

Differences and Influences of Air Pollution Prevention and Control Laws between China and the United States

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Keywords: Air Pollution Prevention and Control Law, Sino-US legal comparison, Legislative differences, Environmental governance practice

Abstract: Air pollution caused by industrial development not only leads to environmental degradation such as ozone layer depletion and accumulation of photochemical smog, but also has been proven to be an important inducement for respiratory diseases like bronchitis and pneumonia. With the deepening of research on the connection between environmental pollution and public health, countries around the world have accelerated the legislative process of emission control, and environmental governance has entered a new stage of legalization. This paper takes the air pollution prevention and control laws of China and the United States as the research objects, and provides a cross-national reference perspective for improving the environmental legal system by sorting out the legislative background, analyzing the core differences, and discussing the actual impacts.

1. Introduction

Air pollution, as a global environmental challenge, its governance effect is directly related to public health and social sustainable development. The World Health Organization (WHO) began to pay attention to the damage of air pollution to human health in its technical report released in 1958[1]. Due to the particularity of historical background, social structure and environmental problems, different countries have formed distinct legal systems for air pollution prevention and control. The Clean Air Act of the United States and the Air Pollution Prevention and Control Law of China, as the core laws for environmental governance in the two countries, respectively reflect the institutional design under different governance concepts. This paper focuses on these two laws. Firstly, it traces their legislative background to reveal the realistic motivation and core concepts of law - making; Secondly, it deeply analyzes the differences from multiple dimensions, including the mechanism design of expert participation in standard formulation, the differences in channels for public participation in environmental supervision, the centralization and decentralization of environmental management systems, the focus of legal control over pollutants, and the intensity and scope of legal liability investigation; Finally, combined with practical effects, it discusses the specific impact of these differences on environmental governance in the two countries, in order to provide ideas for understanding the advantages and disadvantages of different legal paths and promoting the improvement of environmental laws.

2. Legislative Background and Core Concepts

The ambient air quality standards and corresponding index systems reflect the national air quality protection policies and requirements, which are important scales to measure whether the environment is polluted, and also the basis for atmospheric environmental planning, environmental management and the formulation of pollutant discharge standards[2]. The birth of laws often stems from the urgent need to solve practical problems, and the promulgation of air pollution prevention and control laws in China and the United States is no exception.

2.1 Legislative Motivation of the U.S. Clean Air Act

At the end of the 20th century, urban and industrial centers in the United States suffered from a serious air pollution crisis, and high - concentration smog became the norm. Take Los Angeles as an example, there was a situation where "residents had difficulty breathing, tears flowed, the air was filled with a stench and the smell of bleach, and the end of the street was indistinct"[3]. The severe pollution situation promoted the upsurge of the national environmental protection movement. The Clean Air Act came into being in 1970, whose main management object is air pollutants, and its legislative purpose is to prevent and control air pollution[4]. It was revised twice in 1977 and 1990 according to new environmental problems. In the 1990 revision, provisions for dealing with cross - border air pollution problems such as acid rain and ozone layer depletion were added, strengthening the sense of responsibility in global environmental governance. The core objectives of the law include: protecting the quality of national air resources to improve public health and labor capacity; promoting national research on air pollution prevention and control; providing technical and financial support for local governments; encouraging the formulation and implementation of regional prevention and control plans. The U.S. Environmental Protection Agency (EPA) formulated the National Ambient Air Quality Standards accordingly, set up a scientific review committee to be responsible for standard revision, and launched a number of supporting measures, such as tax relief policies for clean energy technology research and development, and finally achieved the simultaneous promotion of economic growth and air quality improvement.

2.2 Legislative Purpose of China's Air Pollution Prevention and Control Law

China's Air Pollution Prevention and Control Law was enacted in 1987, later than that of the United States. Its background is the increasing environmental pressure brought by the rapid industrial development after the reform and opening - up. With the continuous growth of the economy, regional and compound air pollution problems have emerged in some areas, such as frequent smog weather in the Beijing - Tianjin - Hebei region and its surrounding areas. The core purpose of the law is clearly defined as "protecting and improving the environment, preventing and controlling air pollution, safeguarding public health, promoting ecological civilization, and promoting sustainable economic and social development", emphasizing the balance between environmental protection and economic growth. The law has been revised many times. In 2015, the revision added contents such as joint prevention and control in key regions and response to heavy pollution weather, further improving the governance system. It is managed by the Ministry of Ecology and Environment, and implemented by local governments at different levels. By clarifying the responsibilities of all levels and the monitoring system, remarkable results have been achieved in practice. For example, the "Blue Sky Defense War" special action implemented in the Beijing - Tianjin - Hebei region and its surrounding areas has effectively reduced the concentration of pollutants.

It should be noted that judging legal differences needs to be combined with the national governance system. For example, although the formulation subjects of pollutant discharge standards in China and

the United States belong to the EPA and the Ministry of Ecology and Environment respectively, they are both central government agencies and have the same nature; if there is a situation where "one party controls certain types of data while the other completely ignores them", it is a substantial difference.

3. Core Differences between China and the United States in Air Pollution Prevention and Control Laws

3.1 Expert Participation Mechanism in Standard Formulation and Revision

The U.S. Clean Air Act stipulates that when the EPA Administrator issues pollutant standards, he shall appoint an independent scientific review committee composed of 7 members, including at least 1 member of the National Academy of Sciences, 1 physician and 1 representative of the state air pollution control agency. The formulation of standards depends on the cross - support of experts from multiple fields. The committee has a high degree of independence, and its suggestions are not subject to administrative interference. In the process of standard revision, it will fully solicit public opinions to ensure the scientificity and fairness of the standards.

China's Ministry of Ecology and Environment entrusts the drafting of standards to professional environmental protection research institutions. For example, the Environmental Air Quality Standards (GB 3095 - 1996, GB 3095 - 2012) are jointly completed by the Chinese Research Academy of Environmental Sciences and the China National Environmental Monitoring Centre, with participants mainly being environmental scientists in fields such as atmospheric chemistry and environmental ecology. In the process of standard formulation, discussions will be organized with relevant industry experts and representatives of local environmental protection departments to widely absorb opinions from all parties, so that the standards not only conform to scientific laws but also can adapt to the actual situation of different regions.

3.2 Design of Channels for Public Participation in Environmental Supervision

American citizens enjoy extensive civil litigation rights. The Clean Air Act clearly stipulates that citizens can file lawsuits against "any act that violates the emission standards or restrictions of this Act". For example, in the 2021 case of "Utah Health and Environmental Physicists Organization v. Diesel Power Equipment Company", non - profit organizations accused enterprises of falsifying data through litigation, reflecting the public's direct supervision over illegal acts. In addition, citizens can also report complaints to the EPA, which will promptly handle and feedback the reported information and keep the informants confidential. At the same time, the U.S. environmental information disclosure system is relatively perfect, and the public can easily obtain various environmental monitoring data and enterprise pollution discharge information, which provides convenience for participating in environmental supervision.

China's public participation channels are relatively limited, and lawsuits can only be filed when one's own interests are damaged by pollution. Article 31 of the Air Pollution Prevention and Control Law stipulates that the competent department of ecology and environment shall publish reporting channels and protect informants from retaliation, but does not grant universal civil litigation rights. However, in recent years, China has made great progress in environmental information disclosure, and timely publishes air quality status, enterprise pollution discharge and other information through government websites and press conferences. At the same time, some localities have established an environmental public interest litigation system, allowing environmental protection organizations to file lawsuits on behalf of the public, making up for the lack of public direct litigation rights.

3.3 Degree of Centralization and Decentralization of Environmental Management System

The citizen litigation provisions of laws such as the U.S. Clean Air Act stipulate a "pre - litigation notice period" procedure. Its existence forces the plaintiff in a citizen lawsuit and the court to respect the primary jurisdiction of the local administrative organ that has jurisdiction over the alleged act[5]. That is to say, the U.S. Clean Air Act gives local governments greater autonomy, for example, allowing governors of each state to delimit "air quality control areas" in their states within the time limit specified by the EPA; at the same time, through the Tribal Authorization Rule, Indian tribes are authorized to formulate some implementation plans independently, which do not need to be enforced, reflecting respect for local differences. Local governments can formulate more targeted prevention and control measures according to local industrial structure, geographical environment and other characteristics. For example, California has formulated strict emission standards for automobile exhaust pollution.

China implements a centralized management system, where local governments (at the district, county and township levels) are responsible to the higher - level government and subject to the unified leadership of the State Council. Although governments at or above the county level are responsible for establishing monitoring systems, they must strictly follow the "total amount control target" formulated by the central government, and local autonomy is restricted by central coordination. This centralized management system is conducive to unified planning and coordination of air pollution prevention and control work nationwide. For example, policies such as "coal to gas" and "coal to electricity" implemented nationwide have effectively reduced coal - burning pollution. At the same time, the central government strengthens supervision over local governments through environmental protection inspections to ensure that various prevention and control measures are implemented.

3.4 Key Scope of Pollutants Regulated by Law

The U.S. Clean Air Act clearly regulates common pollutants including particulate matter, ozone, sulfur dioxide, nitrogen dioxide, carbon monoxide and lead, focusing on pollutants directly related to public health. With the deepening of scientific research, the United States has continuously expanded the scope of pollutant control, including some new pollutants such as volatile organic compounds into supervision, so as to better protect public health and the ecological environment.

China's Air Pollution Prevention and Control Law focuses on controlling particulate matter, sulfur dioxide, nitrogen oxides, volatile organic compounds, ammonia and greenhouse gases, with a greater emphasis on pollutants generated in industrial production, which is in line with the stage of economic development. In the process of rapid economic development, industrial emissions are one of the main sources of air pollution, so the control of these pollutants can effectively solve the current environmental problems. At the same time, China is also paying active attention to pollutants related to public health and constantly improving the monitoring and control system.

3.5 Intensity and Scope of Legal Liability Investigation

The U.S. Clean Air Act imposes severe penalties for illegal acts, including heavy fines, and criminal liability may be pursued for serious offenders. For example, if an enterprise intentionally violates emission standards, it may face fines of tens of thousands of dollars per day, and even the person in charge of the enterprise may be sentenced to imprisonment. At the same time, the scope of legal liability investigation is relatively wide, including not only pollutant - discharging enterprises but also dereliction of duty by regulatory authorities, ensuring that all parties can earnestly perform their duties.

China's Air Pollution Prevention and Control Law also stipulates corresponding legal liabilities,

including fines, orders to suspend production for rectification, etc. In recent years, China has continuously increased the penalties for environmental violations, increased the amount of fines, and pursued criminal liability for serious offenders in accordance with the law. However, compared with the United States, in terms of the scope of liability investigation, the accountability for dereliction of duty by regulatory authorities needs to be further strengthened to ensure effective supervision.

4. Practical Impact of Legal Differences

4.1 Impact of Expert Mechanism on Standard Applicability

The multi - disciplinary expert committee in the United States, which includes physicians, makes standard formulation more in line with public health needs and easily gains social recognition. For example, in formulating ozone standards, the participation of physicians can fully consider the impact of ozone on the human respiratory system, making the standards more scientific and practical, and has been widely supported by the public.

China is led by environmental scientists, who can integrate environmental protection experience from multiple fields and promote the efficient advancement of atmospheric protection. Environmental scientists have in - depth research on the causes and diffusion laws of air pollution, and can comprehensively consider various factors when formulating standards, making the standards highly operable. For example, when formulating particulate matter emission standards, it is fully combined with China's energy structure and industrial layout, effectively promoting the prevention and control of particulate matter pollution.

4.2 Impact of Public Participation on Law Enforcement

The civil litigation rights of the United States have increased the exposure rate and accountability of environmental cases, and enhanced the public's awareness of environmental management. A large number of environmental litigation cases have made enterprises dare not easily discharge pollutants illegally, and also prompted regulatory authorities to strengthen supervision. In the process of participating in litigation, the public has a deeper understanding of environmental laws and environmental protection knowledge, and their awareness of environmental management has been continuously improved.

China's reporting mechanism reduces the cost of public participation, which is in line with the national conditions where citizens are short of time and have high litigation costs, but may lead to departmental prevarication and inefficiency due to the lack of external supervision. However, with the continuous improvement of the environmental public interest litigation system, this situation is gradually improving. Environmental protection organizations supervise and hold accountable illegal acts by filing public interest litigation, supplementing the deficiency of government supervision.

4.3 Impact of Management System on Governance Efficiency

The autonomy of local governments in the United States enables them to formulate plans in combination with industrial characteristics. For example, Indian tribes, with the support of the EPA, control regional pollution sources and improve local air quality. Indian tribes have formulated pollution prevention and control measures suitable for their own tribes according to their living environment and industrial conditions, effectively solving local environmental problems.

China's centralized system ensures the implementation of central goals. From 2021 to 2025, the concentration of PM_{2.5} and nitrogen dioxide in 339 cities has significantly decreased, and the number of heavily polluted days has been greatly reduced, reflecting the advantage of efficient

implementation. Various prevention and control policies formulated by the central government can be implemented quickly and effectively nationwide, forming a strong governance synergy.

4.4 Impact of Regulatory Focus on Problem Solving

The control of health - related pollutants in the United States accurately responds to the threat of urban pollution to public welfare. Through strict control of pollutants such as particulate matter and ozone, urban air quality has been significantly improved, and the incidence of respiratory diseases among the public has decreased.

China's emphasis on industrial pollutants is in line with the legislative goal of "protecting the environment and promoting economic growth", and specifically solves the pollution problems in development. While effectively controlling industrial pollutant emissions, it ensures the normal operation of industrial production, achieving a win - win situation between environmental protection and economic development.

4.5 Impact of Legal Liability Investigation on Illegal Costs

The severe legal liability investigation in the United States has made the illegal costs of enterprises extremely high, effectively curbing the occurrence of environmental violations. In the process of production and operation, enterprises will take the initiative to take measures to reduce pollutant emissions to avoid severe penalties.

China's continuous increase in legal liability investigation has also had a certain deterrent effect on enterprises. However, due to the relatively narrow scope of liability investigation, some enterprises still have a fluke mentality, and illegal discharge of pollutants occurs from time to time. Therefore, it is necessary to further expand the scope of liability investigation and increase the cost of violations.

5. Conclusion

The differences between China and the United States in air pollution prevention and control laws are essentially adaptive systems formed by the two countries based on their national conditions such as the causes of environmental problems, social structure and governance models. U.S. laws are characterized by local autonomy and public participation, while Chinese laws are characterized by central coordination and efficient implementation. Both have achieved a balance between air pollution prevention and control and social development in their respective contexts, providing multiple path choices for global environmental governance. In future environmental governance, the two countries can learn from each other's experiences, constantly improve their own legal systems, and jointly respond to global air pollution challenges.

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