

Has the construction of industrial pollution treatment improved the status of environmental pollution in China?

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Abstract. In recent years, China's economy has developed rapidly and the people's material living standards have continued to improve, but environmental problems have gradually become apparent, which seriously threatens people's daily lives and production. Therefore, the state is actively constructing industrial pollution control projects, hoping to improve China's environmental pollution status and achieve green development. Based on data from 31 provinces in China in 2017, this paper finds that the construction of wastewater treatment projects significantly reduces wastewater discharge and has a significant effect on improving water pollution; while the construction of waste gas treatment projects does not significantly improve the status of air pollution. Further research found that coal Consumption has significantly increased the level of air pollution and weakened the role of waste gas treatment projects. At the same time, investment in technological innovation has significantly improved the state of environmental pollution.

1 Introduction

Since the 40 years of reform and opening up, China's economy has developed rapidly, but environmental pollution has become increasingly prominent. Environmental pollution refers to the phenomenon that human beings directly or indirectly discharge substances or energy exceeding their self-purification ability to the environment, leading to a reduction in environmental quality and adversely affecting human survival and development. Including: water pollution, air pollution, noise pollution, etc. With the acceleration of industrialization and urbanization, great progress has been made in urban economy, culture and technology. But at the same time, a series of urban environmental problems have arisen due to infrastructure shortages and poor environmental management. Among them, the most important are water pollution and air pollution. For example, turbid river water reminds the seriousness of water pollution problems, and large-scale haze weather warns of the seriousness of air pollution problems. On the one hand, water is the source of life and plays a pivotal role in the development of human society. With the acceleration of the urbanization process and the continuous development of the national economy, a large amount of industrial wastewater and urban sewage emissions are increasingly flooding, water pollution is serious, and people's healthy lives are not guaranteed; on the other hand, the air environment is also necessary for life. In human daily production and life, a large amount of exhaust gas will be generated. For example, during cooking, combustion materials generate smoke,

automobile exhaust, and exhaust emissions from industrial processes. Exhaust gases emitted into the air can pollute the atmosphere, cause a greenhouse effect, damage the ozone layer, and worsen the human living environment. Therefore, relevant departments must take timely action to control water pollution and air pollution, and purify human production [1].

The increase of suspended particles and sulfur compounds, and the large amount of wastewater discharged, have led to the deterioration of environmental quality, which seriously threatens people's daily life and production. In recent years, scholars have carried out extensive discussions on this. Wang Qi et al. (2012) used the super-efficiency DEA model to study the air pollution control efficiency of various provinces in China from 2004 to 2009 [2]. Guo Shihong et al. (2017) used the super-efficiency DEA model to measure the air pollution treatment efficiency of China's provincial-level administrative regions, and empirically analyzed the effect of air pollution treatment efficiency on the improvement of the atmospheric environment through a simultaneous equation model [3]. Li Nature (2019) analyzed the current status, causes and treatment of water pollution in China [4]. Therefore, the state is actively constructing industrial pollution control projects, hoping to improve China's environmental pollution status and achieve green development. For example, in Beijing, the completion scale of waste gas treatment projects increased from 25.78 million yuan in 2009 to 78.542 million yuan in 2017, which has more than doubled. The completion scale of wastewater treatment projects also increased from 12.05 million yuan in 2009 to 15.65

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million yuan in 2017, an increase of nearly 30%. China has invested a lot in environmental governance, which fully reflects China's emphasis on environmental issues and slowly abandoned the model of economic development at the expense of the environment. So can industrial pollution control construction projects significantly improve the status of environmental pollution? This article delves into this. Based on the 2017 data from 31 provinces in China, a regression model is used to analyze the improvement of industrial pollution treatment and construction on China's current environmental pollution.

2 Model construction

In this paper, 31 provinces (regions) in the country are research samples to study the impact of industrial pollution control construction on the status of environmental pollution. Environmental pollution mainly considers water pollution and air pollution, mainly because water and air are indispensable material conditions for human survival. The degree of water pollution is measured by the total amount of wastewater discharged. The degree of air pollution is measured by the emissions of sulfur dioxide, nitrogen oxides, and soot and dust. The construction of wastewater treatment and waste gas projects is measured by the amount of investment in the construction of wastewater treatment and waste gas projects. In addition, air pollution is inseparable from coal consumption, and the improvement of environmental pollution is also significantly related to investment in technological innovation. Therefore, the explanatory variables in this paper are the degree of water pollution and air pollution. The explanatory variables are the construction of wastewater treatment projects and the construction of waste gas projects. The factors that cause environmental pollution are controlled variables such as investment in technological innovation, urbanization rate, economic development level, Degree of opening to the outside world, coal consumption, etc. Establish the following measurement model.

$$water_{it} = \alpha_1 + \beta_1 water_{tre_{it}} + \beta_2 z_{it} + \varepsilon_{it} \quad (1)$$

$$air_{it} = \alpha_1 + \beta_1 air_{tre_{it}} + \beta_2 z_{it} + \varepsilon_{it} \quad (2)$$

3 Data source and indicators

The data are mainly from the National Bureau of Statistics, and the data of 31 provinces (regions) in the country in 2017 are the research objects. Since the 2017 data for coal consumption was not found, the data for the previous five years were used to make a linear prediction, and the data for 2017 were obtained.

Environmental pollution level (water, air): Select the total waste water discharge (water) to represent the water pollution level, and select the representative sulfur dioxide pollutants (air1), nitrogen oxides (air2), and dust (air3) as the measurement of air pollution Of the main indicators. Water and air resources are part of our survival and can be used to measure the degree of environmental pollution.

Industrial pollution treatment and construction (watertre, airtre): The amount of investment selected to complete the construction of wastewater treatment projects (watertre) represents the level of construction of wastewater treatment projects, and the amount of investment to complete the construction of wastewater treatment projects (airtre) represents the construction level of wastewater treatment projects.

Economic development level (econ): Choose industrial added value to measure.

Degree of opening to the outside world (exp): The total amount of imports and exports at the location of the business unit is selected for measurement.

Scientific and Technological Innovation Input (rd): Select the R & D funding input of industrial enterprises above designated size as an indicator of scientific and technological innovation input. The higher the investment in scientific and technological innovation, the higher the level of regional science and technology, and the more significant the effect on environmental improvement.

Urbanization rate (city): The ratio of the urban population to the total population is used as an indicator of the urbanization rate.

Coal: Choose coal consumption to measure. The more coal is consumed, the more serious the air pollution becomes.

Table 1 shows descriptive statistics for each variable.

Table 1. Descriptive statistics.

	Min	Max	Mean	Std.
airtre	40.00	813429.00	143955.74	159962.54
watertre	280.00	105626.00	24637.39	28491.37
water	7175.6	882020.48	225697.10	185112.23
air1	3462.8	739121.42	282386.31	195829.61
air2	30153	1158620.8	406074.96	278431.67
air3	6570.0	803689.19	256859.44	185797.22
econ	102.16	35291.83	9731.27	9102.95
exp	65575 1.	100667837 4.	132489170. 06	219697147. 26
rd	3186.0	18650313.	3875148.1	5059757.5
city	0.31	0.88	0.59	0.12
coal	498.07	41265.63	14041.25	10944.32

As can be seen from Table 1, the standard deviation of most of the variables is large, indicating a large degree of dispersion, indicating that the differences between different cities are large. Therefore, the data needs to be standardized before being analyzed.

4 Results and analysis

The benchmark model (1) is returned to explore the impact of wastewater treatment project construction levels on water pollution. It was found that, overall, the regression coefficient of the equation was significant at the levels of 1% and 5%, and the regression results were better, as shown in Table 2.

Table 2. Table 2 Impact of construction level of wastewater treatment projects on water pollution.

VARIABLES	(1) water	(2) water	(3) water
watrtre	-0.5303*** (0.157)	-0.1087** (0.064)	-0.0495** (0.069)
econ		0.8285*** (0.087)	1.1653*** (0.200)
exp		0.2862*** (0.092)	0.4070*** (0.110)
city		-0.0981 (0.063)	-0.1053* (0.060)
rd			-0.4815* (0.259)
Constant	-0.0000 (0.155)	-0.0000 (0.048)	-0.0000 (0.046)
Observations	31	31	31
R-squared	0.281	0.939	0.946

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

As can be seen from Table 2, when no control variable is added to column (1), the construction coefficient of the wastewater treatment project is significantly negative, that is, the construction level of the wastewater treatment project has significantly reduced the level of water pollution. Related control variables are added to column (2), The result is still significantly negative, indicating that the same conclusion can be reached. Column (3) includes the input variable of scientific and technological innovation, and the results are consistent, and the coefficient of technological innovation level is significantly negative, indicating that an increase in the level of technological innovation can significantly improve water pollution.

The benchmark model (2) returns to explore the impact of the construction level of the waste gas treatment project on air pollution. The results are shown in Table 3.

Table 3. Impact of construction level of waste gas treatment projects on air pollution.

VARIABLES	(1) air1	(2) air2	(3) air3
airtre	-0.0434 (0.224)	-0.0920 (0.169)	-0.2991 (0.253)
econ	-0.3591 (0.465)	0.8485** (0.351)	0.1221 (0.525)
exp	0.0365 (0.272)	0.0223 (0.205)	-0.0183 (0.307)
rd	0.3453 (0.556)	-0.3501 (0.419)	-0.1220 (0.627)
city	-0.3812** (0.160)	-0.1001 (0.121)	-0.0591 (0.181)
coal	0.7999*** (0.197)	0.4390*** (0.149)	1.0062*** (0.222)
Constant	0.0816 (0.103)	0.0286 (0.078)	0.0577 (0.116)
Observations	30	30	30
R-squared	0.743	0.855	0.675

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

5 Conclusions and countermeasures

The discharge of waste water and exhaust gas has led to the deterioration of environmental quality, which seriously threatens people's daily life and production. The research results in this paper show that the construction of wastewater treatment projects significantly reduces wastewater discharge and has a significant effect on improving water pollution; the construction of waste gas treatment projects cannot significantly improve the status of air pollution, that is, it cannot lead to emissions of sulfur dioxide, nitrogen oxides, smoke and dust. Further reductions in quantity were found, and coal consumption significantly increased air pollution and weakened the role of waste gas treatment projects. At the same time, investment in technological innovation has significantly improved the state of environmental pollution. Therefore, while developing, China needs to strengthen the construction of wastewater treatment projects, control coal consumption, increase investment in scientific and technological innovation, and ensure stable and sustainable economic development.

For the sustainable development of the environment, we can start from the following aspects: (1) Improve relevant laws and regulations, and implement publicity and rectification measures in place. At present, the relevant departments of pollution control are not enough to rectify, and the public's awareness of protecting the environment is relatively weak. Therefore, relevant departments must strictly divide the areas according to the level, set warning signs to strengthen the warning work, and set up special team members to conduct random inspections. While applying environmental protection to market planning, improve laws and

regulations governing the environment, and implement strict system management, the propaganda and rectification measures have been put in place, and the goal of treating both the symptoms and the symptoms has been basically achieved. (2) Strengthen the construction of wastewater treatment and waste gas projects, increase investment in scientific and technological innovation, strictly control coal consumption, and control emissions from pollution sources.

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