultimately harm to agriculture. Total (N, P, K) chemical fertilizer usage in Ninghe is 17,000 tonnes in 2007, with an average application rate of 450 kg/ha compared with 107 kg/ha for the American mid-west and far higher than the standard of developed countries. Excessive fertilizer application and low fertilizer utilization has become a common and serious problem in China. In Ninghe county rainfall producing significant runoff is rare however traditional flood irrigation, especially after fertilizing, aggravates fertilizer loss through field runoff (Qiu, 2009). The potential pollution load is shown in Table 1.

Industrial pollution: Rural industry is mainly divided into two categories; one is mainly relying on the local power of self-development of township enterprises. These companies generally focused on agricultural and sideline products processing, easy assembly and machinery manufacturing, raw materials primary processing industries, which with characteristics of low-tech, labor-intensive and extensive management features. Such as chemicals, paper, cement and other industries, a high degree of pollution, poor primary industrial processing power, are generally smaller, backward technology, high pollution and low output, due to the one-sided pursuit of economic efficiency, lack of environmental regulation and environmental awareness, waste gas, waste water and solid waste emitted to the environment directly, most of which are untreated and led to water, air and soil pollution. Not only damage our ecological environment, but also a serious impact on the health of rural residents. The other is the "foreign" enterprises, including local investment and some serious environmental pollution enterprises which cannot gain a foothold in the city and are forced to move to the countryside. These foreign enterprises are big with high pollution, high energy consumption, etc. Often took a fancy to the weak management of the rural environment and the environment before entering the lower cost of this malaise. Since the year 2000 there has been a decline in the number of environmental accidents in China (Table 2). Whereas the number of environmental accidents in China grew rapidly between 1997 and 2000, the number fell between 2000 and 2003. Of all the classes of environmental accidents, water pollution accidents are the most frequent and they have become more frequent between 1997 and 2003. Of course, some of these are from large urban industries, but the enforcement of environmental regulations in cities, anecdotal evidence and media reports suggest that the

Table 2: Number of environmental accidents in China (1997, 2000 and 2003)

Type of accident	1997		2000		2003	
	Number of accidents	(%)	Number of accidents	(%)	Number of accidents	(%)
Total accidents	1992	100	2411	100	1843	100
Water pollution	986	49.5	1138	47.2	1042	56.5
Air pollution	752	37.7	864	35.8	654	35.5
Solid waste pollution	55	2.80	103	4.30	56	3.00
Noise pollution	119	6.00	266	11.0	50	2.70
Other pollution	80	4.00	40	1.70	41	2.20

majority of these accidents are caused by rural enterprises. There is probably also significant underreporting of water pollution accidents from rural industries due to the close connections between environmental regulators and rural entrepreneurs (Table 2).

ANALYSIS THE CAUSES OF ENVIRONMENTAL PROBLEMS IN RURAL AREAS

Environmental problems in rural areas are particularly important and very complicated. Advance the environmental governance, strengthening the environmental protection and ensure the sustainable development of agriculture have become an urgent task.

Historical reasons: Our farmers have generally low level of education and a long time, not enough environmental protection and farmers living in dispersed, the closed nature of the mode of production, social interaction and contact limitations in the environment lacks protection publicity and education, all resulted in backward rural areas, environmental protection awareness.

Law policies:

Rural environment lacks of legal protection: There are still blind spots in the legislation, existing laws and regulations are needed to be further improved for the regulations regulatory system lagged behind (Mao, 2008). On one hand, China has developed and formed a series framework of laws, such as "constitution", "Environmental Protection Law" and "Circular Economy Promotion Law" as the main environmental laws, but in some important areas and important production processes are also lack of clear requirements. For example, in terms of environmental pollution compensation, compensatory measures for environmental pollution prevention and control law legal system are not in place, which is unable to prevent large-scale urban industrial pollution to the transfer of rural and harms the legitimate environmental interests of the farmers who cannot effectively motivate residents to protect the environment in rural areas. Pollution problems generated by the others, such as animal manure, soil pollution prevention, agricultural non-point source pollution, the township enterprises in

the spread of pollution and urban and rural pollution transfer specific aspects and links of the lack of legal regulation. Many places, on the other hand, poor grassroots government endowments and qualifications, poor environmental management, building capacity is very weak, blind spots exist in many rural areas, resulting in environmental protection and other public service facilities are seriously lagging behind. Already established pollution control facilities, are also as non-existent due to technical, personnel, operating costs and other issues. It is difficult to cope with the sudden major environmental safety incidents for uneven level of local protectionism and environmental law enforcement.

No scientific and effective planning's as a guide:

Awareness in planning, long-term people's eyes has been to invest in the city, including the organ functions of the department staff, which have the poor concept and awareness of rural development planning. Although in recent years the village planning in China has been gradually seriously, but a complete and village planning system has not been establish yet, the generally low level of rural environmental planning units engaged in planning community planning focus remains on the city, causing for rural areas environmental planning long-term in the blank.

Lack construction of rural environment investment:

A long time, the government finances in cities and inadequate investment in rural infrastructure construction (Gong, 2009). Rural environmental protection investment is very significant input, not only have an important impact on people of the rural habitat and the development of recycling economy, but also has a significant role in promoting the sustainable development of the whole society.

SUGGESTIONS OF SOLVING ENVIRONMENTAL PROBLEMS IN RURAL AREAS

Strengthen environmental publicity and education to increase public participation. It is fundamentally to improve the environmental awareness of farmers to solve environmental problems in rural areas. Environmental education is an important way to improve the level of environmental awareness of

farmers. Only raising farmers environmental consciousness can improve their conscious of their own living environment protection and become the subject of improving the rural ecological environment, so as to realize the sustainable and healthy development of the rural areas. Rural environmental education object is to broad farmer and basic level cadre, the education level is generally not high, so the way of education must be practical, easily to be understood, simple and practical method, for example it is to publicize energetically rural environmental protection knowledge, policy, policies and regulations by using environmental protection publicity, television, newspaper advertising form, so it is a civil right and the citizen's obligation for rural people to understand and enjoy a good environmental protection (Gong, 2009).

Develop the suitable legal system to adapt the rural situation and play a good practical results, guidelines and policies for rural environmental problems. The first and foremost is to develop integrated rural environmental protection, as the legal basis for rural environmental protection work of the Basic Law. Cope with the Basic Law "rural environment" to make clear legal definition of the rural environmental management system, the rights and responsibilities of the different departments in the rural environmental protection work, the basic objective of the rural environmental protection, principles and the system provides for the principle and thus construct rural basic institutional framework for environmental work. Second, the existing system of environmental laws should be read in conjunction with the rural situation to be flexible and effectively solve the major environmental problems in the rural areas by modifying a single line of laws and regulations and perfect. In this regard, it is particularly important to water pollution, air pollution, soil pollution, solid waste pollution and pesticide pollution prevention, to develop a practical system must be based on the rural characteristics of "point source" pollution. Should also support the development of environmental liability insurance system in rural areas, the social remedy environmental damages fund system, administrative compensation system, decentralized environmental risks to ensure that victims are compensated (Feng and Tang, 2008).

Improve the rural environment management system, increase investment in the construction and support of the rural environment. For not perfect rural environmental management and the shortage of environmental protection and technical personnel situations, more rural environmental protection management system should be established to strengthen the environmental protection department of the county (district) business training and strive to improve their professional quality and operational capacity. Strict supervision of the rural environment pollution, do not introduce the pollution and broad negative effect on the

natural ecology project and urge pollution reduction or comprehensive management of the township industrial enterprises.

It is a long-term process and requires a big investment and the whole society to participate in the system engineering to build a beautiful rural area with no environment pollution, economic development, clean and tidy village. The investment in environmental protection in rural areas includes financial security, environmental infrastructure construction in rural areas and rural environmental protection industry which provide technical and personnel support, assistant for the purchase of pollution control equipment township SMEs. Government should make comprehensive use of economic, administrative and legal means, to increase investment in environmental protection in rural funding for rural environmental protection included in the normal budget expenditures subjects and increased year by year. There is history and reality of the dual problems in rural environmental development, the solution of environmental problems in rural areas is a complex and long-term projects. For the dual problems of history and reality, how to solve old problems and avoid new problems in environmental protection in rural areas, are strategic choices in front of the sustainable development of agriculture.

DISCUSSION

Our research leads policy makers insight into the components of rural pollutions and legislation, investment and education need to be focused. Especially policies now being developed by the Chinese government for agricultural pollution control need to focus on real, for example, one perception is that cropland is a major source of N to watercourses from over-fertilization. It is certainly true that over-fertilization is a major issue across China and N runoff is probably important in Southern China where rainfall is plentiful. However, this perception is not supported for the dry North China Plain. It follows that national legislative and control policies should reflect the regional differences that exist so that control can focus on the most important issues.

The current pollution control system should rely on a top-down approach to monitoring, control and supervision. This needs a large of investment to build a series of supervisor systems and major workers with high education to management it. While this may work in cities where pollution sources are spatially concentrated and pollution-monitoring systems are well developed, it does not work in the rural areas where polluting activities are dispersed in villages and have close associations with local government officials. Pollution control regulations can be applied to rural industries only to the degree that local government officials are able and willing to implement environmental standards and exercise authority.

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REFERENCES

Feng, Z.M. and Y. Tang, 2008. Model establishment and application for China habitat environment index based on GIS. *Geographical Sci.*, 12: 1327-1336.

Gong, G., 2009. Green countryside: New socialist rural areas construction. *Rural Econ.*, 10: 17-19.

Mao, R.B., 2008. China's environmental problems and environmental legislation. *Law Rev.*, 2: 3-9.

Qiu, Y., 2009. Current situation and countermeasures in rural environmental pollution in Liaoning province. *Rural Econ.*, 10: 28-32.

Yu, X.H. and G.Q. Zhao, 2009. Review of agricultural growth in China. *Econ. Theory Econ. Manage.*, 4: 68-73.