

# Overview and prospect of the history of air pollution control in the United States in the 20th century

Jie Wang

Guangxi Normal University, Guangxi, China

## ABSTRACT

Environmental history, as a comprehensive discipline method and research paradigm, started in the 1970s, and air pollution control is the most important field in environmental governance. After more than 50 years of relevant research and accumulation, scholars at home and abroad have achieved fruitful results in the history of air pollution control in the United States. In terms of the overall study of the history of air pollution in the United States, almost all the stages of American air control in the 20th century have been systematically studied by the academic community. In terms of case studies, cases such as the photochemical smog incident in Los Angeles and California's advanced air management in California have also been well studied. In terms of the research of relevant laws and precedents, important laws such as the "Clean Air Act" and important concepts such as "bubble" have been systematically studied, and various court cases have been sorted out and compiled. In terms of urban environmental history, the existence of social inequality in society has been valued. However, at the same time, there is room for further research in the air governance process of the United States between the 1940s and 1960s, the Donora smoke event, some detailed rules and standards in the "Clean Air Act", and further research efforts can be made to realize the innovation of transnational and even globalization.

## KEYWORDS

Overview of American air pollution control in the 20th century.

## 1. INTRODUCTION

In the 20th century, with the continuous advancement of industrialization, the air pollution problem caused by large industrial production also emerged. Los Angeles, New York, Pittsburgh and other places in the United States have been plagued by increasingly serious air pollution, and attracted wide public attention. Since the 1960s, with the rise of the civil environmental protection movement, the US government has also taken a series of measures and promulgated a series of policies and regulations, so as to control air pollution.

In the 1970s, environmental history began to rise as a comprehensive disciplinary method and research paradigm, studying the evolution of the relationship between human and the environment by focusing on the historical process of the interaction between human and the environment. Historians at home and abroad also began to examine the process of air pollution control in the United States from the perspective of environmental history. This paper will be comprehensive research at home and abroad, for the study of the air pollution control system comb, summarizes the existing important research results, to comprehensively introduce and evaluate the process and effectiveness of the air pollution control, at the same time critically examine the shortcomings of the existing research, in order to explore the future of the air pollution history research academic approach.

## 2. THE GENERAL DISCUSSION ON THE PROCESS OF AMERICAN AIR GOVERNANCE IN THE 20TH CENTURY

The study of the environmental history in the United States started relatively late in the 1990s. Throughout the 20th century, the research on air pollution in the United States is only scattered in some monographs and papers, and the research results are relatively lacking. Most of them are a simple introduction of the air control measures and policies in the United States, without the in-depth discussion of its governance mechanism. In the 21st century, due to the increasingly prominent domestic air pollution problem, the government and the public pay more attention to air pollution. In view of this, historians have also begun to examine the air pollution problems faced by the United States in the 20th century from the perspective of environmental history, in order to provide a reference for domestic air control.

MAO Yushi is the earliest domestic environmental policy researcher. His paper focus on the government's environmental protection policy, which also on the us government air management policy from the perspective of timing, introduces the clean air law in 1970 amendment, 1977 amendment and the evolution of atmospheric standards and emission standards. In addition, the author is pessimistic about the governance of global warming, arguing that the current measures are "misusing the experience of human beings in a short period of time to solve the very long problems". At that time, the topic selection of the article opened the idea for the domestic research on the history of environmental policy in the United States.

In the 20th century American environmental history of the overall research, "governance and balance —— American environmental protection movement and federal environmental policy research" is earlier for the environmental history overall and detailed research papers, cited 22 times, greater influence. Article to the American environmental movement and various aspects of the environmental policy as the research object, which also discusses the air pollution control stage, the author of the air management is divided into two stages, the first stage dominated by the local government air governance and little effect, the second phase of the federal government established the environmental protection agency and leading the promulgation of environmental regulations, the stage of way in the study has proved its correctness.

After more than 20 years of development, the phased study on the history of American air pollution control in the 20th century has gradually matured. Basically, there have been papers corresponding to each stage to study the air pollution control measures in the United States at this stage. Jiang Lijie's thesis "Investigation on the History of Environmental Pollution and Treatment of Industrial Cities in the United States (1870s-1940s)" was also an early paper to systematically review the history of air pollution control in the United States in China, and was quoted by relevant scholars 35 times. This paper makes a comprehensive investigation of the history of air pollution and treatment in the United States from the end of the 19th century to the first half of the 20th century, and summarizes the successful experience of Pittsburgh smog control, and summarizes the reference significance of the Pittsburgh model for domestic air control. The authors point out that the implementation of the smoke control decree in 1941 increased public confidence, which in turn boosted the implementation of the decree, which is the successful experience of the Pittsburgh model.

Hu Die's master thesis "after the world war ii to the 1960s American environmental pollution problem and the countermeasures research" focus on the 40s to 60s after the second world war, the author points out that the 60s is the most complex since the environmental pollution problems, this period, the various classes for the first time to the complex environmental pollution problems made various attempts and efforts, the federal government for the first time to expand federal power, is the beginning of the national pollution control gradually, also in the 1960s and later s milestone in the history of environmental pollution control. In the field of air pollution, the author combs the evolution of the "Clean Air Act 1963", "the Motor Vehicle Air Pollution Control Act" and the "Air Quality Act 1967".

Wang Qian's thesis "on air Pollution Control Policy in the United States in the 1960s in 2009" focused on the air environment policies in the United States in the 1960s and 1970s, and made a comprehensive evaluation of the environmental policies in the past 20 years. The paper points out that the intensity and federal degree of air control in the United States reached the peak in the past two decades, and then combed the important air control policies in the United States in this period, and analyzes the positive role played by the president, Congress and federal courts in the regulations and policies of pollution control. At the same time, the paper analyzes the contradictions between governments at all levels, interest groups, public awareness and other factors on the policies and regulations. At the same time, by comparing the American environmental policy with the United Kingdom and Germany, it tries to show the advantages and disadvantages of the American air policy. The disadvantage of the article is that the structure is relatively large, which is not further discussed in a relatively short space.

HuoPengFei master's degree thesis "American air pollution control mechanism transformation research(70s-90s)" focus on the American environmental control model in the 70s to 90s ideas and the period of significant change, respectively discusses the two control mode before and after the transformation (that is, command-control mode andMarket regulation mode) Advantages and disadvantages, the author points outWithout cost and benefit, ignore the enterprise initiative in environmental governance, command-control mode without considering the cost and benefit, ignore the enterprise initiative in environmental governance, and market model is based on cost-benefit analysis of environmental control policy, through the way of economic interests guide enterprises to better implement environmental policy, finally analyzes the environmental control by command-control mode to the market mode.

Liu Li's master thesis of "the American air pollution control research since the 1990s" focus on the 90s to drop in the United States government to seek new ways of air pollution control, in the first part discusses the air pollution control from "command-control" mode to the market based model transformation process, the second part by three concrete examples of PM2.5The debate over the new standards concludes with the use of the cost-benefit analysis in U. S. air pollution control policy.

Professor Liu Xiangyang of Hebei Normal University is deeply engaged in the study of environmental history in the United States. As a leader of American environmental history in Hebei Normal University, he has made great achievements. His monograph published in 2014 "The Game of Clean Air: The Control of American Air Pollution in the 20th Century from the Perspective of Environmental Political History" can be described as a masterpiece of studying air pollution and its treatment in the United States in the 20th century in the field of environmental political history. Xiang-yang liu to the famous American environmental historian Samuel hes environmental political history theory for analysis framework, to examine the late 20th century the air pollution control and its derivative political relations, based on the predecessors for American air governance case study, air pollution and governance empirical research for the 20th century, comprehensively discusses the history of air policy evolution in the 20th century. One of the main points of this book is that the "game" describes the extensive struggle between environmental forces and anti-environmental forces in the political field, describes the struggle of multiple interest groups over environmental pollution and governance, and further explores the internal mechanism of the formation of the air governance policy in the United States. The Game of Clean Air has broadened the horizon for environmental historians to explore the generation logic of environmental policy.

### **3. A CASE STUDY ON AIR POLLUTION INCIDENTS IN THE UNITED STATES IN THE 20TH CENTURY**

For the above discussion of the overall research of the 20th century air governance from the evolution of national policy, the change of management system, environmental protection and environmental protection forces against the macro dimension study of the air environment, but does not allow to

ignore, the macro overall research is based on a large number of case studies on the basis of the United States. Many scholars at home and abroad are also committed to investigating the cases of air pollution in the United States, which started very early.

The photochemical smog event in Los Angeles in the 20th century is one of the famous "eight public hazards". This event has caused a serious impact on the health and living environment of local residents, which has aroused wide attention from the public and academic circles on environmental pollution.

Foreign scholars have studied the air pollution cases in the United States very early, and thanks to the convenience of local regional research, foreign scholars have achieved fruitful research results. Known as the "father of smoke", American scholar Hagen Smit Published in 1970, "The Lesson of the World Smoke Capital," was the first American study of air pollution in Los Angeles. This paper discusses the evolution history of air pollution in Los Angeles and the process of gradually transferring local government functions to the central government. In the construction of the future urban development, the paper points out that the technological innovation should adapt to the population growth, and discusses the important influence of the two on the air environment respectively. In the end, Schmidt proposed two ways to study the history of air pollution control in the United States. One is to study the government's measures to control air pollution, and the other is to study the dynamic connection between air pollution and residents' lives.

In China, as early as 1975 before the reform and opening up, Environmental Protection published the article "Photochemical Smog Incident in Los Angeles", which discussed the cause of the photochemical smog incident in Los Angeles and the harm of smoke to human body. This is the first article of Chinese historians that paid attention to the air pollution control in the United States. Under the background of that time, the article pointed out that the pollution event is the inevitable product of the development of capitalism, and at the same time, it cannot be completely solved under the capitalist system, which has a strong color of revolutionary historical view.

"The prevention and Disposal of Photochemical Pollution" written by Ding Jinguang and Yang Hang in 2010 and "the Experience and Enlightenment of the Los Angeles Haze War" written by Zheng Quan and Tian Chen in 2013 both comprehensively discussed the air pollution control process of Los Angeles, and summarized the origin, process and experience of the Los Angeles smog event. Among them, Ding Jinguang summed up the five experiences of government leading, market regulation, legal guarantee, public promotion and scientific and technological support, and compared the domestic Qingdao city with Los Angeles, in order to apply the foreign governance experience to the domestic pollution control. Zheng Quan and Tian Chen mentioned the obstacles to air pollution control caused by anti-environmental forces such as automobiles and oil companies.

Li Jie's thesis "on The Analysis of Photochemical Smoke Control in Los Angeles in the 20th Century" in 2015 is the first article in China to conduct a comprehensive and systematic study on the Los Angeles smog event and its governance. The author points out that the process of air control has gone through a transformation process from local government led to federal led, and then discusses the pollution control measures of local governments and central governments in various periods. In the early days of governance, the Los Angeles County and California governments played a leading role, and the author further discussed the governance initiatives of the Los Angeles County Air Pollution Control District, the California Motor Vehicle Pollution Control Commission, and the California Air Resources Commission. Since then, in the 1970s, the National Environmental Protection Administration was established, implemented a series of measures, and gradually played a leading role in air control. This paper studies this typical case from a micro perspective, and discusses this historical event in detail with more than 60 pages, which is a model of case study.

In addition, the study of the air governance model in California, where Los Angeles is located is also a common concern of environmental historians at home and abroad. As the first state to take the effective air pollution control road, California was particularly prominent in the control of motor

vehicle pollution and enjoyed considerable autonomy. Its policies were often advanced and innovative, which played a guiding role in the United States and even the world at that time.

American scholar James Krier and Edmund Ursin's "the pollution and policy: California and the federal motor vehicle air pollution experience case paper, 1940-1975" to California air management for the case, is different from the academic circle for California air policy affirmation, corrier questioned with critical view. Due to the lack of awareness by environmental regulators about the causes of air pollution and its impact on public health, the formulation of air control policies has been too quickly to solve the problem of air pollution well, forming a controversial mandatory solution. Mr Krell went on to note that the government should be more cautious in making environmental policy.

Sheldon Kamienieck and Michael R. Ferrall's article entitled "Southern California's Intergovernmental Relations and Clean Air Policy" studied the Air Quality Management Plan (AQMP) adopted in 1989 and its impact on revising the "Clean Air Act" revised in 1990, and explored the ways of the newly adopted "Clean Air Act" for supporting California's air quality management plan. Kaminik pointed out that on the one hand, local governments play their independent role in the federation, which is conducive to the establishment of more effective federal governance policies. On the other hand, Kaminik also believes that due to the wide and complex scope of air pollution, it is difficult for California's air quality management plan to achieve good results at the federal level. Through dialectical analysis, the article deeply reveals the interaction between governments at all levels in terms of air pollution policy.

Liu Qian's "for the air we breathe together -- southern California air quality administration practice" article focuses on the establishment of southern California air quality administration and its evolution process, for the overall goal of air governance and control way of the analysis, for the local air governance institutions research provides important references. However, as a popular science article, it does not mark the notes and references, which is a drawback.

"The Historical Evolution and Essence of Air Pollution Control in California", written by Liu Xiangyang and Wang Jingping and published by Hebei Normal University in 2017, points out that the air control in California has experienced the transformation from the object, from the subject, from the state level, the model, and from the point of thinking, it has experienced the transformation from the pure command control to the market stimulus. This paper systematically analyzes the control of air pollution in California from three aspects, and finally points out that the governance is essentially the adjustment of various interests. This paper marks that the domestic research on air control in California has reached a high level.

In addition, there are works on the macro-historical context of American air governance based on the discussion of multiple cases, which combines the case study with the overall study. In his book "Don't Breathe the Air" written in 2000, Scott Hamilton Dewey selected three typical cities including Los Angeles, New York and London to explore the different processes and their influencing factors through the comparison of air policies between different cities and even countries. On this basis, Dewey systematically discussed people's experience of air pollution in the 1940s and 1960s. On the ideological side, the book discusses how post-war environmentalism has peaked in the overall federal control of the economy. Dewey pointed out that the rise of environmental politics is the cause of concerns about pollution and emphasis on their own health, which reflect the increased ecological awareness of residents. "Don't Breathe the Air" has brought the public's understanding of American pollution politics to a new height, and made a new contribution to the further study of American environmental politics in the academic community.

Wang Xiaomeng's master thesis " the United States in the 20th century 50-70s interstate air pollution control mechanism research -- in New York and New Jersey air governance as the research object", through to explore the air environment governance between local governments and cooperation between the local government and the federal and friction. Wang pointed out that air pollution has no

boundaries, and the local autonomy in the United States based on administrative divisions is bound to lead to friction between local governments and between local and federal governments, which will affect the effective control of air pollution to some extent. In view of this problem, Wang Hemeng believes that the solution is to enhance the central government's control ability.

#### **4. RESEARCH ON THE LAW AND PRECEDENTS OF AMERICAN AIR GOVERNANCE IN THE 20TH CENTURY**

The United States is a country with early and perfect environmental law in the world. The American environmental law is rich in connotation and diverse in origin.

Yin Zhijun's doctoral dissertation on the history of American environmental law is the early domestic detailed legal history of environmental law, detailed content, to the structure of the total detail introduces the main environmental law, for domestic academia, has cited 91 times, scholars engaged in the study of American environmental history are basic need to take this article to understand the content of the relevant environmental law and evolution. In the general section of the first two chapters, the paper introduces the formation and development of environmental law in the United States, and analyzes the important role played by the four factors of science and technology, economy, law and society in the historical process and components of American environmental law. In Chapter V, A History of the Clean Air Law, the author explains the legal efforts and legal development process of the United States in the control of air pollution over the past 100 years, and summarizes the legal characteristics of different eras.

Liang Rui's doctoral thesis "American clean air act research" from small incision focused on the clean air law of a law, research is very deep, a comprehensive and detailed, for domestic study of the American air environment has made great contributions, the article has been cited 121 times, its influence can be seen. This paper introduces the background, basic content and promotion process of the "Clean Air Act", and analyzes the specific content under the guiding principles and principles of the Act from the legal perspective. In addition, the article has a major unique feature. Due to the state of California's special regulations on vehicle emissions, the reaction of the automobile industry in the implementation of the law.

Environmental Justice: Who Is the Bell Chell, compiled by Wang Jin, Yan Houfu and Sun opu in 2006, focuses on the collation of various cases related to environmental law in the United States, and is a selection of environmental law classic precedents. The author focuses on the collection of famous classic cases related to the Clean Air Act, and a brief introduction of each case, convenient for readers to read and audit. In addition, the great advantage of the book is that the court for different cases of judgment, and describes the part of the judge for and against, vividly presents the court debate process and the case, for the academic study the environmental law and case law system provides an important case reference.

Wang Yao's master thesis "Research on the Legitimacy of the 'Bubble Policy' in the United States in the 1980s — Focusing on judicial precedents" with "bubble", the earliest entry of the United States environmental regulations as the center, Examining the disputes between the environmental political subjects in the United States over the legitimacy of the "bubble policy", The authors point to the occurrence of "Chevron Corporation v. Natural Resources Conservation Commission," Marking the first time that market-based environmental regulatory methods such as "capacity balance" and "offset" have taken the stage, It also opens up a new paradox: industrial groups try to circumvent the new pollution source review mechanism to reduce the scope of the Clean Air Act, Environmental groups want to expand the mechanism as much as possible.

## 5. RESEARCH ON AIR GOVERNANCE IN THE HISTORY OF AMERICAN ENVIRONMENT IN THE 20TH CENTURY

In the 1990s, with the maturity of major issues in the environmental history of the United States, the study of environmental history in the United States began to experience the sinking of vision, and new fields of environmental history research, such as urban environmental history and global environmental history, were constantly opened up.

Urban environmental history is one of the emerging fields of environmental history research. With the improvement of environmental protection awareness and the attention of pollution problems, academic scholars began to study the pollution-related problems in the urban environment, not only paying attention to the urban pollution problems, but also starting to discuss the issues of urban planning, social inequality and environmental justice, urban natural environment and other aspects. Scholars began to use interdisciplinary research methods, combined with history, geography, sociology and other disciplines of theory, to deeply explore the relationship between cities and the environment.

Andrew Hurley's "Environmental Inequality: Class, Race, and Industry in Gary, Indiana" opens a new field of environmental history by combining environmental issues in urban society, focusing on environmental issues in urban society. In this book, Hurley took Indiana as the case location, focusing on the impact of environmental pollution on different groups under the differences in race, class and living patterns, and pointed out that different groups are greatly affected by environmental pollution. Air pollution is the most harmful to African Americans, while white workers are relatively less affected, and the middle class members and their families are the furthest from air pollution sources.

Martin V. Melosi's "The polluted America: Cities, Industry, Energy and the Environment" focuses on the ecological investigation of urban history, is another masterpiece of the study of American urban environmental history. Melosi, who specializes in urban pollution and urban health, points out that cities are not only places where people live, work and consume, but also places where they make waste. He further explored the impact of the change of production mode and the change of new energy on the ecological environment. Melosi pointed out that the United States, as the world's richest country, is also the most polluted country. Through an overview of the history of air pollution and specific case studies, he discussed the association of air pollution with the mass use of motor vehicles, which is the product of urban industrial development. Melosi examines urban expansion and industrial development from an ecological perspective, discusses the role of American cities in environmental protection, and points out a new direction for the study of air pollution history in the United States

American epidemiologist Devra Davis witness home donora town serious smoke events, also witnessed the local industrial enterprises for environmental protection disregard and intervention, so in 2002 published the book "fog like water", through the analysis of professional data, expose the harm of air pollution to the public. Using the steel industry in his hometown as an example, Davis pointed out that most companies and capital groups have overplayed the toxicity of harmful chemicals for their own interests. And carcinogens arising from industrial emissions directly enter the public through the air, causing immeasurable damage to people. According to Davis, the Donora Smoke scandal made headlines because of the control of the state and the government. Scientists with a conscience trying to speak out are also pushed out. Although the workers resisted air pollution, they could not give up the work and profits brought by steelmaking. The author thus points out that economic interests are an important factor in driving air pollution.

## 6. SUMMARY AND OUTLOOK

In general, after decades of research and laying the foundation, the research on the environmental history of the United States at home and abroad has gradually become mature, its theoretical structure has been gradually improved, and many gratifying results have been achieved. First, in terms of the overall research on the history of air pollution in the United States, almost all the stages of American air control in the 20th century have been systematically studied in the academic circle. Second, in terms of case studies on air pollution control in the United States, cases such as Los Angeles and advanced air control in California have been fully studied by scholars at home and abroad. Third, in terms of research on air governance laws and cases in the United States, important laws such as the "Clean Air Act" and important concepts such as "bubble" have been systematically studied, and historical materials of various court cases have been sorted out and compiled. Fourthly, in terms of the history of urban environment, the relevant research is conducive to promoting the establishment of environmental justice for the existence of social inequality in the society. Scholars also actively analyze the political factors affecting urban air pollution and examine urban expansion from an environmental perspective.

However, with the joy, it should also be noted that the foreign research on the history of air pollution control in the United States in the 20th century is far from reaching the point of perfection. As the author sees, there is still a large space for research in the following aspects.

First, in terms of the phased research on the history of air pollution control in the United States, the process of air pollution control in the United States between the 1940s and 1960s is still relatively blank. In the above literature, can be found since the early 20th century to 40s, 60s to 70s, 70s to 90s, 90s to the 21st century has been specialized deep excavation, and 40s to 60s, some scholars explore the overall environmental policy in the United States, but still have not see special from the perspective of air environment governance to explore the evolution of the air pollution control policy in this period.

Second, in terms of case studies of the history of air pollution control in the United States, there is still a lack of comprehensive and in-depth studies of other representative events during this period, such as the Donora smoke event in Pennsylvania, and detailed case studies of the independent treatment of air pollution in other states except California.

Third, in the us air governance law and case research, is still relatively lack for the clean air law rules standards such as air quality benchmark, national environmental air quality standards, air quality control area, new source enforcement standards, technology, reasonable control principle, best available control technology and other concepts of specific definition and their relationship between in-depth study and discussion.

Fourth, the comprehensive study of the general narrow vision and lack of problems, lack of innovation in the vision. Although the existing studies have paid attention to the coordination and coordination of interstate air governance, there is still a lack of air governance from a broader international perspective and even a global perspective. Therefore, we can try to find the history of air pollution control between the United States and its neighbors such as Canada in the border area, and explore the particularity of the coordinated treatment of air pollution problems between countries.

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