

## **Research on Industrial Pollution in Rural China: Field Survey of a Chemical Plant's Water Pollution**

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### **要 旨**

中国農村地域では、工業化に伴い様々な企業が設立された。ところがその結果として工業汚染が農村地域における環境破壊の主要な原因となっている。中国国内では環境立法や環境保護機構昇格による環境保護と経済の持続可能な発展を重視しているにもかかわらず、中央政府の環境保護措置は農村地域の工業汚染を解消することができない。そこでその原因を探る手掛かりとして、ある化学工場の水質汚染状況についてフィールド調査を実施した。本論は、その調査に基づいて論述したものである。

**Keywords: Industrial Pollution, Survey, Sustainable Development**

### **1. Introduction:**

Recently, with the development of industrialization in rural China, the industrial zones and industrial parks have been emerging in rural areas throughout the countryside. At the same time, because many high-polluting enterprises have been emerging in rural regions, the rural environmental pollution incidents have appeared frequently. Especially water pollution is serious. More than fifty percent of China's major waterways are heavily polluted. (Dexter Roberts, 2003). In rural China, 360 million people are using unsafe drinking water poisoned by pollution. Among them, 190 million rural residents are drinking water in those toxic substances exceeding the required safety standards<sup>1</sup>. Water pollution in rural areas is mainly from three sources; the first is due to excessive application of fertilizer and pesticides in agricultural production: second, due to lack of treatment facilities and management of life garbage led to water pollution as well. The third reason is from industrial production in rural regions<sup>2</sup>. However, China's water is mostly polluted by industrial wastewater and sewage, especially, the industrial factor contributed to 63.8% of the total. (Meng, X., & Ma, F. Sh., 2002).

In fact, Chinese central government has been improving its attention shown to environmental problems gradually. For instance, in the Environmental institutional settings, 30 years ago, China just established an

Environmental Protection Office under the Construction Committee. The office became National Environmental Protection Agency in 1987. In 2009, it was upgraded to Ministry of Environmental Protection led directly by the State Council. The fact that the institution in charge of environmental protection went from an office to a ministry reflects the Chinese government's deepening concern for environmental protection. The question is why rural environmental pollution problems have not been effectively curbed even though the government has been paying more attention to environmental protection?

Some scholars believe that China's financial investment for environmental governance is not enough. However, during the tenth Five-Year Plan from 2001, the central government pledged to spend 1.3 percent of its GDP on the environmental sector, with the majority of this money focused on pollution treatment and prevention (Elizabeth. E, 2004). Some scholars believe that lack of environmental law is one of the reasons for China's environmental degradation. However, through the legislation, we can say that China is not lacking in environmental law. China introduced *the industrial three wastes discharge trial standards* in 1973. As the first environmental protection law, *the Environmental Protection Law (Trial)* was passed in 1979. And since the economic reform, the environmental protection system has been formed gradually in China.

#### **Key Chinese Environmental Law**

- The Air Pollution Prevention and Control Law(1987,amended in 1987, 2000)
- The Clean Production Promotion Law(2002)
- The Energy Conservation Law(1997)
- The Environmental Impact Assessment Law(2002)
- The Environmental Noise Pollution Control Law(1996)
- The Solid Waste Pollution Prevention Law(1995)
- The Marine Environmental Protection Law(1982, amended in 1999)
- The Radioactive Pollution Prevention and Control Law(2003)
- The Water Pollution Prevention and Control Law(1984, amended in 1996)
- The Wildlife Protection Law(1988)

Source : Richard ,J.F &Zhang, H.J(2003)

Some scholars believe that China's environmental legislation has been developing continuously; China's environmental problems cannot be resolved because law enforcement has been weak. (Eric, Z. & Jennifer., 2004). In order to find the real cause of environmental pollution in rural areas, I empirically investigated a chemical company and analyzed it in this paper.

## **2. Field Survey of a Chemical Plant's Water Pollution**

### **Purpose of the Survey:**

Through the survey of a chemical company, this paper seeks to 1) realize the station of industrial water pollution in rural areas, and 2) find out the reasons for long-term unresolved pollution and 3) give reasonable policy suggestions for pollution control in rural China.

### **Survey Object:**

In this paper, the object of the survey is Hua Chemical Company. We interviewed the factory managers and factory workers, a number of villagers living near the factory, the local Environmental Protection Agency officers, local hospital experts and the chemical industry expert.

### **Survey Methods:**

This paper adopted two survey methods including 1) field observation, to understand the actual plant pollution, and 2) individual interviews, to realize the pollution reasons.

### **Survey :**

Hua-Chemical group was started in 1996, after ten years of establishment, it developed into a big enterprise which has 1,600 employees and 510 million RMB sales in 2006, and became one of the corporate major tax payers for local government. As the biggest maker of DSD acid, the output reached 30 thousand tons per annual. Most products are exported to developed countries such as European nations, America and Japan. It meets over 60 percent of the global DSD acid needs. DSD acid is the commodity name of 4,4'-diamino-2,2'-stilbenedisulfonic acid and a necessary dye and pigment intermediary. The raw materials are nitro-toluene, sulfuric acid and caustic soda<sup>3</sup>.

Carrying the questions of how productions of DSD acid damage the environment, I consulted the expert of chemical department of Zhanjiang Normal University. The production of DSD acid concludes mainly three steps of nitro toluene sulfur nation, oxidation and reduction. The materials are highly corrosive

and the products usually contain toxic contaminants such as formaldehyde, benzene and heavy metals. Due to the water media oxidation process in production, there are problems in the process which are unstable, difficult to control, have poor response and cause extremely serious pollution. Especially in water pollution, about 30 tons of high polluted water will be discharged during the production of one ton of DSD acid. However, it is a big issue in resolving this pollution and there isn't any real technical solution. So production of DSD acid is prohibited in most developed countries, and they imported the products from developing countries where there is a lack of environmental protection.

For these reasons, this product has a large market in the world and therefore it is very profitable. However, in fact, the profit is on the loss of agricultural production and the health of local residents. Based on the information of Hua chemical group, the production of DSD acid reaches 30 thousand tons and 30 ton waste water for each product, this company discharges 1300 ton waste water every day. However, the waste of other products is not included. It is easy to image how this company damages the local environment.

**Field Observation :**

Hua Chemical plant is located in Dongguang County, Hebei Province and here is the North China Plain, one of the most populated areas in China. The North China Plain is China's second widest plain, and the population reaches 450 million and accounts for about one fifth of the total. It has an area of about 310 thousand square kilometers and is one of the largest agricultural regions. The production of grain and cotton accounts for 18.4% and 40% of China's total output. The coastal area is also one of the most important sources of sea salt.

Even though many rivers flow through the North China Plain such as the Yellow River, the Huai River and the Hai River, but the amount of water is less. The water volume in this region is only 335 cubic meters per capita annually and less than 1 / 6 of the countrywide average. So groundwater has become an important pillar for sustainable economic and social development in this region. Currently, most cities in the North China Plain are relying heavily on groundwater and the share of groundwater has reached more than 70% of the total water supply.

The factory is about 3 km far from southern Dongguang County and next to State Road 104. There are several villages around the factory and a kindergarten is next to it just separated by a wall. There is a river between the factory and State Road. The river flow is dark and it smells bad. Behind the factory, there is a river about 1 km far behind the factory and it flows to the Xuanhui River, which flows across hundreds of

villages and into the Bohai Sea. There are several ponds next to the factories and the water is dark and smells bad as well. A villager working in the farm told me that these are sewage storage tanks from the Hua chemical company. There are pipelines buried under the soil, and the chemical factory emits waste water on rainy days or at night. The waste water has seriously polluted the rivers and groundwater.

**Villager Survey:**

The river used to fill the water source originally, one villager told me, but since the chemical company came and emitted waste water into the river, the river has been polluted and it has caused a reduction in crop yields. According to villagers, Hua chemical group has caused pollution problems on many occasions. One of the villagers seemed to be frightened, and he said: "The sewage plant was horrible." They irrigated land once in 1999 with the river polluted by Hua Chemical Company, and crops died. The villagers made a video of that, and then petitioned the local government to resolve the problem. Finally, Hua Chemical Company was forced to make compensation of 70 thousand RMB. The residents of Xu village told me that the plant's pollution damages not only the crops but also livestock.

As local drinking water totally depends on the groundwater, the company's chemical production damaged the health of local people. According to a local villager, Hua chemical plant has been polluting the water for many years since its foundation in 1996. Initially, because they did not know the harm that the chemical pollution caused, they just noted that the air had become thick and the river water dark. However, two years later, they found that not only was the river totally black and choking, but even 30 meters-deep underground, it had become yellow and smelt bad. They had to drink the water, and sometimes waited for two days until the color had changed. A middle-aged farmer said that shallow wells could not be used as drinking water at all. For that reason, Hua chemical company dug several 300 meter deep wells for the nearby villages. Even the water is from so deep ground, it is slightly brown in color.

The Xiaoxing villagers said that since Hua Chemical Company moved to their village and polluted the water source, the number of cancer patients has increased. According to the villagers' statistics, several dozens cancer patients have been discovered in the nearby villages in recent years, and many of them have died. Many residents of nearby villages had developed cancer. The villagers said that if you go to Cangzhou hospital, you will see that most cancer patients are from Dongguang County. Besides cancer, in Dongguang County, the incidence of femoral necrosis is much higher than the surrounding counties. In addition, other strange diseases have begun to appear, especially the occurrence of several children being born with

deformities.

The villagers have complained and petitioned repeatedly, but the government has not resolved the problems. The pollution problems here have been also exposed by several media outlets. But this has not been of any help in solving the problem. So there is no change in the problem of pollution here. Villagers have decided to resolve the problems by themselves and attempted to prevent the pollution from business activities on several occasions. So there have been several conflicts between the corporation and the residents. As a result, County Public Security Bureau has ended up mediating and detaining the organizers. Therefore, the villagers have lost confidence and hope for a solution to their problem. They only told me what they had reported to the Deputy Prime Minister, which is to say the problem would have to be resolved or, it wouldn't work.

#### **Hospital Survey :**

After that, carrying the prevalence of cancer, I visited Dongguang County Hospital and Cangzhou People's Hospital. It seemed that they were reluctant to submit specific figures, but through interviews of several hospital staff, I came to a conclusion. In Dongguang County, the incidence rates of various types of cancer has soared in recent years and the cancer incidence rates of this county are far more than in surrounding counties.

#### **Survey on the Local EPA:**

Concerning the pollution from Hua chemical company, I visited Dongguang County Environmental Protection Agency and interviewed the executive officer. He said that the company did have pollution problems. As a petition had been received on many occasions, EPA and county government communicated and coordinated with the Hua chemical corporation. Eventually, the company bought sewage treatment equipment and solved the pollution problems. The enterprise treats the sewage and then pumps it to a sewage treatment plant to be treated. So there is no problem with the final discharged water.

The executive officer told me that because pollution control targets for this company are lower than the requirements of the Government, the State Environmental Protection Administration and the Provincial Environmental Protection Bureau have not found any problems. When I asked about the problem of the high incidence of cancer and other diseases among local residents, the executive officer showed me an investigation report from 2007 conducted by the Department of Environmental Protection of Hebei Province.

It clearly stated that the incidence of cancer in Dongguang County is lower than the national average.

Through the investigation conducted by the EPA of Dongguang County, It can be sure that the Hua chemical company does not have pollution problems. Even assuming that the problems were resolved after the sewage treatment plant had been established, nevertheless the county's sewage treatment plant was only built in 2005, which is ten years after the foundation of the chemical plant. In other words, the pollution problems have existed for ten years. According to experts, 30 tons of highly polluted waste water will be emitted due to production of each ton of DSD acid. The company produces 15,000 tons DSD acid annually, and ten years of production of DSD acid has already had discharged 4.5 million tons of highly polluted wastewater. This means that the company has already caused extremely serious damage to local water resources. The other problem is whether the pollution problems have been really resolved or not. Bearing this in mind, I tried to visit the company. However, I was refused an interview when I contacted the company and described the investigation I was carrying out. Therefore I decided to interview some employees to understand the situation more clearly.

#### **Employee Survey :**

According to one of the plant's workers who asked that I not disclose his name, the factory purchased the devices for sewage treatment. However, these facilities will be operated only during checks by the Environmental Protection Agency or their correspondents. After they leave, the operation will be stopped because running costs are too high. In addition, one worker said that the factory planned to establish branch plants in other regions, but failed several times to invest because of pollution problems.

### **3. Survey Analysis**

Through on-site observation and survey of relevant personnel, we can see that the chemical plant caused great harm to the local environment, especially the water source. However, why could not the problem of pollution be effectively resolved given the indisputable evidence? Based on the survey, we can conclude that the reasons are as follows:

Firstly, environment protection law is vague and this makes it difficult for law enforcement. However, China already has a groundwater protection law system, including "Water Law", "Water Pollution Prevention Law," "Water and Soil Conservation Law" and "City Water Regulations". These laws provide a number of measures for the protection of groundwater resources. However, these laws generally focus on how to ensure

the supply of groundwater, not the protection of groundwater quality.

At the same time, although some laws make provision for water pollution, these provisions are too vague and limited. For example, to prevent groundwater pollution, the "Water Pollution Prevention Law" has made the following provisions : Prohibition of the emission of waste containing toxic pollutants, of sewage including pathogens and other waste from the seepage of wells, seepage pits, fissures and caverns<sup>4</sup>, and the prohibition of the transportation or storage of wastewater containing toxic pollutants, including pathogens of sewage and other waste using ditches and ponds without anti-leakage measures. However, the law has not clearly defined groundwater quality<sup>5</sup>.

Secondly, since the officials are often keen to develop the local economy and even seek personal gains, it is common that the local government protects the polluters. The local governments in rural regions have often viewed the economic development as its priority task. In order to develop the local economy, they diffuse investment widely but pay less attention to its environmental impact. The environmental management of local government is not strict. On the one hand, they are environmentally aware about business site-settlement. On the other hand, if enterprises have pollution problems, the local government often condones it and even takes the attitude that the enforcement of environmental protection must not hinder the pace of economic development.

Besides, because heavy polluting enterprises often manage to forge relationships with the local officials by giving shares or positions to them, in return, officials provide information concerning environmental checks from the SEPA to polluting enterprises. Once the inspection teams have arrived, the enterprises manage to address the pollution problems and meet the standards. However, when the inspectors leave, they often continue to fail to meet the pollution standards which would put heavy cost burden on them. Some local governments even refuse to cooperate with the State Environmental Protection Administration (SEPA) in punishing factories which caused pollution. Furthermore, local officials often pressure the EPB to ignore pollution from enterprises.

Thirdly, because environmental officials are subject to local government economics, the central Ministry of Environmental Protection law enforcement cannot be carried through to the final stage of the process. In China, the State Environmental Protection Administration (SEPA) is the chief architect of national environment protection standards, regulations and laws. It is responsible for supervising the implementation of national laws at the national level. However, implementation is overwhelmingly a local issue. Local environmental protection officials are responsible for the enforcement of the environmental regulation of a



regional level. However, the EPB holds a dual allegiance to the SEPA and the local government. On one hand, they are branches of the SEPA. On the other hand, they depend on the local government for financial support. Their salaries and office maintenance fees are all from local fiscal expenditure. So even if the Environmental Protection Bureau attempt to enforce environmental regulations, they have to consider how it influences the local officials.

In addition, in the context of economic globalization, transnational pollution has become one of the factors of environmental damage in rural China. In the context of industrialization and abstract investment in rural areas, many companies have transferred their production bases to the rural industrial zone including many heavily polluting enterprises. One of the very important sources of pollution enterprises in rural areas is from heavily populated cities. In order to reduce pollution pressures, the central cities began to evacuate the seriously polluting plants. This makes the seriously polluting enterprises spread out from urban areas to rural regions, thus many rural areas have begun to become industrial areas with their own polluting problems (Zhang, Z.Q., et al, 2007). Another source of pollution from enterprises is that of the developed industrial countries (Jin, L. Sh., 1997). With economic globalization and international production division, cross-border pollution is increasing. On the one hand, because the regulation of industrial pollution in the advanced industrial countries is very strict, many heavily polluting enterprises in these countries have selected to transfer operations to developing countries where the environmental regulation is much looser. On the other hand, because the production process of some products has caused very serious environmental pollution, it is prohibited in developed countries. So enterprises in developed countries have taken to importing their goods from developing countries.

Due to a huge market and industry clusters, China is one of the most important locations for these enterprises. This has contributed to the country's environmental problems and has made industrial pollution in developing countries heavier. In China, especially in eastern rural areas, the rural economy is relatively developed and local industrial enterprises have the production capacity to meet the demands of the international market. So many chemical companies have accepted the heavy production of pollution and have become a base of high-pollution production. In the context of trade liberalization and economic globalization, environmental problems are spreading worldwide. In other words, economic globalization and the pollution globalization are part of the same process. Therefore, under the background of globalization, researching China's sustainable development must deal with environmental problems on the global scale.

#### 4. Conclusion

In order to achieve sustainable development in rural China, solving the environmental pollution problem is the government's most important task. First of all, China must change the economic growth mode by changing the "treatment after pollution" model and establishing pollution prevention and a control system. The regional economic development plane should be based on the regional environmental agency carrying out its capacity to prevent pollution from urban to rural areas. As for the examination of site-settle industrial production, construction of high-pollution projects must be firmly banned in rural areas. Especially with regards to the pollution that takes a long time to resolve such as groundwater, the examination should be particularly careful. In 2002, *the Environmental Impact Assessment Law* was promulgated and became the basis for environmental for project site selection. In the future, local governments should comply strictly in accordance with law enforcement.

Secondly, improvement of legislation and enforcement is the foundation of pollution prevention and control. When we review the global situation, we can see that the industrialized countries have also experienced the process of environmental pollution resolution. These countries finally have achieved the condition of economic development needed for appropriate environmental protection because they have established a sound legal system. So China should improve its environmental protection laws, especially in the context of economic globalization, legislation, pollution indicators and should gradually move closer to the position of move developed countries.

Thirdly, at the same time as improving the legislation, China should establish strict enforcement and effective monitoring systems. Environmental protection and company management should be put together, and the law enforcement can then ensure that the production cannot go beyond environmental regulations. SEPA should strengthen environmental law enforcement on industrial enterprises in rural areas and carry out remedial action for industrial pollution. Furthermore, the environmental protection agency should monitor the emissions from industrial enterprises and crack down the illegal emissions. In particular, the SEPA should take some nationwide action to resolve pollution problems which strongly affected residents in rural regions. For the enterprises in which such pollution cannot be resolved technically such as the Hua Chemical Company mentioned previously, its production activities should be resolutely banned. If local government officials condone their production activities, the producers and connivance of government officials should be severely punished.

Fourthly, the central government should establish an effective mechanism to urge local governments to pay more attention to environmental protection. Because local officials have played such a decisive role in the decision-making on economic development and environmental protection, enforcement significantly depends on them. The central government should change the evaluation content of local government performance and view environmental protection as its most important task. Especially for the rural governors, industrial pollution control and environmental protection indicators should be an important part of the appraisal index system and the necessary assessment of rural cadres. On the other hand, the central government should establish a mechanism for environmental protection target responsibility and accountability encouraging the local officials to engage in environmental protection work.

Finally, the Government should increase investment on environmental protection in rural areas. On the one hand, it is important to study and formulate environmental prevention and control planning according to the characteristics of rural pollution, while at the same time, encouraging pollution prevention technology development in rural areas and thus improving environmental protection capability. On the other hand, because environmental officials are subject to local government for financial aid, the central Ministry of Environmental Protection law enforcement cannot be carried out through to its final stages to uncooperative local governments. To ensure that environmental enforcement is independent, the central government should establish a special salary fund for an environmental protection system by making the officials economically independent from local governments. In addition, the government in rural areas should improve the public education of cadres and residents to actively participate in environmental protection.

### **Endnote:**

- 1 The information is from Environmental and Ecological Net  
<http://www.eedu.org.cn/Article/es/envir/ptheory/water/200504/4568.html>, accessed on 2011-09-21
- 2 Su, Y. 2006, *China's rural pollution survey*,  
<http://theory.people.com.cn/GB/40557/49139/49143/4039594.html>, accessed on 2011-07-10
- 3 The information is from Homepage of Hua Chemical Group, <http://www.hua-chem.com/product/hgindex.htm>, accessed on 2011-06-02
- 4 Water Pollution Prevention Law, Article 35
- 5 Water Pollution Prevention Law, Article 36

## References:

Deng H.B, Zhang, Y., 2005, *Population, Resources and Environmental Economics*, Science Press, Beijing

Dexter Roberts, *the greening of China*, Business Week (Oct.27, 2003):53).

Eric Zusman & Jennifer L. Turner, 2004, *Beyond the Bureaucracy*, An East Gate Book, New York

Etienne, M., 2001, Yan, W.M. translate, *Water- the immediate crisis*, Shanghai Translation Publishing House, Shanghai

Jin, L. Sh., 1997, the international and urban-rural transfer of environmental pollution, *China Environmental Science*, 17 (4):335-339)

Meng, X., & Ma, F, Sh., 2002, *Groundwater Resources and Environment in China*, Earthquake Press, Beijing

Richard ,J.F &Zhang, H.J, 2003, *Reaching Out to the Rule of Law: China's Continuing Efforts to Develop an Effective Environmental Law Regime* Willian and Mary Bill of Rights Journal 11(February 2003):569-602

Wang, Y., 2002, *to build a sustainable city: 2002 urban environmental management and sustainable development*, China Environmental News. Beijing

Wang, Q., et al, 2001, *urban environmental issues*, Guiyang Science and Technology Press, Guiyang

Zhang, ZQ et al, 2007, *thinking of laws on rural industrial wastewater pollution control*, *Journal of Anhui Agricultural Science*, 35 (3)

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