Lessons from Abroad: A Comparative Study of Air Pollution Laws and their Application in Bangladesh

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Abstract

This paper offers a thorough examination and comparative analysis of Bangladesh's legislative responses to air pollution against the backdrop of other nations with comparable demographic and developmental paradigms. Bangladesh is experiencing severe air pollution issues that are endangering both human health and the ability of the ecosystem to exist, due to the country's rising industrialization, urbanization, car emissions, and biomass burning. The article extensively examines the major laws pertaining to air pollution, paying particular attention to the functions and duties of the various governmental and non-governmental organizations, the efficiency of enforcement, and the limitations of the current laws and policies. The efficiency of various legislative remedies is clarified by comparison with a few countries that have successfully managed comparable air pollution challenges. Examining effective laws and policies from other countries might help identify what makes them work and whether Bangladesh could benefit from them. A number of proposals have been made in the article to strengthen and improve Bangladesh's current laws and enforcement system by adopting effective laws and policies from other nations. The research ends with a call to action, urging decision-makers in government, business, and the general public to cooperate in putting the suggested ideas into practice. This thorough method of study lays the path for Bangladesh and other developing countries to implement efficient air pollution reduction measures.

Keywords: Comparative Legislative Analysis, Bangladesh Air Pollution Control, Successful Pollution Policies, Environmental Policy Enforcement, Sustainability Strategies

Introduction

The quality of life in general as well as human health are seriously threatened by air pollution, an invisible yet sneaky danger. Numerous studies have confirmed the causal relationships between air pollution and a wide range of health disorders, escalating this into a public health emergency on a global scale. Bangladesh, a nation that is fast developing, is one of the countries that is battling this problem. The difficulties the nation faces in reducing air pollution are complicated by a number of reasons, including industrialization, urbanization, vehicle emissions, and widespread biomass burning.

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Bangladesh's legislative frameworks, which serve as the cornerstone of environmental management and air quality control, are embodied in its efforts to address and regulate air pollution. However, in spite of current laws, the issue still exists and worsens, raising questions about potential weaknesses and restrictions in the legal systems and the way they are implemented.

This article begins a thorough examination of Bangladesh's legislative strategies for combating air pollution. It examines the efficiency of the nation's current legislation as well as the obstacles preventing their full implementation. Importantly, the study does not function in a vacuum; rather, it broadens its focus to include comparisons with other nations that have faced comparable air pollution problems and have comparable demographic and developmental situations.

The study intends to inform and design effective measures that could boost Bangladesh's battle against air pollution by drawing lessons from other countries' successful legislative practices. It also makes suggestions for prospective adjustments and policy changes that take into account Bangladesh's particular socio-economic and environmental settings.

This work sheds light on the interaction between law, policy, and environmental science by establishing relationships between legislation, enforcement, and environmental effects. It emphasizes how important it is to vigorously and forcefully enforce laws and policies in order to reduce the threat of air pollution and advance a sustainable future.

2. Literature Review

Air pollution is now a significant environmental concern on a global scale, and it is particularly bad in developing nations like Bangladesh. Numerous studies highlight the scale of the issue (Qadir et al., 2018; Salam et al., 2003). Qadir et al. claim as much (2018), the degree of air pollution in Dhaka, the capital of Bangladesh, significantly surpasses the air quality recommendations from the World Health Organization, attributing the condition to rapid urbanization, industrial development, vehicular emissions, and biomass burning.

Various research (Begum et al., 2011; Guttikunda & Khaliquzzaman, 2014) discusses the sources of pollution in Bangladesh. Guttikunda & Khaliquzzaman (2014) point out that the transportation sector and brick kilns are key contributors to the deteriorating air quality. Concurrently, the burning of biomass, primarily for cooking, has been singled out as a significant source of indoor air pollution (Dasgupta et al., 2006).

The effects of this rising air pollution on human health and the ecosystem are increasingly clear. Studies show a correlation between exposure to air pollutants and a range of health issues, from respiratory diseases to cardiovascular problems, leading to premature mortality (Balakrishnan et al., 2014; Gurjar et al., 2010). The environmental implications, including soil degradation and reduced crop yield, have also been reported (Shahid, 2018).

Despite the severity of the situation, Bangladesh's legislative response has been critiqued for its lack of effectiveness (Gain et al., 2013). The primary legislation, the Bangladesh Air Pollution Control rules, 2022, was enacted to regulate and control air pollution. However, the enforcement of the Act has been impeded by multiple challenges, including limited technical expertise, inadequate resources, and lack of public awareness (Hoque et al., 2012).

A comparison with other countries grappling with similar air pollution issues can provide valuable insights. For instance, China, despite having a notorious history of severe air pollution, has made significant strides in improving air quality. Strict environmental standards, active enforcement, and public awareness campaigns have been integral to this transformation (Chen et al., 2013; Wang et al., 2019). Lessons learned from China's success story can potentially inform effective policy measures for Bangladesh.

Simultaneously, the Indian experience with air pollution offers valuable insights. The country, with similar socio-economic and environmental contexts, has enacted comprehensive air quality standards and introduced measures like the National Clean Air Program (Balakrishnan et al., 2019). Nevertheless, enforcement remains a significant challenge (Guttikunda & Calori, 2013).

In summary, a more robust legislative response is required to address Bangladesh's growing air pollution issue. Although the present Air Pollution Control Act offers a legal framework, it has not been very effective. When compared to nations like China and India, study shows the need for tougher environmental regulations, better enforcement, and public involvement in solving this problem.

In light of these findings, a sizable body of research contends that comprehensive, scientifically supported, and strictly implemented legislative measures are necessary to reduce air pollution in Bangladesh. To solve these difficulties, a number of academics and professionals advise examining the best practices in nations with comparable environmental circumstances, such as India and China. These tactics must be context-specific and take into consideration the particular difficulties and possibilities Bangladesh faces.

Bangladesh may learn a lot from how other nations have handled the problem of air pollution. A more focused effort to comprehend and put into practice efficient legislative methods, along with better resource allocation for enforcement, could be a key step in Bangladesh's efforts to reduce air pollution.

3. Overview of Air Pollution in Bangladesh

Bangladesh's air pollution crisis has reached crisis proportions, with the country's capital, Dhaka, routinely listed as one of the world's most polluted cities (World Health Organization, 2020). Air pollution has become a severe environmental issue as a result of quick industrialization, urbanization, and population increase. The scope of the problem is enormous, affecting not just the general well-being of the populace but also the nation's economy and ecology as a whole.

3.1 Scale of the Issue

According to the State of Global Air report, approximately 173,000 deaths in Bangladesh were attributed to long-term exposure to outdoor and indoor air pollution in 2019, making Bangladesh one of the nations most afflicted by pollution-related health problems globally (Health Effects Institute, 2020). Additionally, Dhaka frequently records levels of PM2.5, a tiny particulate matter detrimental to human health, several times higher than the World Health Organization's recommended limits, revealing the terrible status of the country's urban centers' air quality (Hossain et al., 2019).

3.2 Sources of Pollution

The primary sources of air pollution in Bangladesh include vehicle emissions, industrial discharges, and the burning of biomass and waste (Begum et al., 2013). Of these, the brickmaking industry, with its traditional kilns, is a significant contributor to the high levels of PM2.5 particles in the air. According to a World Bank study, brick kilns contribute to 58% of the total PM2.5 emissions in Dhaka during the dry season (World Bank, 2020). Likewise, the substantial use of fossil fuels and the burning of biomass for cooking in rural regions both considerably add to air pollution (Wang et al., 2019).

3.3 Impact on Health and Environment

Human health is severely impacted by air pollution, which can lead to conditions including asthma, lung cancer, heart problems, and early mortality (Health Effects Institute, 2020). Children, the elderly, and those with existing health conditions are particularly vulnerable. Furthermore, air pollution has also led to substantial environmental degradation in Bangladesh. It affects crop yields,

disrupts ecosystems, and contributes to climate change by releasing greenhouse gases into the atmosphere (Shahid, 2018).

Air pollution is the greatest environmental threat to public health globally and accounts for an estimated 7 million premature deaths every year. Air pollution and climate change are closely linked as all major pollutants have an impact on the climate and most share common sources with greenhouse gases. Improving our air quality will bring health, development, and environmental benefits.

According to the United Nations Environment Programme's (UNEP) Pollution Action Note, chronic obstructive lung disease is one of the leading causes of death from fine particle pollution. Along with lower respiratory infections, stroke, tracheal, bronchial, and lung cancer, ischemic heart disease, type 2 diabetes, and newborn abnormalities, it also plays a role in these conditions. In addition, data on the proportion of each disease's mortality in Bangladesh in 2019 that can be directly linked to fine particle outdoor air pollution are also provided in the remark.

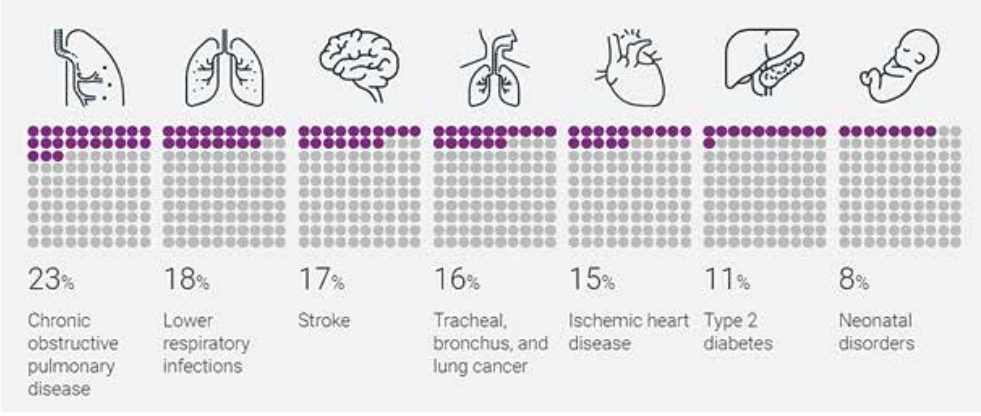

Figure 1: Percent of deaths from each disease attributable to fine particle outdoor air pollution of Bangladesh in 2019(UNEP, 2019).

In summary, the environment and public health are negatively impacted by Bangladesh's diverse, intricately rooted air pollution problem. Bangladesh, a rapidly developing country, must adopt effective legislative techniques to deal with this issue.

4. Bangladesh's Air Pollution Legislation

As mentioned in Article 18 of the constitution of the People's Republic of Bangladesh, it is our constitutional duty to protect and improve the environment, we need to prioritize the worst affected in doing so. Concentrated efforts of the

government and citizens are now required to treat the damage that air pollution is causing to our health as a whole. The main legislative tools for regulating air pollution in Bangladesh are the Air Pollution (Control) Rules of 2022 and the Bangladesh Environment Conservation Act (BECA) of 1995, the Bangladesh Environment Conservation Rules of 1997, the Brick Manufacturing and Brick Kilns Establishment (Control) Act, the Motor Vehicles Act, 2018, and the forest Act 1927. Despite appearing comprehensive on paper, these legislative initiatives frequently face numerous difficulties when put into practice, which reduces their total influence on the nation's air quality.

4.1 Bangladesh Environment Conservation Act (BECA) and its Role in Air Pollution Control

The cornerstone of environmental legislation in Bangladesh, the Bangladesh Environment Conservation Act (BECA) of 1995, has been instrumental in shaping the country's approach to environmental issues, particularly those related to air quality. This legislation was enacted in response to the growing awareness of environmental degradation and its implications for public health and economic development.

4.1.1 Key Provisions of BECA for Air Quality Management

The BECA has conferred on the Department of Environment (DoE) with the authority to control, maintain, and improve environmental standards, including air quality. There are laws in place to cope with this outdoor air pollution. All vehicles must utilize smoke-controlling equipment before operating on Bangladeshi roadways, according to Section 6 of the Bangladesh Environment Conservation Act, 1995. Additionally, a certificate stating that pollution is under control must be obtained. For violations of these rules, the Motor Vehicles Act of 2018 contains more severe penalties. To demonstrate their effectiveness in reducing pollution, our industries are required by this law to get Environment Clearance Certificates from the Department of Environment.

One of the critical tools in this arsenal is the power to designate certain regions as Ecologically Critical Areas (ECA). This provision allows the DoE to add an extra layer of environmental protection to areas suffering from extreme ecological degradation, including severe air pollution.

The Act also gives the DoE authority to control industrial pollution, which significantly increases the burden of air pollution on the country. Under the Act, industries are prohibited from discharging pollutants – including those airborne – beyond permissible levels. This provision is critical in a country like Bangladesh, where rapid industrial growth can often lead to environmental compromises if not appropriately regulated.

4.2 The Air Pollution (Control) Rules 2022: Enhancing the Scope of BECA

Further enhancing the reach and effectiveness of BECA, the Air Pollution (Control) Rules of 2022 offer a more detailed framework for emission controls. These rules, formulated under the umbrella of BECA, stipulate permitted emission levels for specific industries and vehicles.

This rule expands on the broad provisions of BECA by categorizing industries based on their pollution potential and prescribing more stringent environmental standards for those that are more harmful. These industry-specific rules offer a more nuanced and targeted approach to industrial air pollution control.

Similarly, vehicle emission standards are a key step towards managing vehicular pollution, a significant contributor to urban air pollution.

4.3 The Brick Manufacturing and Brick Kilns Establishment (Control) Act,2013

The Brick Manufacturing and Brick Kilns Establishment (Control) Act of 2013 in Bangladesh addresses the emission and pollution concerns generated by brick kilns, which are significant contributors to air pollution. While the Act (under Sections 6, 7 and 8) mandates the use of "environment-friendly technologies," it lacks specificity on what constitutes such technologies, making it difficult to enforce. There's also no mention of periodic review or upgrading of these technologies as environmental science progresses. Penalties for non-compliance (Section 16, 17) are generally insufficient to act as a deterrent.

4.4 The Forest Act, 1927

The Forest Act of 1927, on the other hand, is severely outdated in addressing contemporary environmental challenges including air pollution. This Act mainly focuses on the conservation of forests for timber, overlooking their ecological role in air purification. Given that forests act as carbon sinks and air purifiers, there should be amendments that explicitly outline penalties for deforestation leading to increased air pollution. Modern concepts like Payment for Ecosystem Services (PES) could be incorporated to encourage the preservation of forests for their air-cleaning capabilities.

4.5 The Motor Vehicles Act, 2018

The Motor Vehicles Act, 2018 includes legal provisions in sections 46 and 89 to control air pollution and to impose penalties for violating emission norms, essentially targeting air pollution caused by vehicles. Under Section 89 of the Act, any person who drives a vehicle that does not comply with the standards prescribed in relation to road safety, noise limits, or manner of carrying goods, risks facing penalties that may include fines and imprisonment. The law also empowers traffic officers to impound

vehicles found to be emitting pollutants beyond the prescribed limits. However, while the Act provides legal tools for penalizing violators, it stops short of offering a comprehensive strategy to combat vehicular pollution, including updating emission norms or encouraging cleaner modes of transport. Therefore, the Act's approach, although punitive, is limited in scope when it comes to effectively tackling air pollution.

5. Comparison with International Best Practices

In this era of globalization, it is imperative to look beyond national boundaries to gather insights and learn from international best practices. A comparative analysis of air pollution laws from countries that have successfully managed to improve their air quality can offer valuable lessons.

One possible model to consider could be the Clean Air Act of 1970 in the United States, which has been successful in significantly improving air quality over several decades. The Act's enforcement mechanisms, technological adoption, public participation strategies, and emphasis on continuous improvement and adaptation to new scientific findings can provide a blueprint for strengthening Bangladesh's approach towards air pollution control.

In summary, while the Air pollution-related laws including BECA and the Air Pollution (Control) Rules form a robust legal framework for controlling air pollution in Bangladesh, challenges persist in their application. Overcoming these challenges requires strengthening enforcement mechanisms, boosting monitoring capabilities, enhancing public awareness and participation, and learning from international best practices. With a concerted effort on these fronts, it is possible to better leverage these laws for effective air pollution control in Bangladesh, ultimately contributing to improved public health and environmental sustainability.

6. Roles and Responsibilities of Various Governmental and Non-Governmental Bodies

The DoE, under the Ministry of Environment, Forest, and Climate Change, is primarily responsible for enforcing environmental laws, including those relating to air quality. However, other entities like the Ministry of Health, the Ministry of Industry, and local city corporations also have overlapping jurisdictions, which can sometimes lead to coordination issues (Ahammad, 2011).

NGOs and other civil society organizations are essential for conducting research, promoting air pollution awareness, and arguing for stricter environmental regulations. Some prominent NGOs in this space include the Bangladesh Environmental Lawyers Association (BELA) and Bangladesh Poribesh Andolon (BAPA) (Rahman & M'ikiugu, 2011).

7. Enforcement Mechanisms and Their Effectiveness

The Department of Environment (DoE) has various enforcement mechanisms at its disposal, such as imposing fines, shutting down non-compliant industries, and filing cases against offenders. However, the effectiveness of these enforcement actions is often hampered by limited resources, a lack of technical expertise, and sometimes political interference (Ahammad, 2011).

Furthermore, according to statistics from the Bangladesh Air Quality Monitoring Project, levels of PM2.5 and PM10 in significant cities frequently exceed the permitted limits, indicating that the existing regulations and their enforcement have not been successful in reducing air pollution (World Bank, 2020).

8. Limitations of the Current Legislation

Several limitations of the current legislative framework have been identified.

Firstly, the allowable emission standards for some pollutants are still higher than those recommended by the WHO.

Secondly, while the legislation provides for the regulation of industrial and vehicular emissions, it does not adequately address other significant sources of pollution, such as the burning of biomass and waste (Begum et al., 2013).

From a legal standpoint, the full picture of indoor air pollution is absent. Scientists have emphasized numerous times how the domestic energy needs of the people living in Bangladesh's rural areas depend on biofuels that produce toxic smoke. The majority of these emissions from conventional fuels like wood and cow dung are made up of tiny particles that can lead to fatal illnesses. What's worse is that those in our society who are weaker and have less resources are more at risk. The most vulnerable women to this risk are those who spend most of their time indoors near the stove. Children are more likely to experience asthma attacks, respiratory infections, congenital abnormalities, harmful neonatal circumstances, and severe impacts on cognitive development.

Lastly, as noted above, there are significant challenges in enforcing these laws effectively.

However, Bangladesh has created legislative measures to limit air pollution, but a number of circumstances hamper these measures' efficacy. As a result, it is urgent to review these legislative tactics, improve enforcement techniques, and

consider implementing effective procedures from other nations.

9. Comparative Analysis

The challenges faced by Bangladesh in managing air pollution and enforcing legislative measures are not unique. Other countries, notably China and India, have faced similar issues but have also seen some measure of success in mitigating air pollution. A comparative analysis of these countries' experiences can provide insights into alternative legislative and enforcement approaches.

9.1 Selection of Countries for Comparison

For this analysis, China and India were selected due to their similarities with Bangladesh in terms of population density, rapid industrialization, and air pollution challenges. Moreover, both countries have made notable progress in recent years in controlling air pollution (World Bank, 2019; WHO, 2019).

9.2 China's Air Pollution Problem and Legislative Response

China, like Bangladesh, has been grappling with severe air pollution, primarily due to its rapid industrialization. However, in response to the mounting health and environmental crisis, China enacted the revised Air Pollution Prevention and Control Law in 2015. The legislation prioritized the reduction of PM2.5 and established stricter emission standards for critical industries and vehicles (Zhang, 2015). "Air Quality Standards (GB3095-82)" was the first set of air quality rules published by China, and it provided standards for defining air contaminants and leveled management. Soot and ash pollution were given top priority in air pollution control, according to the "Air Pollution Control Act" of 1987.

9.2.1 A detailed review of China's Air pollution-related legislations and Policies:

The primary legislation for air pollution control in China is the Air Pollution Prevention and Control Law which is known as the Air Pollution Act (Amendment), 2015. However, the following are detailed reviews of China's air pollution-related legislation and policies.

9.2.1.1 The Air Pollution Prevention and Control Law (updated in 2015)

This is the primary law addressing air pollution in China. The law was significantly updated in 2015, making it far more comprehensive in terms of emission standards, responsibility definitions, and punishment measures. This law includes several key points:

- Stricter emission standards and deadlines for key regions and industries.
- Increased punishments for illegal emissions and non-compliance,

including daily fines, and the potential for criminal charges.

- Increased the responsibility of governments at all levels, including provisions to hold officials accountable for air quality in their regions.

9.2.1.2 The Environmental Protection Law (2014)

This law does not exclusively focus on air pollution but provides a framework for environmental protection in general. The 2014 update to this law significantly increased the penalties for non-compliance and included provisions for public participation and the role of NGOs in environmental protection.

9.2.1.3 The Thirteenth Five-Year Plan (2016-2020)

This plan laid out a comprehensive strategy for economic and social development, including substantial sections on environmental protection. The plan sets out goals for reductions in PM2.5 levels, energy consumption, and carbon intensity.

9.2.1.4 The Law on the Prevention and Control of Atmospheric Pollution (1987, Revised 2015)

This law has been revised several times, most recently in 2015. It specifically targets air pollution, setting standards for air quality, emissions, and fuel quality, among other things. The law covers all stationary and mobile sources of pollution and outlines the responsibilities of businesses, individuals, and the government in preventing and controlling air pollution.

Each of these laws and regulations marks a significant step in China's efforts to tackle air pollution. They reflect China's growing recognition of the severity of its air pollution problem and the need for a comprehensive legal and regulatory approach to address it. However, their success depends on effective implementation, strict enforcement, and ongoing adaptations to meet the changing nature of the country's air pollution challenges.

9.3 India's Air Pollution Problem and Legislative Response

India, another rapidly developing country, has also faced severe air pollution challenges. The Indian government's response was the introduction of the National Clean Air Program (NCAP) in 2019. This initiative aims to achieve a 20-30% reduction in PM2.5 and PM 10 concentrations by 2024. It also includes 102 non-attainment cities where pollutant levels are consistently above national standards (Ministry of Environment, Forest and Climate Change, 2019).

9.3.1 A detailed review of India's Air pollution-related Legislation and Policy:

The primary legislation dealing with air pollution in India is the Air (Prevention and Control of Pollution) Act of 1981. However, the following are

detailed reviews of India's air pollution-related legislation and policies:

9.3.1.1 The Air (Prevention and Control of Pollution) Act, 1981

This Act provides for the prevention, control, and abatement of air pollution in India. In order to advise the government, coordinate efforts, conduct inspections, set emissions standards, and enforce the Act, it created the Central Pollution Control Board and State Pollution Control Boards.
Principal clauses of the Act include:

- Prohibiting the use of certain types of fuels and appliances that cause air pollution.
- Setting standards for emissions from industrial plants and vehicles.
- Granting powers to the Boards to test and inspect sources of pollution, close non-compliant industries, and coordinate with other institutions.

9.3.1.2 The Environment (Protection) Act, 1986

Despite being a more comprehensive piece of legislation, it grants the central government the power to take the steps required to protect the environment, including reducing air pollution. The Act gives the federal government the power to create standards and regulations, organize and carry out federal programs, and coordinate the actions of state governments.

9.3.1.3 National Air Quality Monitoring Programme (NAMP)

The Central Pollution Control Board also runs the National Air Quality Monitoring Programme, which measures air quality across the country. This data is crucial for informing policy and ensuring that initiatives are having the desired impact on air quality.

9.3.1.4 The Motor Vehicles Act, 1988 (and its amendments)

The Motor Vehicles Act also contains rules pertaining to air pollution, specifically those that deal with vehicle emissions standards. In accordance with international best practices, the Act and its revisions have implemented progressively tighter emissions regulations.

These are the primary legal systems in place in India for regulating air pollution. However, it is still difficult to effectively apply and enforce these rules, and air pollution continues to be a major issue in many regions of the nation.

9.4 Comparison of the Effectiveness of Different Approaches

Both China's and India's legislative responses have shown promise. For instance, China's multi-pronged approach has resulted in a significant reduction in

air pollution levels. A study by the University of Maryland indicated a 33% drop in PM2.5 levels from 2013 to 2017 (Ma et al., 2019).

India's NCAP is relatively recent, but it represents a comprehensive and ambitious approach to tackling air pollution. It focuses on city-specific action plans and the enhancement of air quality monitoring networks (Chowdhury et al., 2019).

The main distinction from Bangladesh's air pollution legislation is in the scope and severity of the legal reaction. In order to tackle air pollution, both China and India have developed large-scale, nationally coordinated measures. While enhancing its own legislative initiatives, Bangladesh may find it advantageous to take this strategy into account.

10. Lessons from India and China

It can be helpful for Bangladesh to understand the methods and policies that have been effectively applied in other nations. A thorough examination of China's and India's strategies uncovers a number of crucial elements that have contributed to their success and may be applicable in Bangladesh.

10.1 Successful Policies in India and China

China's success lies in its comprehensive and aggressive legislative approach. The revised Air Pollution Prevention and Control Law not only established stricter emission standards but also prioritized the reduction of fine particulate matter, which is responsible for severe health impacts (Zhang et al., 2019).

India's National Clean Air Program, on the other hand, demonstrates a successful policy based on multi-sectoral collaboration and city-specific action plans. By including non-attainment cities in its ambit, it addresses pollution hotspots directly and encourages local solutions (Chowdhury et al., 2019).

10.2 Factors Contributing to the Success of These Policies

In China, the critical success factor is vigorous enforcement. The Chinese government implemented heavy penalties for violations and used a combination of command-and-control measures and market-based mechanisms, such as emission trading, to achieve its targets (Wang & Jin, 2018).

India's NCAP has been successful due to its focus on a comprehensive approach that covers emission reduction from multiple sources and its emphasis on the enhancement of air quality monitoring systems. The development of city-specific action plans is another factor that contributes to its success, making the program

more adaptable and efficient (Chowdhury et al., 2019).

10.3 Evaluation of Their Applicability in Bangladesh

Given the similarity in the types of air pollution and socioeconomic environments, Bangladesh might be able to use both countries' strategies. Bangladesh should think about tightening enforcement and focusing on reducing fine particulates in its legislation, similar to China.

Adapting India's approach, Bangladesh could develop city-specific plans to address localized sources of pollution. Expanding and enhancing air quality monitoring systems would also be critical to understand the pollution dynamics better and track progress (Guttikunda & Khaliquzzaman, 2014).

11. Recommendations for Bangladesh

The following suggestions have been put up for Bangladesh based on these lessons:

a) **Amendments to specific sections of the Environment Conservation Act:**
To rectify the above issues, amendments to specific sections of the Environment Conservation Act, 1995 could be made to strengthen its enforcement capabilities. Firstly, a new section could be added detailing the development and maintenance of real-time air quality monitoring systems, similar to the data collection procedures outlined in Section 9 (“Records and reports”). Secondly, Section 15, which deals with penalties, could be amended to include specific punitive measures for air pollution, clearly defining the fines and imprisonment terms based on the severity and recurrence of the violation. Lastly, a separate section could be included to mandate inter-agency cooperation, clearly outlining roles and responsibilities for both federal and state agencies involved in air pollution control, thereby closing any existing loopholes. This could function similarly to Section 4, which gives the central government the power to coordinate actions by states, or like Section 5, which enables the issuance of directions for closure, prohibition, or regulation of any industry. These amendments would help in fortifying the Act's capacity to control and reduce air pollution effectively.

b) **A multipronged approach could be considered:**
To overcome the limitations of the Motor Vehicles Act, 2018 in addressing air pollution, a multipronged approach could be considered. Amendments to the Act could include provisions for periodic revision of emission standards, aligning them with international norms. Legal incentives for adopting electric or

hybrid vehicles, possibly under Section 29 (Special provisions for registration of motor vehicles of diplomatic officers, etc.) or a new dedicated section, could also be introduced. Additionally, the Act could be harmonized with other existing environmental laws, such as the Air (Prevention and Control of Pollution) Rules, 2022, to develop a comprehensive framework for monitoring and reducing vehicular emissions. Lastly, Section 122, which deals with the power of the Government to make rules, could be expanded to include educational programs that aim to raise awareness about the environmental impact of vehicular emissions. These combined legal measures would provide a more rounded approach to mitigating air pollution.

c) **Adopt Tougher Emission Regulations:**
Bangladesh should consider adopting stricter emission standards in accordance with global best practices, like China's emphasis on lowering fine particulates.

d) **Strengthen Enforcement:**
For environmental regulations to be successful, enforcement must be strengthened. Violations can be considerably reduced by enacting stiffer penalties for non-compliance as well as thorough inspection and monitoring.

e) **Implement City-specific Action Plans:**
Implement city-specific action plans: Bangladesh might create city-specific action plans, targeting localized sources of pollution and increasing the effectiveness of the actions adopted by learning from India's National Clean Air Program.

f) **Promote Public-Private Partnerships (PPP):**
The government and business sectors should work together to advance more environmentally friendly production techniques, make investments in more environmentally friendly technology, and promote the adoption of Corporate Environmental Responsibility (CER).

g) **Encourage research and development (R&D):**
Encourage research and development in the areas of clean technologies, strategies for reducing emissions, and pollution control. In this context, partnerships with academic and research institutes may be advantageous.

h) **Introduce market-based instruments:**
To incentivize sectors to adopt cleaner technology and cut emissions, economic tools like emissions trading could be implemented. These tools have been helpful in many nations, including China.

i) **Improving the control involvement mechanism:**
It is necessary to set up a control structure that is dominated by the government and backed by enterprises and the public. When it comes to pollution control, the government should not only act as the administrator but also coordinate the interests of different parties, establish their responsibilities, provide a mechanism for interest coordination for parties involved, encourage businesses to promote technical innovation, lower pollutant emissions, compel public participation, monitor, and implement low-carbon living.

Figure 2: The procedure for controlling the law's coverage of air pollution.

12. Conclusion

Bangladesh's growing industrialization, urbanization, automobile emissions, and the extensive burning of biomass continue to be significant causes of air pollution. Even with current legal protections like the Air Pollution Control Act, the health and environmental ramifications are significant and there are ongoing difficulties. This analysis demonstrates the complexity of the problem, emphasizing the necessity for an equally thorough and nuanced strategy to solve it.

Comparative analysis of laws in nations like China and India, who have struggled with comparable air pollution issues, offers insight into the approaches that have been effective elsewhere. These include tighter emission regulations, action plans tailored to individual cities, improved air quality monitoring systems, public-private collaborations, and the application of market-based tools.

The effectiveness of enacting stronger emission limits, more thorough city-specific action plans, improved air quality monitoring systems, and utilizing public-private partnerships for environmental control is highlighted by lessons learned from other nations. Market-based tools have also demonstrated potential as a means of encouraging carbon reduction.

Everyone in society must work together to address the severe problem of air pollution. Adopting a comprehensive strategy that includes harsher rules, better monitoring, and more vigorous enforcement is necessary for policymakers. It is imperative that industry leaders use greener technology and procedures. Parallel to

this, the public and corporate sectors can both be held accountable by civil society through encouraging sustainable behaviors.

Although the road to cleaner air is undoubtedly tricky, it is attainable with thorough, evidence-based policies and teamwork. As Bangladesh continues its path of rapid development, it is crucial to make sure that this progress does not compromise environmental sustainability and public health. Let us revitalize our villages and cities so that Bangladesh's people can live there in the future.

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