Government's Responsibility for Control of Agricultural Environmental Pollution in China

Dongfang CHEN*

Railway Police College, Zhengzhou 450053, China

Abstract In this paper, the current situation of agricultural environmental pollution caused by the increase of chemicals input in agriculture in China was analyzed, and it is found that agricultural pollution is related to agricultural industrial policies, urban-rural economic structure, funds input in pollution control, comprehensive environmental management, laws of pollution control, and so forth. To control agricultural pollution effectively, it is needed to implement integration of agricultural and environmental policies, establish environmentally friendly agricultural technology popularizing system, implement integrated planning and management of a basin, and set up and improve legislation to protect agricultural environment.

Key words China, Agricultural environmental pollution, Government's responsibility

1 Introduction

Agricultural pollution is a kind of non-point source pollution. Point and non-point sources are proposed aiming at water environmental pollution in America's *Clean Water Act*. In large quantities of studies, point source and non-point source pollution have been widely applied to other problems of environmental pollution, such as soil and atmospheric contamination. Non-point source pollution is called surface source pollution by some scholars in China. Excessive and unreasonable application of pesticides and chemical fertilizers in agricultural production, animals' manure produced during the process of large-scale livestock breeding, untreated waste generated during the process of agricultural production, and so forth can lead to agricultural non-point source pollution directly. With the strengthening of control of industrial point source pollution, agricultural non-point source pollution has become the main root of water pollution and the important source of air pollution in China. According to the First National Pollution Source Census Bulletin issued by the Ministry of Environmental Protection of the People's Republic of China on February 6, 2010, the emission of agricultural pollutants in China has great impacts on water environment. In 2007, the emissions of chemical oxygen demand (COD), total nitrogen (TN), and total phosphorus (TP) from agriculture reached 13.2409 million, 2.7046 million, and 0.2847 t respectively, accounting for 43.71%, 57.19% and 67.27% of total emission respectively.

2 Current situation of agricultural environmental pollution in China

China is a big country to use large amounts of chemical fertilizers and pesticides presently, and agricultural pollution caused by the use of chemicals has been paid more attention to in China. Excessive and unreasonable application of pesticides and chemical fertilizers can result in residual of inorganic substances in soil and then accumulation of heavy metals in agricultural products; residual of pesticides in agricultural products can damage human health, lead to water eutrophication, and threaten wild flora and fauna; the residual of agricultural films that are not easy to degrade in soil can affect physical and chemical properties and permeability of farmland and produce toxic substances to decrease soil fertility. In 2004, the China Council for International Cooperation on Environment and Development (CCICED) suggested that about 0.174 million tons of nitrogen fertilizer applied to food and vegetable crops in China lost every year, of which around 50% of the lost nitrogen fertilizer flowed from farmland into the Yangtze River, the Yellow River and the Pearl River, thereby affecting local and global environment and functions of ecosystems seriously. For instance, 49% -70% of TN and 40% -52% of TP flowing into Lake Chao are from agricultural pollution. In Lake Dianchi basin, the contribution rates of agricultural pollution to TN and TP are 33% -53% and 30% -58% respectively, that is, more than 12000 tons of chemical fertilizers flow into Lake Dianchi, accounting for about 10% of annual average application of chemical fertilizers (ranging from 0.10 million to 0.12 million t) in Lake Dianchi basin, so agricultural pollution is the main source of nitrogen and phosphorus in non-point source pollution. In Lake Tai, the contribution rates of agricultural, domestic and industrial wastewater pollution to TN are 59%, 25% and 16% respectively, and the contribution rates of agricultural, domestic and industrial wastewater pollution to TP are 30%, 60% and 10% respectively. In addition, 92% and 88% of nitrogen flowing into the Yangtze River and the Yellow River every year are from agriculture, of which nitrogen from chemical fertilizers accounts for 50%.

3 Causes of agricultural environmental pollution in China

3.1 Food security guarantee and industrial policies Food security guarantee and industrial policies are deep reasons for agri-

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* Corresponding author. E-mail: chendf525@sina.com

cultural pollution in China. In China having a large population but a small area of arable land, pressure for the balance between food supply and demand is great, and food security is always the core of agricultural policies established by Chinese government. Chinese farmers pursue high yield during the process of agricultural production, so grain yield has increased since the founding of China due to scientific and technological progress and institutional innovation. Because of scientific and technological progress, a variety of modern agricultural chemical inputs, such as pesticides, chemical fertilizers, agricultural plastic films and so on, are produced. At present, there are no good substitutes for pesticides and chemical fertilizers, but it is inevitable to apply pesticides and chemical fertilizers in farmland to ensure food supply and security. As a result, agricultural pollution related to agricultural input will become increasingly serious if effective control measures are not adopted. Meanwhile, some policies supporting industrial development in China (such as policies on production and use of agricultural chemicals) also lead to the increase of chemicals. For instance, to encourage grain production, Chinese government provided certain subsidies for farmers who used chemical fertilizers. After the implementation of household contract responsibility system in the 1980s, farmers' enthusiasm for agricultural production enhances, and the demand for chemical fertilizers also increases, which stimulates the development of fertilizer industry and increases fertilizer imports in China. After China's accession to the World Trade Organization (WTO), the price of chemical fertilizers in the domestic market is close to that in the international market gradually, so Chinese farmers can buy cheap chemical fertilizers easily, which is conducive to Chinese farmers' participation in the international market of agricultural products. However, it will also result in the excessive application of chemical fertilizers in farmland, which will put great pressure on the environment. According to a study, government policies of controlling price of fertilizer industry and fiscal policy of supporting agriculture have resulted in the distortion of fertilizer factor market, thereby further stimulating the discharge of agricultural non-point source pollutants obviously[13].

3.2 Dual structure with urban and rural division Because of giving priority to the development of heavy industry when China was founded, the household registration system of restricting farmers entering cities, and the price scissors of industrial and agricultural products for a long term, China's dual structure has become very prominent, and its essence is inequalities between urban and rural areas. The existence of special dual structure with urban and rural division in China may be the deep reason for increasing deterioration of rural non-point source pollution. The main reasons are shown as follows: urban and rural division aggravates the tension between rural population and resources or the environment; farmers applied a large quantity of chemicals in farmland but neglected the production and control of agricultural pollution; small-scale agricultural production increases the difficulty of controlling pollution; a large number of young adults in rural areas work in cities, which affects agricultural production and decreases farmers' environmental protection awareness; the environmental protection issue in rural areas has been neglected for a long time, so rural environmental pollution has not been controlled.

3.3 Lack of comprehensive management of environment in a basin In recent years, water problems have become increasingly serious in a basin of China, such as decreases of ecosystem services and economic loss in a basin caused by compound water pollution and its transfer in a basin, comprehensive water shortage and drinking water safety, hydraulic and hydropower engineering, and comprehensive water-related disasters in a basin caused by flood, drought and pollution events. The tend of global warming aggravates the above problems and increases uncertainty and risk of water problems in future. In China, there is a big gap between the upper and lower reaches of a river flowing across administrative areas in the level of economic development, where pollution problems are complex, and there are collisions between the upper and lower reaches, trunk stream and tributaries, water quality and quantity, and interest groups. At present, water pollution is controlled by local government, and there is no unified planning and management of agricultural pollution in a basin. As a result, water pollution in the lower reaches is controlled, but water pollution in the upper reaches is not controlled effectively and then affects the control effect of water pollution in the lower reaches. Pollution is very serious at the junctions of provinces, cities, and counties, because local government is not willing to control the pollution at the junctions. If there are no correct ideas of controlling water pollution, water problems in a basin of China will influence the sustainable development of the basin.

3.4 Lack of laws against agricultural pollution In 1972, Organization for Economic Co-operation and Development (OECD) proposed polluters must pay for their behavior. The principle can relieve environmental pollution to a certain extent, and it has been accepted soon as a regulation of a country participating international trade. In 1979, China stipulated that pollution should be controlled by polluters in the Environmental Protection Law of the People's Republic of China (Trail Implementation). However, the principle aims at point source pollution, and pollution caused by agricultural activity has been excluded from environmental management for a long term, so farmers need not to take charge of their pollution behavior. In fact, there are no special laws for controlling (agricultural) non-point source pollution in China. Non-point source pollution is involved in some laws, but the laws are regarded as being related to non-point source pollution and are conducive to the prevention and control of non-point source pollution. However, the content of the laws is not enough detailed, has no strong pertinence, and lacks law enforcement effect, so they have little effect.

4 Countermeasures against agricultural environmental pollution in China

4.1 Implementing integration of agricultural and environmental policies Seen from the process of agricultural develop-

ment in developed countries, the integration of agricultural and environmental policies is the trend of sustainable development of agriculture, and agricultural policies should be assessed according to their environmental impact. One of fields to which the integration of agricultural and environmental policies is applied is grain production. With the development of industrialization and urbanization, the decrease of farmland in area in China is an inevitable trend, so the pressure for increase of grain yield will be very big. The fact about grain production since the founding of China proves China has a great success in food security. However, the success results from the increase of per unit area yield to a great extent at the cost of damage to the environment. In the new period restrained by resources and environment, Chinese government should pay more attention to the sustainable development of agriculture besides food security. To coordinate the sustainable development of agriculture and food security, it is needed to dispose the relation between balance and environmental protection. Appropriately adjusting and establishment of self-sufficiency rate of grain, and making full use of food markets both at home and abroad can reduce the pressure of chemical use on the environment and is beneficial to environmental protection.

4.2 Establishing environmentally friendly agricultural technology popularizing system efficiently Firstly, it is needed to establish pollution monitoring system to fully monitor farmland environmental capacity and quality of cultivated land. A survey of rural environment is a fundamental work and the premise of scientifically solving rural environmental pollution. Therefore, agricultural environmental pollution should be surveyed as quickly as possible, especially for rural non-point source pollution and soil pollution. At the same time, environmental pollution monitoring system should be established and improved gradually to provide complete and reliable information for establishment of policies and scientific decision-making. Secondly, it is necessary to establish efficient agricultural technology popularizing system, reform huge promotion system, improve the quality of science and technology extension workers, increase the work efficiency of agricultural technology popularizing teams, separate technology popularizing activity and commercial activity, and enhance the operating efficiency of the popularizing system. Thirdly, mature techniques of using chemicals should be popularized actively. It is needed to set up technical specifications for clean production of pesticides and chemical fertilizers, and encourage producers to produce efficient and low-residue pesticides and chemical fertilizers; mature techniques of using chemical fertilizers and pesticides should be popularized according to local conditions, and balanced fertilization, changing fertilizing method and time should be conducted to reduce the application of chemical fertilizers and pesticides.

4.3 Implementing integrated planning and management of a basin In recent years, water pollution has become increasingly serious in a basin of China. If there are no correct ideas of controlling water pollution, water problems in a basin of China will influence the sustainable development of the basin. Based on circular economics and basin integrated management principle, most countries in North America and the European Union implement environmental protection policies and promulgate laws and regulations in a basin to integrated planning and management of a basin. In regions where agricultural pollution is serious, China government should implement integrated planning and control in a basin. Based on the reduction of application of nitrogen and phosphorus fertilizer and pesticides, it is needed to establish farmland ecological interception system to reduce discharge of pollutants from farmland, build distributed sewage treatment system in rural areas, control pollution of regional rivers, and build ecological river beds.

4.4 Setting up and improving legislation to protect agricultural environment It is necessary to set up and improve legislation to protect agricultural environment, make the functions of various departments to protect agricultural environment clear, coordinate agricultural environment work of various departments, set up regulations and standards of agricultural ecological environment, actively revise current unreasonable legal standards, and improve related legislation to protect agricultural environment. Meanwhile, a comprehensive coordination agency should be set up to promote the synergistic effect of plan, agricultural, environmental protection, water conservancy, land and resources, and fiscal departments participating in agricultural environmental protection.

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