Problems and Solutions of Waste Treatment in Urban and Rural Communities: Anhui as an Example

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Foreword: "Waste-filled cities" and "waste-filled villages" has become a phenomenon as China's economic performance excels. Compared with important cities such as Beijing and Guangzhou, cities in Auhui and Jiangxi provinces, in the middle-lower course of Yangtze River, the waste-problem has not been addressed well enough. The hygienic level of waste treatment in these cities are still in transition: unmonitored dumping fields, sanitary landfill sites and waste incineration plants all exist at the same time, but they are poorly managed and waste sorting is not properly carried out. Hazardous byproducts, such as dioxin (a type of carcinogens) and the greenhouse gases from waste incineration are not seriously treated. Waste produced in the rural areas consists of a large amount of industrial waste from the cities. Some rural areas are filled with chemical factories and they cause organic pollution and living pollution. The decline of soil fertility, soil and underground water pollution lead to damages of ecosystem and is threatening the health of communities. However, the urban environmental and hygienic system does not take up the waste-problem in the rural areas as its responsibility. Straw-burning, commonly exists in the middlepart of China, is also posing threat to the atmosphere and the health of the locals. More importantly, these provinces are less developed and the residents share a lowerawareness of environmental protection and climate change. Bureaucracy also makes activities against climate change and persistent organic pollutants (POPs) in the rural area difficult.

Between late October and early December 2009, with the support of China Waste Information Network, Wuhu Ecology Centre made a study on the situation of waste treatment in 8 cities of Anhui Province. The findings are divided into two parts, on rural and on urban areas.

I. Waste problem in the cities

1. Un-standardized and low efficiency of waste treatment

The finding shows that municipality-level cities in Anhui have a daily waste of 600 to 800 tons, while the capital Hefei produces 1100 to 1200 tons of waste per day, mostly kitchen waste and plastics, which are matching to the capacity of the landfill sites. More developed cities, such as the capital Hefei and those in the southern parts are more standardized in waste processing, cities such as Huangshan, Chaohu and Luan, have reached the "first rate landfill site" standard of China. In the less developed cities of the northern part, such as Huainan and Fuyang, dumping field and landfill mainstream. sites with very simple treatment procedure are the



Photo 1 Design of a landfill site for domestic waste, Huangshan City

The efficiency of landfill sites and incineration plants is low. Waste sorting has been carried out unprofessionally (e.g. sorting the waste by size, instead of by nature). Due to the wrong sorting methods, the incineration plants need a lot of energy (coal) for burning, which causes further pollution. Garbage pickers, who live on collecting rubbish, would also unsort the sorted and packed garbage again, making the processing more difficult. In one extreme case, in Chaohu landfill site, a landfill site which has passed "the national first rate of landfill site test", some 500 goats are left there for "free-ranging", while some villagers come to collect kitchen waste to feed their pigs.



Photo 2 more than 100 goats are searching for food on landfill site

Thirdly, the treatment of discharge from waste processing is not up to the national standard. The processing system of refuse landfill leachate is still using the standard from the time of 2003 severe acute respiratory syndrome, instead of the new standard

of 2008. The leachate has been polluting the agricultural fields in the neighborhood and underground water. In the northern part of the province, the leachate has been directly discharged into the rivers. The only operating incineration plant in Anhui fails to produce convincing figures to prove it efficiency as well. Dust of severalcentimeter thick has been found outside the plant. Large consumption of coal, the debates of desulphurization technology and fiber filter are also the questions, to challenge the operation of the plant.



Photo 3: Bangbu's landfill site has to compensate 6.8 million Yuan for polluting the agricultural field of its leachate leakage

Fourthly, rubbish sorting and collecting bins in the cities are not properly used. The landfill sites in the cities are operating loosely, the technology of leachate processing has been outdated and the COD index in waste water disposal fails to reach the new environmental standard.

2. Environmental policies not reaching the grassroots level

The current landfill and incineration standards are set up by the foreign-educated experts, who have limited understanding of the grassroots communities. Therefore to implement their standards at the grassroots level is rather costly and not efficient. China's garbage contents are different from overseas and heating value of the Chinese waste is lower, its incineration could not reach the foreign standard. Without detailed guidelines, the waste treatment has been operating far from the principals.

3. Policy makers have no insight on incineration

Wuhu has the only one garbage incineration power plant of the whole province, with technology from Zhejiang University (or maybe from Japan). The province does have potential to develop in this direction, such as there is plan to build more in Hefei city two years later and other cities would like to follow. However, the investment involved is enormous and debates are taking place among the officials of the

environmental protection bureaus. The debates among the environmental protection departments are more on how to bring in foreign technology, instead of discussing the potential damages on environment and human health caused by the plants, as most of the officials are not knowledgeable about this aspect. As our research shown, the environmental departments have no workable guidelines on dioxin discharge from incineration power plants and it is a dangerous trend, as by 2010, 18% of the waste is expected to be processed through incineration throughout China. From our observations, using BOT methods in building incineration plants would take the lead and between 2008 and 2015, it would reach the peak. Dioxin, furan and other POPs would be released in enormous amount. Together with the coal and diesel used on burning and low level of desulphurization, would deepen the problems of climate change. Dioxin, produced from the incineration, is a carcinogen which is highly toxic to the reproduction, immune and endocrine systems. Its toxicity is 1000 times of potassium cyanide and is categorized as the highest rate of carcinogen by the International Agency for Research on Cancer. "Dixion is very toxic and difficult to get degradable. Its half-life is between 14 and 273 years and it accumulates in one's body. Even you set a very low standard, it is still a carcinogen and we have to be extremely careful." said Zhao Zhangyuan, an expert from the Chinese Research Academy of Environmental Sciences.

4. Public's weak awareness of waste hazards, poor civil education

The middle and high income groups might have better understanding of the health hazards related to waste incineration, while the lower income group are not aware of it. The waste treatment is normally not monitored by the public. The government department also told us that civil education in this aspect is very limited and its main focus is on reducing the volume of waste, instead of understanding the harms of improper treatment of the waste. Therefore the civil education is at the superficial level.

II. Waste problem in the rural areas

1. No regulation on waste treatment and pollution

As industrialization reaching the rural areas, waste has also become a serious problem and can be seen everywhere, from plastic bags, broken electronic devices to pesticide bottles, most of them are not degradable. They could still have effect on the ecosystem for more than hundred years. POPs are serious threat to the ecosystem and through the food chain, would harm the health of the residents eventually. In the rural area, incineration is the most commonly used method to treat waste and therefore, POPs, carbon dioxide and dust are emitted, causing air and also land pollution.

2. Not covered by the urban environmental and hygienic system

The waste produced in the rural area, if not too far from the cities, might be collected and sent to the cities' landfill sites. But for remote areas, they are usually ignored. In some cities, such as Wuhu, the city's landfill site and incineration plant have very limited capacity and could not handle the domestic waste from the surrounding

counties.

If we say that the environmental education in the cities is superficial, then it does simply not exist in the rural areas. For example, villagers are still eating poisonous cucumbers and tomatoes, which grow on a sealed landfill site in Datong district of Huainan city.

3. Industrialization invading ecosystem in rural areas

Township enterprises and industrialization has threatened the ecosystem in the rural areas. Industrial waste, lack of supervision on POPs and heavy metals discharge will cause a decline on soil fertility, polluting the corps and underground water. Lead, mercury and other heavy metals are discharged into the sewage; acid gases are emitted from chemical factories.

Plastic bags and products are the main domestic waste in the rural areas. It is common knowledge that a plastic bag takes at least 50 years or even 100 years to be degraded in soil, yet, plastic garbage is found everywhere in the villages, some enterprises from the cities are even dumping this type of waste intentionally in the rural areas.

4. Little attention paid for waste treatment

Some years ago, there was a project of composting with marsh gas in villages along the Yangtze River in Anhui. However the project ends in vain as, first, the soil fertility from this project was not good enough for the farmers to make use of it, and second the cost was unaffordable for villagers. The project also ignored two important facts, first, the real threat comes from the POPs, generated from industrialization, instead of the organic waste which the villages can easily deal with. Secondly, the low level of economic development in rural areas, without extra funding, this kind of project cannot be self-sufficient.

Till now, the pollution of rural areas is not well addressed and it would eventually harm the humans. Rural area, as the provider of the cities' consumption, its health is inevitably linked with the well being of the cities.

It is important to provide solutions in accordance with the needs. As the economic development between urban and rural areas is different, the wastes they produce are as well different and should not be treated by the same method. We should come up with different and workable approaches.

For cities, we should make assessment of the current waste treatment and provide additional solutions, based on the reality, instead of providing too radical viewpoint or too out-dated knowledge.

Waste treatment in the cities needs the government, the residents and all sides' joint participation. The cancellation of Panyu Waste Incineration Plant and re-location has

been an excellent example of their interaction. Such an incident has led to a massive campaign against waste incineration in China, while on the other hand, garbage sorting has become a new trend. However, garbage sorting involves many steps and it needs the government, as well as the public's joint effort.

Under the current environmental and hygienic system in the city, garbage collection should start from the household and the government should offer workable garbage sorting standard, to make waste processing with clear rules to follow.

Here are some recommendations:

- 1. Environmental department should launch more civil education, to bring garbage sorting policy into communities and families. At the same time, rewards should be provided, as an incentive.
- 2. After the sorting, the further processing should be properly carried out, to reduce the resources and costs wasted on poor management.

The change would take time, as it does not only change the way waste being treated, but also affect the interest of different players.

The domestic rubbish in the rural areas is in small volume and mostly inorganic. Community-based processing should be more practical and here is a model for reference.

First, eco-toilets should be built, to improve the hygienic condition in the rural communities. The human and animal excrements can be collected to a central marsh gas pool for fermentation. The fertilizer could then be used and sold for fields and gardens. Rubbish collection points should also be built, in which metals, paper, plastic, cans, batteries and etc. to be sorted and handled by their nature. Residents should be encouraged to use cloth-bags for shopping, in order to reduce or stop the production of more plastic bags. For plastic which cannot be recycled, it can be made into tiles for road construction.

Waste treatment affects our next generations and it has a long term impact. While the rural and urban areas have different pace of development, the waste treatment would be different. Yet, waste sorting would be the common ground.