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[Field Research]

## Research on the Environmental Issues in China's Sustainable Economic Development

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### Abstract

**Purpose** – During the past twenty years, China has developed rapidly in economy. Meanwhile China's economic development has brought great many problems. Sustainable development is to achieve coordination in the ecological, economic and social aspects. Among them, the environment and resource issues are the most critical issues which affecting sustainable development in China. With China's rapid economic development, China's ecological environment is facing the most serious threat in water pollution, air pollution, solid waste pollution and the destruction of forests and biodiversity, resulting in a significant loss of the national economy. This research aims to examine whether the tragedy of the commons has hindered the sustainable development of China's economy or not. On the other hand, we try to analyze a solution to improve this situation.

**Research design, data, and methodology** – Theoretical background study, finding optimization models, and data analysis.

**Results** – In the case of a clear definition of property rights, the air will have a market price. The market price will coordinate pollutant emissions.

**Conclusions** – The tragedy of commons has hindered the sustainable development. The model of China's Economic development should be changed.

**Keywords:** Chinese Economic Sustainability, Environmental Pollution, Sustainable Development.

**JEL Classifications:** A13, C22, K42, O47, Q51.

### 1. Situation Analysis of China's Environmental Problems

Sustainable development is to achieve coordination in the ecological, economic and social aspects. Among them, the envi-

ronment and resource issues are the most critical issues which affecting sustainable development in China. If the economic and social development exceeded the capacity of the ecosystem, the consequences are dire. With China's rapid economic development, China's ecological environment is facing the most serious threat in water pollution, air pollution, solid waste pollution and the destruction of forests and biodiversity, resulting in a significant loss of the national economy.

#### 1.1. Environmental Costs

During the past twenty years, China has developed rapidly in economy. The GDP of China in 1990 was 356.937 billion dollars, while it reached 8.23 trillion U.S. dollars in 2012. Meanwhile China's economic development has brought great many problems. Such as environmental pollution, water pollution, fog and haze is getting worse recently.

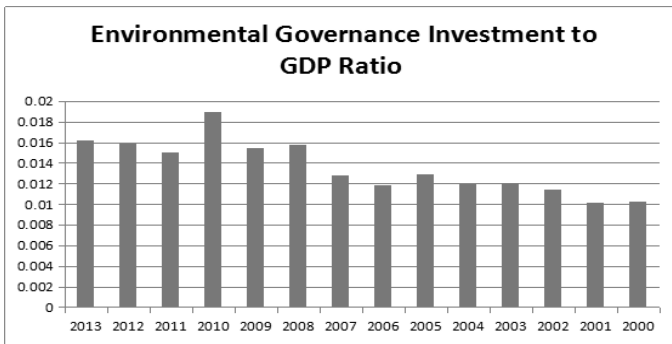
GDP from 2000 to 2013 was shown in the following <Table 1>. Total investment in environmental pollution control showed growth trend year after year as GDP. And environmental governance investment ratio of GDP reached the peak in 2010. In the other hand, we can see that in 2012 the total investment in environmental governance is over eight times as in 2000. Every year the government increased investment in environmental pollution control.

From the perspective of sustainable economic development analysis, environmental costs can be thought as the cost of environmental downgrade. It means a consideration of the decline in environmental services quality. There are two parts in environmental costs: the cost of environmental protection expenditures and the cost of environmental degradation. Environmental expenditures are costs to protect the environment and actually paid. Environmental degradation costs represent the value and cost of protecting the environment should pay for pollution damage. Environmental costs equivalent to the natural environment "depreciation of fixed assets." Popular to say, the environmental cost is ahead of consumption about the health and future generations' well-being.

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<Table 1> China's GDP and Total Investment in Environmental Pollution Control from 2000 to 2013

Years	GDP (100 million yuan)	Environmental Pollution Control (100 million yuan)	Ratio
2013	588018.8	9516.50	0.016184
2012	519470.1	8253.46	0.015888
2011	473104.05	7114.03	0.015037
2010	401512.8	7612.19	0.018959
2009	340902.81	5258.39	0.015425
2008	314045.43	4937.03	0.015721
2007	265810.31	3387.3	0.012743
2006	216314.43	2566	0.011862
2005	184937.37	2388	0.012912
2004	159878.34	1909.8	0.011945
2003	135822.76	1627.7	0.011984
2002	120332.69	1367.2	0.011362
2001	109655.17	1106.7	0.010093
2000	99214.55	1014.9	0.010229



<Figure 1> Environmental Governance Investment to GDP Ratio

1.2. Haze Problem: Typical Case of "Tragedy of the Commons"

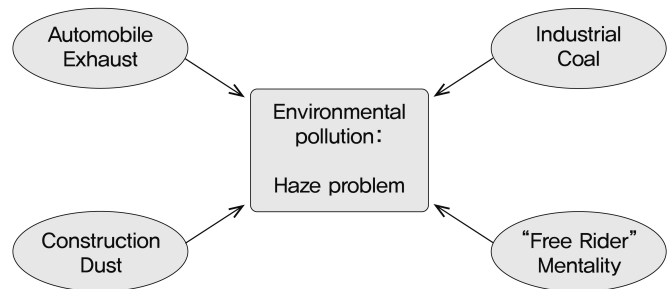
National Development and Reform Commission announced that since the beginning of 2013, fog and haze has covered nearly a quarter of China's land. During 2013, the losses caused by the haze have been over trillion yuan. About the causes of haze, there is no certain public statement. China's overcapacity, industrial structure and single energy structure have caused serious pollution to the atmospheric environment. Specifically, construction dust and pollutants generated by coal-fired atmospheric environment has caused tremendous pollution. If everyone does not think the haze caused by exhaust emission of their own cars, this will be the typical model "free riders." This kind of individual's rational behavior brings collective irrational.

In the specific pollution process, the benefits are real and obvious for all polluters. In the other hand, individual manufacturing pollution is scattered. For the individual, the part of the pol-

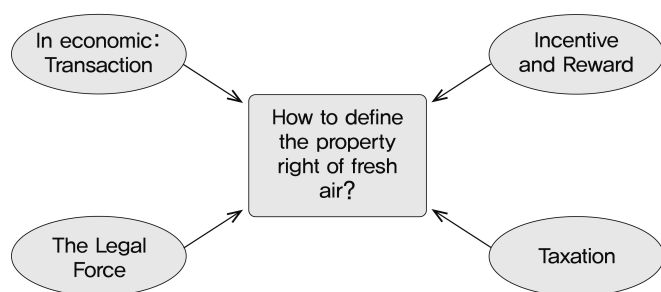
lution they made is only small part of the contamination they subjected. For example, a person drives a car. Then he enjoys the benefits of driving a car and discharge pollution. When many people act like this, if one person stops driving, he would immediately lose the benefits of driving, but it was hardly to change the pollution he subjected. So no one will drive less. However, when everyone choose to drive, the pollution they suffered even greater than the benefits of driving. In short, at this time, the social cost will be jointly shared by everyone. But they also will be stuck in the trap of tragedy of the commons. Only one thing they can do is appeal.

From an economic point of view, the haze problem is a problem of property rights. It does not defined property rights clearly. Haze problem can be understood as following. Your right for breathing fresh air is violated by others. But the problem is that this right does not be defined at the beginning. Why? Because people generally have such a concept that is the air is taken for granted as "public goods". People are reluctant to even do not think the "air" should be defined property rights. Also, affected by this concept the government will stop people to establish private property rights in this area. If there is no clear definition of property rights, the environment as "public goods", then the emission levels of pollutants will far exceed clearly defined in the property as determined by the level. Precisely, it is beyond the boundaries of the people to bear. So that the legitimate rights of the people have been widespread violations. If clearly defined property rights, sewage can be solved as long as people earned this right through transactions. But if he withheld the information of pollutant emissions, then it undermines the legitimate interests of the other, constituting a crime.

Therefore, in the case of a clear definition of property rights, the air will have a market price. The market price will coordinate pollutant emissions. The companies which reduced emissions can be rewarded by selling their emission rights. On the contrary, the companies which increased emissions will bear the additional costs or even be punished by law. Therefore, to solve the haze problem, we must first determine who infringe the rights of whom. In fact there is no environmental problem, only economic and legal issues.



<Figure 2> The Causes of Haze Problem



<Figure 3> The Way to Define the Property Right of Fresh Air

## 2. Conclusions & Solutions

The solution of Haze Problem and "Tragedy of the Commons" is government intervention regulation: making resources private, or according to the degree of harm caused by pollution represent a tax on polluters, to cover the cost of increased private polluters, making the private costs equal to social costs.

In modern technology, the sewage treatment is measurable. From this perspective, the air becomes a kind of "common-pool resources."

Nobel Prize winner in economics, American economist Elinor Ostrom presented eight design principles of management and distribution system on "common-pool resources". Two of design principles for contemporary China haze problem are very instructive. One is the arrangements of collective choice. The majority of individuals affected by the operational rules should be able to take part in changing the operating rules. Another one is oversight. Overseer of "common-pool resources" who checks the status and occupant behavior actively is either the person responsible for the occupants or the occupant themselves.

Haze problem is a warning to the sustainable development of China's economic. Environmental cost will rise in the future. For

example, highways, airports always will be temporarily closed due to insufficient visibility. Nice new car can only put in the garage to watch, a significant increase in the probability of accidents, the number of tuberculosis patients will be more and more, companies have to be discontinued pending the air better. People with economic ability will immigrate to the area with fresh air. This economic model is unsustainable. The tragedy of commons has hindered the sustainable development. The model of China's Economic development should be changed.

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