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Critical Evaluation of Environmental Protection Policies, Laws and Practices in Pakistan

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Abstract

Pakistan's industrial growth over the past thirty years has weakened the country's ability to govern its environment, resulting in severe air, water, and soil pollution and ranking Pakistan at the bottom of global sustainability indices. This study critically assesses Pakistan's environmental protection policies, laws, and institutional practices, with a focus on pollution from the textile, leather, and cement industries. Using a qualitative, descriptive, and exploratory approach, the analysis combines data from legal texts (such as PEPA 1997 and post-devolution provincial laws), audit reports at both federal and provincial levels, Environmental Impact Assessment records, tribunal decisions, and 32 semi-structured interviews with regulators, industry representatives, lawyers, and NGOs. Two industrial clusters—Kasur's tanneries and Faisalabad's textile zone—are examined as case studies for enforcement and compliance at the ground level. Comparing practices with those of China, India, and the European Union highlights best practices such as satellite-enabled real-time emission monitoring, Extended Producer Responsibility, and citizen-led public interest litigation.

Findings reveal four systemic deficits: (1) ambiguous legal provisions and inconsistent provincial harmonization; (2) chronically underfunded Environmental Protection Agencies lacking accredited laboratories, digital monitoring tools, and enforcement autonomy; (3) weak judicial deterrence due to slow tribunal processes and minimal penalties; and (4) widespread non-compliance among small and medium-sized enterprises, worsened by political patronage and limited public transparency. Consequently, untreated industrial emissions and particulate matter regularly exceed WHO limits, causing significant damage to public health and ecosystems.

The study recommends a series of reforms: statutory amendments that establish strict, time-bound emission limits and give EPAs fiscal and operational independence; deployment of IoT-connected stack and emission sensors integrated with satellite data for continuous Monitoring, Reporting, and Verification (MRV); fiscal incentives and green-certification schemes to promote cleaner production technologies; and institutionalized public-participation mechanisms to boost accountability. Implementing these measures is crucial for closing Pakistan's enforcement gap, reducing industrial pollution, and aligning national development with Sustainable Development Goals and Paris Agreement commitments.

Key Words: Industrial Pollution, Environmental Governance, Legal Enforcement, Pakistan, Sustainable Development

Introduction

Pakistan's rate of industrialization has exceeded the country's capacity for environmental management. In the 6th Annual IQ Air report, Pakistan was ranked as the second most polluted country in the world in 2023, with an average annual particulate matter ($PM_{2.5}$) level of 73.7 $\mu g/m^3$—more than 14 times the WHO guideline. Pakistan today.com.pkreuters.com. The 2024 Environmental Performance Index ranks Pakistan 176th out of 180 nations, highlighting ongoing weaknesses in air quality control, sanitation, and ecosystem health. bti-project.org These rankings result in substantial public health costs; recent estimates indicate that air pollution alone reduces life expectancy by 4–7 years in the most affected cities.

Industrial processes continue to drive environmental degradation. The Sindh Environmental Protection Agency reports that over 90% of Karachi's industrial wastewater is discharged untreated into coastal waters. In contrast, 417 MGD of domestic effluent and 80 MGD of industrial effluent reach the sea daily. Similar trends occur inland: field sampling in Rawalpindi found toxic, non-compliant effluents in nearly 90% of surveyed factories. The cumulative effect is the chemical pollution of waterways, soil contamination, and increasing smog events, especially from energy-intensive industries such as textiles, leather, and cement, which heavily rely on coal or furnace oil. A World Bank analysis reveals that Pakistan's industrial energy consumption is 38% more carbon-intensive than that of North America, underscoring the urgent need for decarbonization both economically and environmentally.

Although Pakistan has a relatively modern legal framework, including the Pakistan Environmental Protection Act (1997), the National Environmental Policy (2005), and the National Climate Change Policy (2012), among numerous provincial statutes, implementation is falling short. A 2023 federal audit revealed non-functioning laboratories, staff shortages, missing post-EIA monitoring, and delays of up to 420 days in approving EIAs, all of which weaken deterrence. minutemirror.com.pkwenewsenglish.pk Devolution after the 18th Amendment has further fragmented oversight: Khyber Pakhtunkhwa's plan to establish EPA offices in merged tribal districts has stalled for two years because only PKR 1,000 was released of the PKR 127 million budget.

Against this backdrop, the current study provides a systematic, evidence-based critique of Pakistan's environmental protection system, focusing on industrial pollution and institutional performance, while comparing it to best-practice regions, such as China's real-time monitoring system and the EU's circular economy policies.

Statement of the Problem

Despite decades of environmental laws, Pakistan's ecological indicators continue to worsen. Enforcement efforts are consistently underfunded: federal and provincial EPAs lack certified labs, digital monitoring tools, and trained inspectors, leading to minimal post-approval oversight and weak enforcement of penalties. minutemirror.com.pkwenewsenglish.pk

Industrial compliance remains poor; untreated discharges, especially from leather tanneries (such as Kasur) and textile mills, regularly surpass WHO limits for chromium, arsenic, and sulfides, risking groundwater contamination and public health. pmc.ncbi.nlm.nih.gov

Meanwhile, Pakistan’s share of global emissions is small, but its policy performance is rated in the “very low” category on the 2025 Climate-Change Performance Index, mainly due to low renewable energy adoption and lax industrial regulation.

The main issue, therefore, is not the lack of laws but the implementation gap caused by institutional

fragmentation, limited resources, and weak accountability systems. Without addressing these shortcomings, the ambitious targets set in Pakistan's NDCs, SDG agenda, and provincial climate action plans will stay aspirational.

Research Objectives

General Objective:

To evaluate the effectiveness of Pakistan's environmental laws and institutions in managing industrial pollution and propose reforms based on global best practices.

Specific Objectives:

1. Evaluate the effectiveness of existing laws in addressing current industrial pollution issues.
2. Evaluate the capacity of EPAs to enforce environmental regulations.
3. Analyze industry compliance with pollution control standards.
4. Identify international practices adaptable to Pakistan.
5. Recommend legal, financial, and governance reforms for better enforcement.

Research Questions

1. How effective are Pakistan's environmental laws in controlling industrial pollution?
2. What key constraints limit EPA enforcement capacity?
3. How compliant are major industries with pollution standards, and why do violations occur?
4. Which international best practices can be adapted to Pakistan's context?
5. What reforms can improve enforcement and promote cleaner industrial practices?

Research Methodology

The study uses a qualitative research approach to critically assess the effectiveness of Pakistan's environmental laws, institutional systems, and industrial compliance in controlling pollution. A descriptive and exploratory design was used to examine legal frameworks, institutional performance, and policy gaps. Data collection involved reviewing key legal documents (such as PEPA 1997, National Environmental Policy 2005, and provincial regulations), institutional audit reports, EIA records, tribunal decisions, and sectoral compliance data. Semi-structured interviews were conducted with key informants, including EPA officials, environmental law experts, NGO representatives, and industry stakeholders from the textile, leather, and cement sectors to gain insights into enforcement challenges and regulatory practices. Case studies of industrial zones in Kasur and Faisalabad were analyzed to evaluate local-level implementation and compliance behaviors. A comparative review of international best practices from China, India, and the European Union offered benchmarking insights into advanced enforcement mechanisms and policy models. Purposive sampling guided the selection of informants and case study locations, ensuring they were relevant to the study's goals. Thematic content analysis was used to analyze the data, identify common patterns, and develop practical recommendations. Ethical standards, including informed consent and participant confidentiality, were strictly followed. This approach provides a comprehensive framework for understanding the strengths and limitations of Pakistan's environmental protection system, as well as for recommending evidence-based reforms.

Legal and Institutional Framework

National Policies and Laws

Several legal instruments exist to guide environmental governance in Pakistan. However, most policies suffer from poor implementation and lack specificity in terms of targets and timelines.

- **Pakistan Environmental Protection Act (PEPA, 1997)**: This foundational act established the Pakistan Environmental Protection Agency (Pak-EPA) and authorized it to set environmental

quality standards, conduct assessments, and penalize violators of these standards. However, the act is often criticized for its vague language, lack of stringent enforcement mechanisms, and absence of public participation clauses (Naureen, 2009).

- **National Environmental Policy (2005)**: Projected to ensure sustainable economic development through conservation and efficient resource use. However, it lacks enforceable provisions, monitoring indicators, and actionable policy instruments (Khan, 2014).
- **National Climate Change Policy (2012)**: Although progressive in theory, the policy remains declarative mainly. It addresses climate change mitigation and adaptation, but fails to hold industrial sectors accountable through specific emission reduction targets or carbon pricing mechanisms (Ahmad, 2022).
- **Provincial Legislation**: After the 18th Constitutional Amendment (2010), environmental regulation was devolved to the provinces, resulting in laws such as the Punjab Environmental Protection Act (2012). However, uneven capacity across provinces has led to policy fragmentation and regulatory inconsistencies.

Institutional Challenges

The existing institutional setup is fraught with challenges that hinder effective environmental governance:

- **Capacity Constraints**: Most Environmental Protection Agencies (EPAs) lack technical expertise, modern monitoring tools, and operational budgets necessary for enforcement and inspections (Alam, 2018).
- **Judicial Inefficiencies**: Environmental tribunals are understaffed and underutilized. Legal proceedings are slow, and punishments are often inadequate to deter industrial violators.
- **Weak Inter-Agency Coordination**: The fragmented nature of governance post-devolution has led to unclear jurisdictions, overlapping responsibilities, and duplication of efforts.
- **Corruption and Political Interference**: In many instances, political influence shields major polluting industries from accountability, weakening the credibility and independence of EPAs.

Industrial Pollution and Non-Compliance

Industrial pollution is one of the leading contributors to environmental degradation in Pakistan, impacting air quality, water resources, and soil fertility. Three major sectors—textile, leather, and cement—are particularly culpable.

Major Polluting Industries

Industry	Key Pollutants	Environmental Impact
Textile	Chemical dyes, heavy metals	Water pollution, aquatic life disruption
Leather	Chromium, sulfides	Soil contamination, toxic waste accumulation
Cement	PM2.5 **(Particulate matter with a diameter of 2.5 micrometers),** CO2	Air pollution, respiratory health problems

The informal and unregulated operations of small and medium-sized enterprises (SMEs) exacerbate pollution, as these units often function without obtaining Environmental Impact Assessments (EIAs) or installing pollution control technologies.

Case Study: Tanneries in Punjab

Kasur, a city renowned for its leather industry, is home to over 200 tanneries that discharge untreated runoff into local water bodies. Despite the Punjab Environmental Protection Act (2012), tanneries

frequently violate emission standards due to bribery, weak regulation, and political backing. This has led to severe groundwater contamination, skin issues among residents, and the deterioration of agricultural land (World Bank, 2020).

Comparative Analysis with Global Best Practices

To identify feasible solutions, this study evaluates environmental governance models from other developing and developed countries:

Country	Policy Strengths	Lessons for Pakistan
EU	Circular economy, EPR laws[1], carbon markets	Implement product lifecycle regulation and carbon taxes
China	AI-enabled real-time emission monitoring systems	Introduce digital monitoring infrastructure
India	Active judicial interventions via PILs[2]	Promote citizen-led environmental litigation

- **European Union**: The EU's Emissions Trading Scheme (ETS)[3] Moreover, Extended Producer Responsibility (EPR) laws hold industries accountable from production to disposal stages, encouraging sustainable business models (EMAS, 2023).
- **China**: Embracing "Green GDP" metrics and pollution control technologies, China has significantly improved enforcement through the use of satellite imagery and IoT-based monitoring systems.
- **India**: Public-interest litigation has allowed communities to demand environmental accountability from polluters, making judicial redress more accessible.

Recommendations

Based on the evaluation, the following reforms are suggested:

Strengthen Enforcement Mechanisms

- Increase EPA funding for staffing, equipment, and training.
- Use satellite-based tools and IoT[4] Sensors to monitor real-time emissions and effluent discharge.

Promote Industrial Incentives

- Provide tax rebates and subsidies for the installation of Emission Treatment Plants (ETPs) and emission-reduction technologies.
- Establish a national green certification program to recognize and reward eco-compliant industries.

Enhance Legal Framework

- Amend PEPA to introduce stricter penalties and empower EPAs with greater autonomy.

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[1] **EPR laws** refer to **Extended Producer Responsibility (EPR)** laws — a policy approach where **producers are made legally responsible for the entire lifecycle of their products,** especially the **post-consumer (waste) stage.**

[2] A Public Interest Litigation (PIL) is a legal action initiated in a court of law for the enforcement of public interest, where legal rights or fundamental rights of a group or the general public are violated. Originated in India in the 1980s, now used in countries like Pakistan, Bangladesh, and Nepal.

[3] An **Emissions Trading Scheme (ETS) is a regulatory tool** designed to reduce **greenhouse gas (GHG)** emissions by using **market mechanisms.** It allows countries or companies to buy and sell **carbon emission allowances** under a legally binding cap, creating an incentive to **reduce emissions where it is cheapest to do so.**

[4] IoT-based sensors are **networked devices** that provide **real-time, on-site monitoring** of air and water pollutants, enabling granular insights at the industrial level.

- Standardize provincial regulations to ensure harmonization across the province.

Promote Public Participation and Transparency

- Mandate environmental reporting and disclosure by industries.
- Launch awareness campaigns on the impacts of pollution and environmental rights.

Accelerate Transition to Renewable Energy

- Facilitate affordable access to solar and wind energy for SMEs.
- Set sector-wise emission reduction targets in alignment with the Paris Agreement.

Adopt Collaborative Governance

- Establish multi-stakeholder environmental councils at the provincial level, including representatives from industries, academia, NGOs, and local communities.

Conclusion

Pakistan is at a crucial point in its environmental journey. While laws and policies exist, they are not backed by strong institutions or a strong political will. Industrial pollution continues to harm natural resources, posing a risk to public health and economic stability. A major change is needed—one that incorporates better enforcement, technological advancements, public oversight, and the adoption of clean energy. Drawing on global examples, Pakistan must swiftly overhaul its environmental governance to safeguard future generations and fulfill its international sustainability commitments.

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