

Evaluation of Implementation Strategies of Environmental Security of Pakistan

Muhammad Yasir Hassan¹, Haleema Qureshi²,
Muhamamd Fahim Ahmad³, Khurshid Alam⁴, Mr.
Muhammad Tayyab⁵

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Abstract:

Environmental security is essential for a nation's stability and development, yet Pakistan faces significant environmental challenges, including air pollution, deforestation, and biodiversity loss. The rapid urbanization, population growth, and climate change further exacerbate these issues. Human activities, particularly the burning of fossil fuels, contribute significantly to climate change through the emission of greenhouse gases. Pakistan's forest cover is alarmingly low, leading to increased deforestation driven by urbanization, overharvesting, and unsustainable agricultural practices. Despite having comprehensive environmental laws, Pakistan's enforcement mechanisms are weak, and there is a lack of coordination among stakeholders at all levels of government. The country also lags in adopting modern technological solutions for environmental monitoring. To address these challenges, recommendations include improving coordination through task forces, enhancing law enforcement, utilizing advanced technology, and investing in training for environmental staff. Awareness campaigns and the inclusion of environmental topics in education curricula are also vital for fostering a culture of sustainability.

Key words:

Environmental security, Climate change, Deforestation, law enforcement, Technology adoption

¹ Provincial Management Service-Khyber Pakhtunkhwa, Email: hassanyasir36@gmail.com

² Government of Azad Jammu & Kashmir, Email: haleemaq07@gmail.com

³ Police Service of Pakistan, Email: imransethidr@gmail.com

⁴ Provincial Management Service-Khyber Pakhtunkhwa, Email: khurshidpms75@gmail.com

⁵ Railways Commercial and Transportation Group (RCTG), Government of Pakistan

Introduction

Environmental security plays an important role in the progress and stability of a country. Pakistan holds the dubious distinction of being the world's third-most polluted country when it comes to air quality, compounding its environmental challenges. The swift pace of urbanization, coupled with climate change and population growth, presents further intricacies in this regard (Wikipedia).

Climate change refers to prolonged shifts in temperatures and weather patterns. Human activities have taken the lead as the primary driver of climate change since the 1800s, primarily through the burning of fossil fuels like coal, oil, and gas.

Burning fossil fuels releases greenhouse gases. The primary culprits behind climate change are greenhouse gases, which are generated from everyday activities like driving a car with gasoline, heating a building with coal, clearing land, and the deforestation process that releases carbon dioxide. Major sectors contributing to greenhouse gas emissions include energy, industry, transport, buildings, agriculture, and land use.

Pakistan has a small forested area of 4.478 million ha (5.1 percent), which amounts to 0.021 ha per person, compared to the world average of 1 ha per person. The drivers of deforestation include unplanned urbanization, overharvesting of forest products, high fuelwood demand and consumption, poor harvesting practices, overgrazing, forest fires, high population growth, rural poverty, unclear land tenure, flaws in existing policies, and limited financial resources for the green sector.

Biodiversity conservation is a component of sustainable development, which involves protecting and conserving different species, ecosystems, and genetic diversity. Conservation of biodiversity is crucial to the sustainability of sectors as diverse as energy, agriculture, forestry, fisheries, wildlife, industry, health, tourism, commerce, irrigation, and power.

Problem Statement

The stability of a country in the modern era lies in its national security, which comprises many areas such as the economy, food, and environment, etc. Climate, pollution, and resource scarcity are the major factors affecting environmental security. Moreover, Pakistan's fragile environmental conditions are due to many controllable and uncontrollable factors. Therefore, it has become imperative to delve deep into the policies, frameworks, and action plans addressing the issues of environmental security in Pakistan.

Scope

This study aims to analyze different dimensions of environmental security in Pakistan, such as climate change, pollution, and resource scarcity, covering issues like floods, deforestation, city garbage, and biodiversity. Further, we will evaluate policies, action plans, and implementation strategies.

Research methodology

Secondary research methods will be adopted, using research articles, publications, etc., available on the internet. Analytical techniques such as situational, comparative, SWOT, and GAP analyses will be carried out.

Literature Review

The global ecosystem faces a substantial threat from climate change, impacting both human lives and the natural environment (Wright et al., 2014). Once viewed as a natural seasonal variation, the pace and severity of climate change have been expedited by human activities (Trenberth, 2018). Taking substantial measures to decrease greenhouse gas emissions could cap the rise in global average temperatures at 2°C or below (IPCC, 2023). Conversely, without significant reductions in these emissions, the annual average global temperature may surge by 5°C or more by the close of this century compared to pre-industrial levels.

Pakistan possesses 0.5 percent of the world's renewable water resources. Despite being the fifth most populous country globally, it ranked 36th out of 184 countries in terms of total renewable water resources in 2017. To put it in perspective, India held the 8th position, while Bangladesh ranked 12th during the same period (Cheema et al., 2017). Increasing temperatures can cause faster melting of glaciers, resulting in glacial lake outburst floods. Over 3,000 glacial lakes have formed in Gilgit-Baltistan (GB) and Khyber Pakhtunkhwa (KP), with 36 of them identified as being vulnerable to dangerous glacial lake outburst floods (GLOF). Around 7 million people in GB and KP are exposed to the risk of glacial lake outburst floods, which typically occur in July and August, the warmest months (Abubakar, 2020).

In recent years, Pakistan has increasingly faced significant challenges, including inconsistent monsoon weather, leading to both extensive floods and prolonged droughts. The production of major crops such as wheat, maize, cotton, rice, and sugarcane is under threat from climate change. Projections indicate a potential 3°C temperature rise by 2040 and 5-6°C by the

end of the 21st century. This temperature increase could lead to a substantial loss of up to 50% in wheat productivity, especially in Asian countries (Ghanem, 2010). Pakistan, given its geographical position, is anticipated to experience even greater losses. In 2022-23, climatic changes, including a 7-10°C temperature increase from March to May and a shortage of irrigation water, severely damaged the cotton crop. This led to adverse effects on cotton germination, seedling growth, and issues like leaf wilting (Pakistan Eco Survey, 2022-2023).

It is projected that by 2050, 200 million people will be on the move due to famine, land loss, and environmental degradation (Oxfam, 2009). Recently, due to the floods in 2022, almost one-third of Pakistan was inundated. More than 30 million people were affected. Of these, nearly 8 million were forced to migrate to safer places to save their lives. Approximately 640,000 under-aged girls were victims of gender-based violence, including child marriages.

The World Bank classifies Pakistan as a water-stressed nation. There are seven main rivers entering Pakistan from upper riparian states, including the Kabul River from Afghanistan, and the Indus River, Jhelum River, Chenab River, Ravi River, and Sutlej River from India. Potential water scarcity not only threatens Pakistan's economy but also poses a serious threat to the lives of millions of Pakistanis.

Water pollution is increasing largely due to the growing economy and population, and an almost complete lack of water treatment. The sources of water pollution include the overuse of chemical fertilizers and pesticides, the dumping of industrial effluents into lakes and rivers, untreated sewage being dumped into rivers and the ocean, and contaminated pipelines being used to transport water. Consequently, most of the reported health problems in Pakistan are either a direct or indirect result of polluted water. Forty-five percent of infant deaths are due to diarrhea, and 60% are due to overall waterborne diseases. According to researchers, Pakistan is projected to become the most water-stressed country in the region by 2040. The megacities of Pakistan, such as Karachi, Lahore, Islamabad, and Rawalpindi, face the issue of noise pollution. The main source of this pollution is traffic noise caused by buses, cars, trucks, rickshaws, and water tankers. A study showed that on one of Karachi's main roads, the average noise level was around 90 dB and could reach about 110 dB. This high level of noise pollution can cause auditory and non-auditory health issues. There are very few, vague laws and policies regarding noise levels. There is no accountability, and while the federal and provincial environmental protection agencies receive dozens of complaints on noise pollution from the public, these agencies are unable to take action due to legal constraints and the absence of national noise level standards. According to a World Bank report, "Karachi's urban air pollution is among the most severe in the world, causing significant damage to human health and the economy." The inefficient use of energy, an increase in the

number of vehicles used daily, an increase in unregulated industrial emissions, and the burning of garbage and plastic have contributed the most to air pollution in urban areas. According to a recent study, the Sindh Environment Protection Department claims that the average level of pollution in large cities is approximately four times higher than the WHO's limits. These emissions have detrimental effects, including respiratory diseases, reduced visibility, loss of vegetation, and an effect on the growth of plants. The inadequate air emission treatments and lack of regulatory control over industrial activity have contributed to the deterioration of ambient air quality in major cities. This leads to a reduction in soil purity. The destruction of forests, massacre of species, improper and unscientific cultivation of land, use of pesticides and herbicides, industrial waste, and automotive emissions are the factors behind land pollution.

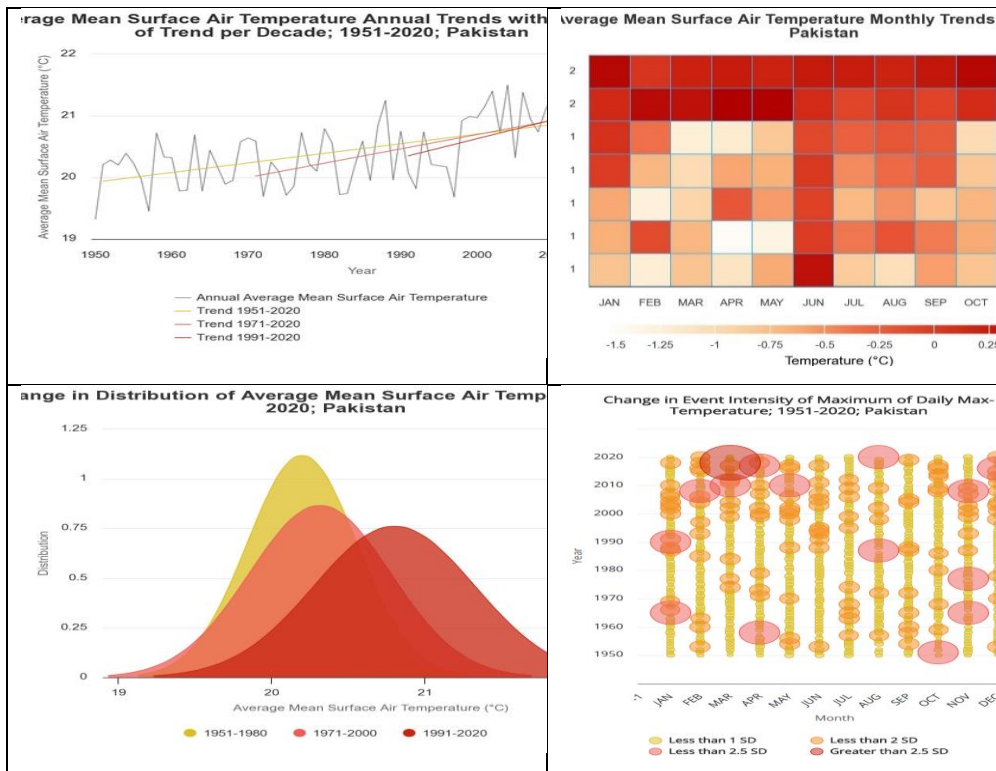
Analysis

Situational Analysis

Prevalent condition of the environmental components will be explored here including climate change, pollution and resource scarcity:

Climate Change

Pakistan is situated in temperate zone, and variation in climate is due to the diverse topography of the country. Generally, the coastal areas and lowland plains along the Indus River experience dry and hot conditions, while the climate gradually becomes cooler as you move towards the northern uplands and Himalayas. According to Ahmad et al. (2015), Pakistan ranks the fifth most susceptible country to the effects of climate change (UN_Habitat, 2023). As the population of Pakistan grows alongside urbanization, the consequences of climate change are expected to bring about severe and damaging impacts (Anwar et al., 2020). The record-high temperature during April in the country has resulted in the melting of glaciers faster than normal; a key highway bridge in the Gilgit-Baltistan region has been swept away in flash flooding caused by glacier melt. In Pakistan, river flows are expected to increase during the first 50 years and decrease by 30-40 percent during the next 50 years. The Indus River could likely become a seasonal river in the future. Therefore, in future, the chances of flash floods, deforestation and ecosystem degradation has increased.



Pollution

Pollution is responsible for the deaths of about 6.5 million people annually around the world (WHO 2016). According to the World Bank Group, (2016), each year, more than 5.5 million people experience premature death from illnesses caused by breathing polluted air. It kills around 6 times more people than malaria and almost 4 times more numbers than HIV. About 1 in 10 deaths around the world can be associated with exposure to harmful air pollution, and reducing the effects of air pollution can annually save around 13 million lives worldwide (World Health Organization, 2014). Today, one-third of the deaths associated with strokes, lung cancer, and chronic respiratory diseases have been linked with air pollution. On top of this, according to the WHO, about 90% of the population in low and middle-income countries do not have access to clean air (World Bank, 2016). The situation seems far worse in developing countries, which constitute some of the world's fastest growing urban regions. In these regions, pollutant concentrations and exposures are consistently higher than WHO permissible limits because of burgeoning industrial activities, an overreliance on dirty fuels (like wood, coal, and residual furnace oil) for power generation and other industrial activities, a lack of essential awareness regarding healthcare, inadequate air quality standards, and outdated technologies.

Pakistan generates approximately 49.6 million tons of solid waste a year, increasing more than 2.4 percent annually. Pakistan lacks waste management infrastructure like other developing countries, creating serious environmental problems. Most municipal waste is either burned, dumped, or buried on vacant lots, threatening the health and welfare of the general population. The Government of Pakistan (GOP) estimates that 87,000 tons of solid waste is generated per week, mostly from major metropolitan areas. Karachi, Pakistan's largest city, generates more than 16,500 tons of municipal waste daily. All major cities face enormous challenges on how to manage urban waste. Bureaucratic hurdles, lack of urban planning, inadequate waste management equipment, and low public awareness contribute to the problem.

Table 1: Solid Waste Generation in Major Cities of Pakistan

City	Population in Million	Solid Waste Generation/day in tons
Karachi	20,500,000	16,500
Lahore	10,000,000	7,690
Faisalabad	7,500,000	5017
Rawalpindi	5,900,000	4,500
Hyderabad	5,500,000	3,973
Multan	5,200,000	3,680
Gujranwala	4,800,000	3,480
Sargodha	4,500,000	3,072
Peshawar	2,900,000	2,048
Quetta	600,000	716

Table 2: Composition of Municipal Solid Waste (MSW) in Pakistan

Category	Percentage
<i>Ash, Bricks & Dirt</i>	18
<i>Glass</i>	6
<i>Textile</i>	2
<i>Cardboard</i>	7
<i>Food Wastes</i>	30
<i>Leather</i>	1
<i>Paper</i>	6
<i>Plastic</i>	9
<i>Rubber</i>	1
<i>Metal</i>	4
<i>Wood</i>	2
<i>Yard Wastes</i>	14

Therefore, all major cities face enormous challenges in managing urban solid and sewage waste. Poor capacity, lack of financial resources, lack of waste management equipment and technology, lack of urban planning, and low public awareness contribute to the problem. Sewage and solid waste-related diseases cause over 5 million deaths each year.

Various recycling techniques are used to address the problem; however, the lack of technology, capacity, and resources makes it difficult for developing countries to embark on such ventures. Pakistan still uses outdated techniques for sewage and solid waste management.

Recycling valuable materials like plastic, tin, paper, glass, etc., is now gaining momentum in the informal sector, as scavengers collect such items to sell at recycling points in urban centers. However, decomposable solid and sewage waste still poses challenges, as there is no recycling arrangement, nor is there any price tag on their trade.

Therefore, decomposable waste is dumped in open spaces all over cities and urban centers. As decomposition begins, smell and bad odor pose another challenge to the surrounding cities and urban centers. Biogas is produced from the anaerobic digestion (AD) of organic matter, such as manure, municipal solid waste (MSW), sewage sludge, biodegradable wastes, and agricultural slurry, under anaerobic conditions with the help of microorganisms, which offers hope for recycling such decomposable waste.

Resource Scarcity

Pakistan is a water-stressed country with poor per capita water availability, below the international threshold of 1,000 cubic meters per year. The country relies heavily on the Indus River system for its water supply. In 2021, Pakistan ranked 147th out of 180 countries in water resource management. It is estimated that Pakistan is facing a water deficit of 109 billion cubic meters per year.

Pakistan is in the process of planning, developing, and managing water resources to meet the needs of people and the environment. The following is the data regarding water availability estimates from different sources:

Resource Name	Availability
Long term annual avg rainfall (mm)	494
Total internal renewable water resources (10^9 m ³ /year)	55
Total external renewable water resources (10^9 m ³ /year)	192
Ground Water (% of renewable water resources)	19%
Total renewable water resources (10^9 m ³ /year)	247

Deforestation:

Ideally, the forest cover of any country should be 25%, while in Pakistan the ratio is almost 4% of the total area. Trend of increase in Forest cover and its subsequent decrease over the years is demonstrated as follows;

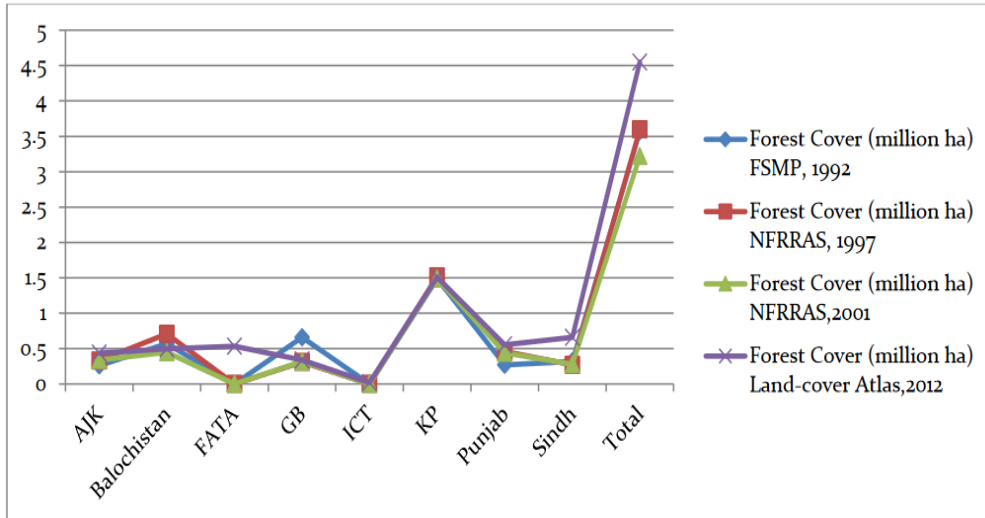
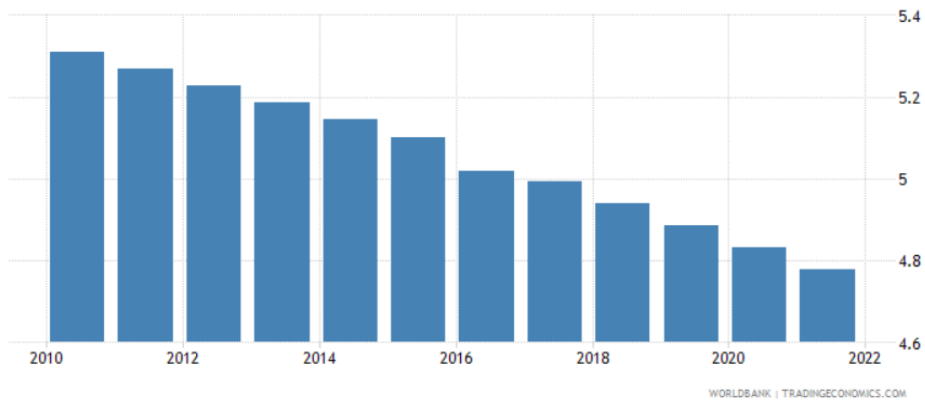


Figure-3 Changes in forest cover from 1992 to 2012 (Million ha) by Province



Pakistan - Forest Area (% Of Land Area)

[Pakistan - Forest Area \(% Of Land Area\) - 2023 Data 2024 Forecast 1990-2021 Historical \(tradingeconomics.com\)](https://tradingeconomics.com/pakistan/forest-area-%-of-land-area)

From 2001 to 2022, Pakistan lost 9.80 kha of tree cover, equivalent to 1.0% of decrease in tree cover since 2000.

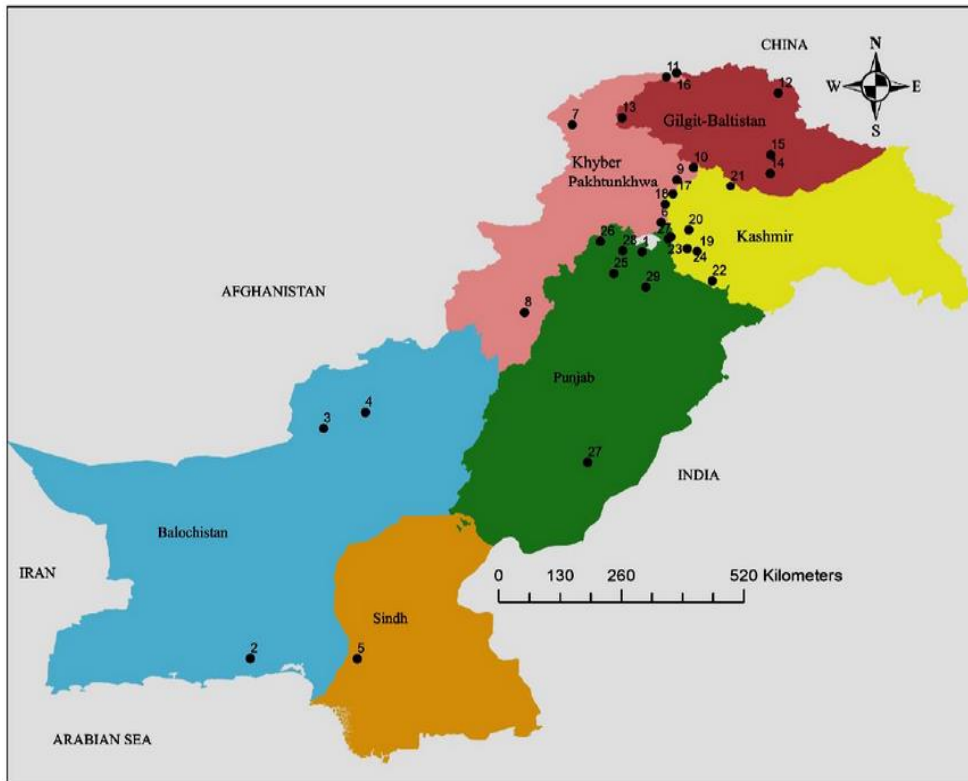
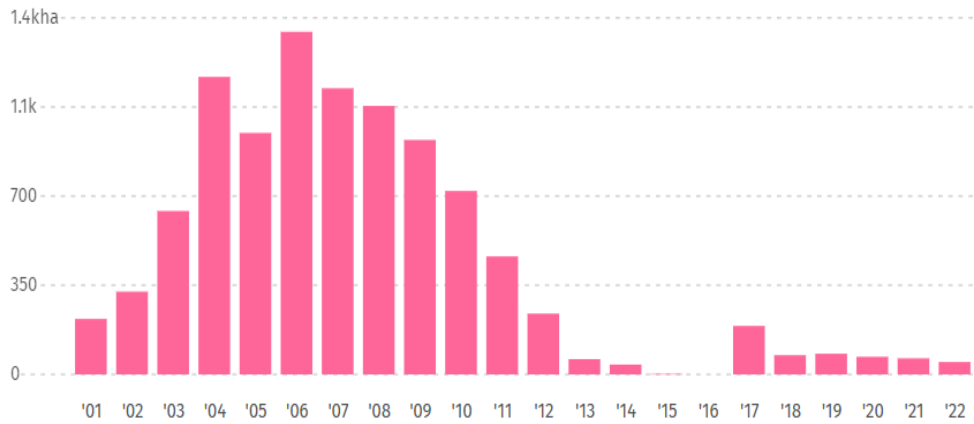


Fig. 1. Map of Pakistan showing locations of National Parks (IUCN Pakistan, 2023).

Table 7: Annual growth rate of the natural resources

Period	Agriculture	Forest	Grassland	Shrubland	Sparse vegetation	Wetland	Waterbody
1992-1995	0.1%	-0.2%	0.0%	-0.3%	0.0%	0.2%	-0.5%
1995-2000	0.2%	-1.1%	0.7%	-1.0%	0.6%	0.7%	-1.5%
2000-2005	0.0%	-0.1%	1.3%	-0.1%	0.5%	0.3%	-0.1%
2005-2010	0.0%	0.2%	1.1%	-0.0%	0.1%	0.6%	-0.9%
2010-2015	-0.1%	0.0%	0.0%	0.0%	0.1%	0.0%	0.3%
2015-2019	-0.2%	1.0%	0.2%	0.0%	0.6%	-0.0%	0.2%

Table 1. Protected Areas in Pakistan showing current number, total and percent area identified as PAs of different categories of PAs in the provinces/ territories of Pakistan (IUCN Pakistan, 2023).

Province/Territory	National Park	Wildlife Sanctuary	Game Reserve	Community Conservation Area / Community Game Reserve	Private Game Reserve	Marine Conservation Area	Wildlife Refuge	Wildlife Park	Total	Area of province/ territory under PAs (ha)
Islamabad Capital Territory	1	1	1	--	--	--	--	--	3	93,186
Azad Jammu & Kashmir	8	1	11	--	--	--	--	--	20	123,762
Balochistan	3	14	6	3	--	3	--	--	29	2,472,960
Gilgit-Baltistan	5	2	5	48	--	--	--	--	60	4,527,200
Khyber Pakhtunkhwa	6	3	38	90	16	--	2	8	163	1,065,453
Punjab	6	37	23	4	5	--	--	16	89	1909922
Sindh	1	34	13	--	--	--	--	--	48	1855981
Total	30+4*	92	97	145	21	3	2	24	414	12048464

*Four proposed: Nanga Parbat National Park, Himalaya National Park (Gilgit-Baltistan); Tilla Jogian National Park, Salt Range National Park (Punjab).

Floods

The total damage is estimated at PKR 3.2 trillion (US\$14.9 billion), total loss at PKR 3.3 trillion (US\$15.2 billion), and total needs at PKR 3.5 trillion (US\$16.3 billion). The sectors that suffered the most damage are housing at PKR 1.2 trillion (US\$5.6 billion); agriculture, food, livestock, and fisheries at PKR 800 billion (US\$3.7 billion); and transport and communications at PKR 701 billion (US\$3.3 billion). The transport and communications sector has the highest reconstruction and recovery needs at PKR 1.1 trillion (US\$5.0 billion); followed by agriculture, food, livestock, and fisheries at PKR 854 billion (US\$4.0 billion), and housing at PKR 592 billion (US\$2.8 billion). The provinces of Sindh and Balochistan account for approximately 50 percent and 15 percent of recovery and reconstruction needs, respectively.

Region	Damage		Loss		Needs	
	(Billion PKR)	(Million US\$)	(Billion PKR)	(Million US\$)	(Billion PKR)	(Million US\$)
Baluchistan	349	1625	541	2516	491	2286
KP	201	935	141	658	168	780
Punjab	111	515	122	566	160	746
Sindh	1948	9068	2444	11376	1688	7860
Cross Provincial	587	2731	14	67	975	4540
Special Regions	7	32	11	49	10	48
Grand Total	3202	14906	3272	15233	3493	16221

Policy Analysis

There are many policies and laws related to environmental security. A comprehensive legal framework exists in the fields of climate change, pollution control, deforestation, biodiversity, and water scarcity. The following laws and policies exist in this regard:

- Constitution of Pakistan, 1973
- Environmental Protection Ordinance (PEPO), 1983
- Pakistan Environment Protection Act, 1997
- Environmental Quality Standards
- Fisheries Act, 1997
- Pakistan Environment Protection Ordinance 1983, revised in 1997
- The West Pakistan Regulation and Control of Loudspeakers and Sound Amplifiers Ordinance (11), 1965
- The Pakistan Agricultural Pesticides Act, 1972
- The Pesticide Rules
- The Canal and Drainage Act (No. VIII) 1873, amended in 1952, 1965, 1968, 1970
- The Sindh Litigation Act, 1879, amended in 1961, 1969
- The West Pakistan Water and Power Development Act, 1958, amended in 1958, 1964, 1967
- The West Pakistan Land and Water Development Board (Authority for payment from Board Fund) Rules, 1966
- The Greater Lahore Water Supply Sewerage and Drainage Ordinance, 1967
- Water Supply and Drainage Forest Act, No. XVI, 1927
- Wild Birds and Animals Protection Act, 1912
- The Punjab Wild Birds and Wild Animals Protection Act (No. XIII), 1955
- Punjab Wildlife (Protection, Preservation, Conservation, and Management) Ordinance (No. XXI), 1972, specifically related Rules, 1973
- West Pakistan Wildlife Protection Ordinance, 1959
- Wildlife Conservation Wildlife Protection Rules, 1960
- Wildlife Protection Ordinance (No. LVI) 1959

A comprehensive legal framework exists to control environmental issues. However, there are certain issues that prevent these laws from being properly implemented. The role of stakeholders has been ignored. Although interdepartmental coordination and responsibilities have been identified, the implementation mechanism has not been clearly defined, leading to the failure to achieve targets and tasks.

The EPA is the primary law enforcement body in all provinces, with vast functions and powers, including:

- Preparing and implementing environmental policies, which have also been adopted by the provincial environmental protection agencies under the Punjab Act and the Balochistan Act;
- Establishing ambient standards for air, water, and land;
- Preparing, revising, and enforcing the NEQS (National Environmental Quality Standards);
- Establishing systems and procedures for inspection, monitoring, and auditing to prevent and control pollution;
- Promoting research and development in science and technology for pollution prevention, environmental protection, and sustainable development;
- Certifying environmental laboratories;
- Specifying safeguards to prevent accidents and disasters that may cause pollution.

Furthermore, the EPA or the provincial environmental protection agency may undertake investigations into environmental issues based on complaints or on its own accord. The EPA may summon any person to furnish information or data relevant to its functions; enter and inspect, under a search warrant, any land, building, premises, vehicle, or vessel where there are reasonable grounds to believe an offense under PEPA, the Punjab Act, or the Balochistan Act has been committed; take samples of any material and arrange for tests and analysis; and confiscate any article used in the commission of any offense.

Pollution Charge

PEPA empowers the federal government to levy a pollution charge on any person who fails to keep the discharge of effluent, waste, air pollutants, or noise within the standards provided in the NEQS or any other standards established under PEPA. The federal government has also notified rules for the determination of pollution and pollution charges, and the calculation, payment, and collection of pollution charges. However, a pollution charge has never been levied, and this tool has almost not materialized due to conflict between the EPA and provincial governments over the use and ownership of the money to be collected. As both the Punjab Act and the Balochistan Act have adopted pollution charges, it is hoped that there are now better chances for its implementation at the provincial level.

Administrative Penalties

PEPA also empowers the director general, federal or provincial, as the case may be, to impose administrative penalties on any person who contravenes any provision of PEPA. However, there are no notified rules for providing a mechanism to calculate and impose the penalty. Hence, this provision is still not in use.

Licenses

Any person who generates, collects, consigns, transports, treats, disposes of, stores, handles, or imports any hazardous substance requires a license issued by the federal or provincial environmental protection agency. However, the process of issuing licenses is to be prescribed through rules, which have been drafted since 2003 but have not yet been notified. Hence, there can be no implementation due to the lack of procedures.

Self-Monitoring and Reporting by Industries

Under the Self-Monitoring and Reporting System (SMART), industries in Pakistan are responsible for systematically monitoring their environmental performance and reporting the data to environmental protection agencies. Self-Monitoring and Reporting Rules classify industries into three categories—A, B, and C—each corresponding to a specified reporting frequency. Category A industries are required to report their liquid and gaseous emission levels as per the priority parameters set out in schedules to these rules, every month. Category B industries must report their liquid and gaseous emission levels quarterly, and Category C industries must report their liquid effluent biannually as per the schedule.

In theory, this system appears to be comprehensive. However, in reality, it has been less effective than expected. None of the industries are regularly reporting, and the ones that do end up reporting are not providing detailed and correct information. Monitoring through SMART was established through rules which do not provide a mechanism for proper enforcement, and no checks are provided for violations of these rules. Violations of the SMART program could be checked under PEPA, if there were an efficient working regulatory body with adequate resources, human resources, and infrastructure facilities. Thus, the industry has no fear of authorities, as no serious steps are taken against them. This system is practically ineffective at present.

Technology adoption and usage have not been prioritized in the policies and laws. In other words, the laws and policies are not in conformity with advanced technology. Pakistan lags behind the rest of the world in the use of modern technology due to unskilled staff and a lack of resources.

There are 457 targets distributed among the stakeholders/departments in the environmental policy. The majority of the targets are idealistic. For the implementation of strategies, a committee has been constituted under the Secretary of Forests of the provinces. Some eight department secretaries are its members. However, no secretary attends the meetings and instead sends their section officers, resulting in strategies not being implemented and best practices not being adopted.

Although the policy is future-oriented and meets international commitments, no proper mechanism or plan has been provided to the stakeholders so that they can perform with clarity. Also, the use of technology has been ignored in the implementation phases.

There is a significant loophole in the implementation mechanism of the targets within the departments. Although responsibilities have been assigned to various departments, within the departments, nobody knows what to do, how to do it, or who will do it.

There are no parameters for assessing the impact of the targets assigned to the departments. In such a scenario, there is no difference between those who perform and those who do not. Some glaring duplications and gaps in the policies are shown in the table below:

Policy Gaps

Sector	Policy	Remarks
Agriculture	Develop appropriate digital simulation models	Model already exists NARC, PARC, Agri Resch
	Enhance the capacity of the farming community to take advantage of the scientific findings of relevant research organizations	Lack of coordination B/W deptt and farmer
	Develop capacity based on Remote Sensing and GIS techniques to assess temporal changes in land cover in different agro-ecological zones;	Already in practice
	Establish Climate Change Units in agriculture research organizations to devise adaptive strategies for projected impacts of climate change on agriculture;	Duplication with GCISC (MOCC) and Agri Univ
Water	Assess and address the needs for additional water storage and distribution infrastructure	Already done
	Develop necessary infrastructure to harness the potential of hill torrents	Flash floods
	Ensure water conservation at all levels, reduce irrigation system losses and provide incentives for adoption of more efficient irrigation techniques	Already incentivized in the form of extremely low pricing
	Ensure rational ground water exploitation by avoiding excessive pumping	Regulatory authority should be formed
	Enact and enforce laws and regulations required for efficient water resource management and a ground water regulatory framework	Intl frameworks and local laws exists, need to be implemented

	Strengthen the current hydrological network to monitor river flows and flood warning systems	Already exists, need integration
Forest	Establish a federal level Center of Excellence on forestry for international level research and higher level education.	PFI already exists, need to enhance it capacities, both in HR and Tech.
	Encourage use of alternate fuels to prevent deforestation	Alternative fuel exists, but costly
Bio Diversity	Establish protected areas in all vulnerable ecosystems, particularly in coastal and marine areas	Exists, already protected areas. Need to implement laws by taking stake holders into confidence
Coastal and Marine Eco-system	Construct barriers near low lying coastal human clusters to safeguard against rising sea level and cyclones	First priority much be given to poorest settlements
	Identify vulnerable coastal areas that should be protected from any infrastructure construction or commercial activities and notify the level of activities allowed in these areas	Already developed Housing Society near Karachi coast/Beach
	Ministry of Climate Change may assist Ministry of Maritime Affairs to fully exploit the potential of 'Blue Economy' while preserving the health of marine and coastal ecosystem	National Institute of Oceanography can also be included
Disasters Preparedness	Develop disaster management institutions, mechanisms and capacities that are capable of addressing multiple hazards and raises the resilience, efficiency and effectiveness of the whole system as outlined in National DRR Policy-2013	PDMA/DDMU already exists, need to increase their capacities

Institutional/ Stakeholder Analysis

The following institutes are stakeholders in implementation of the policies pertaining to environment:

Ministry of Environment; Pakistan Environmental Protection Council (PEPC); Pakistan Environmental Protection Agency; Provincial EPAs; Environmental Tribunals; Pakistan Wildlife Management Boards; Ministry of Food and Agriculture, Forest Departments, Forest and Wildlife Conservation; Water and Power development Authority; Ministry of Health and Social Welfare; Ministry of Planning and Development; Ministry of Defense; Ministry of Petroleum and Natural Resources; Ministry of Production; Ministry of Science and Technology; Ministry of Water and Power; Pakistan Atomic Energy Commission.

There is lack of coordination amongst the stakeholders. More than one departments share responsibility of implementation of certain tasks. Due to lack of coordination the task remains incomplete and inattentive. There is also lack of training on parts of certain departments who have recently been included in the implementation strategy. Some departments even are not aware of their responsibilities. Human Resource capabilities of certain departments are questionable. Some departments are facing shortage of staff and resources. Budgets are not sufficient to meet the needs of the modern technology and methods of improving environmental conditions. Furthermore, main stakeholders like farmers, keln operators etc. have not been taken into confidence at the time of preparation of the policies and adaptation plan. This lack is the worst of all. Those who have to adopt or implement strategies are not aware of it.

Following Ministries/ departments are responsible for implementation of policies/regulatory framework regarding mitigation of deforestation and conservation of Biodiversity in Pakistan;

Ministry of Climate Change and Environmental Coordination

Under the Constitution of Pakistan, forestry is a provincial subject implying that state forestlands belong to provinces and management of forests is in hands of provincial forest departments. Forestry Wing is established under the Ministry of Climate Change and Environmental Coordination which is mandated to perform the functions of formulation of National policy, plans, strategies and programs regarding ecology, forestry, wildlife, biodiversity and desertification, and coordination, monitoring and implementation of environmental agreements with other countries and international agencies.

Forest and Wildlife Departments in Provinces

Forest and Wildlife Departments have been established in all of the four provinces and AJ&K which are headed by a Chief Conservator of Forests, who is mandated to manage government forests, national parks, wildlife, and wetland resources of the region. The Department is also responsible for promoting farm forestry, soil conservation, watershed management, and community-based conservation.

Federal and Provincial Planning and Development Departments

Planning and Development Departments in provinces and at Federal level are responsible for preparation of annual and perspective plans for development in Pakistan. All natural resource conservation projects are evaluated and approved by these departments. They also recommend allocation and distribution of funds to various line departments for conservation and development activities. The departments are also responsible for monitoring and implementation of field projects and ensuring sustainability of conservation initiatives.

Agriculture Department of Provinces

Agriculture department in provinces are responsible for maintaining crop biodiversity in Pakistan and for promoting in-situ and ex-situ conservation of local varieties of crops and fruit trees. Their mandate is to provide extension services to farmers for the development of agriculture and horticulture including provision of seed and fruit plants to farmers.

Livestock Department

Livestock Department is responsible for maintaining livestock diversity, controlling diseases, and providing veterinary services to farmers.

Fisheries Department

Fisheries department is responsible for managing fisheries resources in the sea, rivers, streams, and lakes of Pakistan. They have the mandate to promote aquaculture and regulate fishing. The department maintains a number of fish farms and hatcheries, and provide fingerlings to farmers in order to maintain fish biodiversity in Pakistan.

Pakistan Environmental Protection Agency

The PEPA at Federal and Provincial level is responsible for implementing the PEPA, 1997 in the country. The PEPA also provides technical assistance to the Capital Administration and Development Division.

Pakistan Forest Institute (PFI)

After the promulgation of the 18th Constitutional Amendment, PFI has been devolved to the Provincial Government of KPK under the Environment Department with the mandate of improvement of the environment and conservation of forests resources and providing training in the specialized fields of forestry.

Pakistan Agricultural Research Council (PARC) & National Agricultural Research Center (NARC)

PARC and NARC are autonomous bodies established with the functions to undertake, promote and coordinate agricultural research, expedite utilization of research results and generate, acquire, and disseminate agricultural information. Animal Sciences Institute Crop Sciences Institute, Farm Machinery Institute Horticultural Research Institute and Rangeland Research Program Institute of Plant & Environmental Protection are the subsidiaries of NARC with specified functions of biodiversity and forest conservation.

NGOs

In addition to the public institutions, several NGOs are active in promoting forestation and biodiversity conservation in Pakistan, including World Conservation Union (IUCN),

WWF-Pakistan, Interco operation, Sungi Development Foundation, Lead Pakistan, the Himalayan Wildlife Foundation (HWF), and Wildlife Conservation Society (WCS).

Apex Environmental NGOs in Pakistan and Areas of Focus Environmental Sub-sectors and Issues

No.	Environmental Sub Sector and Issues	No. of NGOs
1.	Sustainable Forestry	08
2.	Biodiversity and wildlife conservation	04
3.	Sustainable agriculture, marine and coastal resources, fisheries, climate change and ozone depletion, urban environment and development, and environmental impact controls	03
4.	Air quality and pollution, chemicals management, rangeland management, and desertification	01

In addition, there are some local NGOs, community-based organizations (CBOs), and Welfare Committees, which have been active in conserving wildlife, fisheries, and forest resources.

Comparative Analysis

Following is the comparison of Pakistan with two developing countries:

ITEMS	BHUTAN	SRI LANKA	PAKISTAN
Constitutional Status on Environmental Protection	Does not have a constitution.	Duty of the State and every person. After 1987, Amendment Provincial govt. & executive power to protect environment, nature and its riches.	Environmental pollution and ecology brought in the concurrent legislative list in 1993.
Major Environmental Laws	Environment Assessment Act - 2000; Forest & National Conservation	National Environment Act '80; NEPA and Forest Conservation	Pakistan EPA 1997 and a web of other environment-

	Act, '95; and Mines Act 1997 address environmental issues	Act. Coast Conservation Act also in existence.	related enactments.
Institutions Directly Responsible for implementation.	National Environmental Commission	Ministry of Environment, Central Environmental Authority	Ministry of Environment; Apex body- Central Environment Protection Authority. Local authorities oversee the local matters.
Environmental Tribunals			The EPA provides for Environment Tribunals, which are to have exclusive jurisdiction to try serious violations.
Environmental Policies, Strategies and action Plans	Environment policies include Paro Resolution on Environment and Sustainable Development, Bhutan's Sustainable Development Strategy, Framework Guidelines for EIA developed in '92.	National Conservation Strategy adopted in '88 & National Env'tal Action Plan adopted in '91 National Policy on Industry and Env't issued in '96. National Forest policy adopted in 1996 Coastal Zone Mgmt Plan '90 - under revision.	National Conservation Strategy of Pakistan, Five Year Plans incorporate principles of sustainability
Judiciary		The SC and Court of Appeals exercise writ jurisdiction. Locus standi widened to hear PILs.	The SC and Court of Appeals exercise writ jurisdiction. Locus standi widened to hear PILs.

Furthermore, given below is the comparison of Pakistan's environmental policies with developed countries:

Criteria	Sweden	Pakistan
Legal provisions	5	5
Appeals	0	1
Time limits	1	1
Competent authority	1	1
Review body	1	1
Sectoral authorities	1	1
Coordination	N/A	N/A
Screening categories	2	2
Screening approach	1	1
Scoping approach	1	1
Alternatives	1	1
Report contents	1	1
Report review	1	1
Public participation	1	1
Decision making	1	1
Environment Management Plans (EMPs)	N/A	N/A
Mitigation	1	1
Monitoring requirements	1	1
Total	20	21
Item	Sweden	Pakistan
Initial legislation	EPA 1981	1983 Ordinance No. 37
Enabling legislation	Road Act 1987	EPA 1997
Current legislation	Environmental Code	NEP 2005
Decree/regulation/order	Ordinance on Environmental Impact Statements	EIA/IEE regulations 2000
Other legislation or additional requirements	Planning and Building Act	No information available
Status of regulations	Legislated	Legislated
Provision for appeal	Present	Present
Specification of time limits	Present	Present
Screening	Country administrative board	Federal and provincial EPAs
Scoping	Developer ensures consultation with authorities	Proponent consult with private consultants
Review	Country administrative boards	Federal and provincial EPAs

Decision-making	Country administrative boards	Federal and provincial EPAs
Appeal regarding screening	No Appeal	Present
Decision on development	Environmental court, superior or supreme court	Federal and provincial EPAs
Implementation of individual parts	NA	NA
Monitoring	Developer	Proponent
Competent authority and environmental acceptability	Present	Present
Review body	Present	Present
Specification of sectoral authorities' responsibilities	Present	Present
Specified screening categories	2	2
Specified scoping approach	Threshold list	Threshold list
Systematic report content	Present	Present
Public participation in process	Present	Present
Systematic decision-making	Present	Present
Requirements for mitigation of impacts	Present	Present
Requirement for impact monitoring	Present	Present
Existence of general and/or specific guidelines, sectoral authority procedures	Present	Present
Systematic implementation monitoring	Present	Present

Gap Analysis

Current State	Desired State	Gap
Lack of coordination between different government agencies	Improve coordination between government agencies	The government should establish a central agency responsible for coordinating environmental protection and management. This agency should be given the authority to oversee the implementation of environmental strategies and to resolve disputes between different government agencies.
Insufficient funding	Increase funding for environmental protection	The government should allocate more funding to environmental protection and management. This funding should be used to support the implementation of environmental strategies, to strengthen environmental law enforcement, and to raise public awareness about environmental issues.

Weak enforcement of environmental laws and regulations	Strengthen environmental law enforcement	The government should take steps to strengthen environmental law enforcement. This includes increasing the number of environmental inspectors, providing them with better training, and increasing the penalties for environmental violations.
Lack of public awareness	Raise public awareness about environmental issues	The government should launch public education campaigns to raise awareness about environmental challenges and the steps that can be taken to address them. These campaigns should target all segments of society, including youth, women, and rural communities.
Element of corruption	Rooting out corruption	Those involved in corrupt practices needs to be dealt with iron hands by giving exemplary punishments

SWOT Analysis

SWOT Analysis of Ministry of Climate Change	
Strengths	Weaknesses
<ul style="list-style-type: none"> • Pakistan primary authority on climate • Change- mandate of policy programs, team of experts, Scientists. • Strong network of partnership with international organizations Like UNFCCC (UN Framework convention on climate change). • GEF (Global Environment facility) which provides access to financial and technical resources. • Strong public awareness components , engagements with communities and stakeholders • Running green Pakistan program for reducing effects of climate change 	<ul style="list-style-type: none"> • Nascent ministry established in 2010, • Limited coordination, • Narrow focus on mitigating measures. • Limited budget for implementing its policies and programs • Not doing enough to address vulnerable • Lack of clear strategies, programs • Policies are reactive and on adhoc basis
Opportunities	Threats
<ul style="list-style-type: none"> • Growing awareness, • Recipient of climate finance, • Growing potential for renewable energy development. • Growing demand for climate smart agriculture. 	<ul style="list-style-type: none"> • Complex and challenging issue • Resistance from vested interests •

SWOT Analysis of PDMAs	
Strengths	Weaknesses
<ul style="list-style-type: none"> • Main authorities with authority and mandate • Strong presence in all districts • Excellent working relationship with gov.t entities and NGOs • Access to variety of resources, funding, equipment and personnel 	<ul style="list-style-type: none"> • Often unfunded, • Under staffed • Lack of expertise and experience, generalists • Lack of compelling authority as far as other gov.t. entities are concerned
Opportunities	Threats
<ul style="list-style-type: none"> • Can play key role in helping Pakistan to reduce its vulnerability to disasters • Can work with other organization on national and international level • Can also strengthen its HR by training and exposure • Can also play effective role in post disaster scenario 	<ul style="list-style-type: none"> • Natural disasters • Climate change • Corruption • Outreach issue due to conflict and law and order situation in certain areas

SWOT Analysis of EPAs	
Strengths	Weaknesses
<ul style="list-style-type: none"> • Strong legal mandate • Good number of qualified and experienced staff • Good understanding of environmental problems • Good contacts with other agencies and civil society 	<ul style="list-style-type: none"> • Under staffed • Under funded • Limited enforcement powers • Difficulty in dealing with other gov.t. departments
Opportunities	Threats
<ul style="list-style-type: none"> • Can play lead role • Can work with other agencies • Can muster support of civil society 	<ul style="list-style-type: none"> • Pressure from vested interests and industries for relaxing environmental standards • Big challenge from climate change • Environmental problems • Malpractices

CHALLENGES

Following issues and challenges have come to the fore after the above analyses:

Lack of Coordination among agencies

It is the major challenge as we have departments and authorities both on federal and provincial level with no regular coordination resulting in surfacing of issues on all stages.

Weak Law Enforcement

Ample legislation in shape of Acts, Statutes, Rules, Regulations and policies exist however the same are not being enforced due to many factors.

Insufficient Funding

Almost all the departments and other entities face issue of proper funding due to which execution of their policies and plans get set back.

Human Resource Issues

Human resource is already limited and that too comprised of generalists thus non availability of right man is the enigma. Moreover, frequent posting and transfer of officers further add fuel to the fire.

Unrealistic targets

We always set unrealistic targets without doing any analysis of the personnel and resources along with ground realities which are never achieved.

Lack of Awareness

Awareness plays important role which is lacking in Pakistan and majority of the general population is not aware of even the ABC of the issue

Corruption

Corruption in the relevant departments is also adding insult to the injury as the top brass is interested in enjoying the perks and privileges and utilization of funds at their whims ignoring achievements of the desired targets

Training Gaps

We are also lagging behind in imparting proper and relevant training to the relevant personnel. Instances are there when bosses prefer to join national and international seminars and training ignoring the deserving and relevant people.

Vague Action Plans

We always lack clear action plans and mold it as per prevailing scenario and often take big U turn after the change of regime and bureaucratic set up.

Lack of Ownership

In the presence of so many departments and authorities the matter fall prey to common neglect and nobody own the responsibility when the results are poor.

Non Involvement of Stakeholders in Policy Making

Normally policies are made after a thorough exercise of consultation with all the relevant stake holders which is missing in our country. Here every body is in habit of taking solo flight caring little about boarding others on the ship.

Lack of Coordination between Federating Units

Although we do have inter provincial departments but effective coordination on key issues is still not up to the mark which result in differences on many issues.

Overlapping of Laws

Laws of federal and provincial governments and the authorities are overlapping as well which creates confusions for public servants and all the stake holders resulting into disputes and litigations.

Conflict of Interest on the part of legislators

Conflict of interest on the part of national and provincial legislatures always exist as they think about their provinces and constituencies ignoring the bigger picture.

Independence of Institutes

Autonomy of the institutes also pose big questions which are center oriented leaving little scope for the experts sitting at lower echelons

Too Many Laws

As too many cooks spoil the broth the same happens here in the presence of many laws and that too overlapping as well.

Lack of Technology

We lag behind in modern technologies as compared to the rest of the world and resort to manual practices which consume our time and energies.

Unavailability of latest Equipment's

We are using outdated and poor equipment's as compared to the developed countries which hamper our speed.

Cumbersome Processes

This the main challenge of almost all the departments in our country. The intricate web is always discouraging and the stakeholders resort to out of the box solutions at the expense of violating the protocols.

Missing Intent

The big issue is the missing resolve and intention as we always resort to reactive rather intentional approach

Conclusion

From the study of the policies and institutes dealing with environmental issues the following conclusions can be drawn.

Lack of Coordination

There is clear lack of coordination between different stakeholders. Federal Government has weak mechanism of coordination with the provinces. Similarly, within the provinces there is lack of coordination amongst the departments. Within the departments, there is lack of coordination as well.

Weak Enforcement of Laws

It is very unfortunate that Pakistan is weak in the field of rule of law. Pakistan's legal framework regarding environment is comprehensive and perfect. It is at par with the developed countries but enforcement of laws is missing due to which we lag behind developed countries.

Lack of Use of Modern Technology

It is also a fact that Pakistan is much behind in the use and availability of state of the art technology. Technology is ears and eyes of the nations in the modern world. The states having no technology or low technology are considered, handicapped. We lack technology hence we cannot adopt real time monitoring mechanisms.

Recommendations

Recommendation	Responsibility	Time Frame	How
Task forces should be made under the chairmanship of CSs of all provinces for better coordination	Federal Government and Provincial Governments	Immediately	Environment Departments should take lead and issue notifications of task forces with clear TORs after getting approval from the concerned governments.
Adoption of modern technological techniques	Concerned Ministries and Departments	Immediate	The Governments should allocate budget for purchase and adoption of latest technology
Law enforcement should be ensured	Secretaries of the concerned departments and ministries	Immediate	By giving full powers to field officers and non-interference in their matters by showing zero tolerance to undue pressures. By practicing rule of law
All technical staff of the attached departments should be given proper state of the art training required	All relevant Ministries and Departments	6 months	By allocating budget and sending master trainers abroad and getting trained other staff with the help of the master trainers
Non-Compliant stakeholders should be given time for compliance of protocols, policies and laws	All EPAs and other relevant authorities	2 years	All industries and institutes not taken on board during law making should be given time for complying with the laws and only lapse of that time administrative actions be taken against them
A task force should be constituted for identifying overlapping areas of different laws in order to remove ambiguities from implementation strategies	Federal and Provincial governments	Immediate	Law ministry and departments should take lead and review all environmental related laws and propose amendments wherever needed for better implementation of the action plan

Understaffed departments and agencies should be strengthened	Planning and Development Departments and concerned secretaries of relevant departments	One year	By allocating budget and including strengthening schemes in PSDP and ADPs as the case may be.
Awareness campaigns should be launched for the understanding of public regarding climate change, pollution, deforestation and water scarcity hazards	All relevant ministries and departments	Immediately	By allocating budget for conducting seminars and workshops.
Conflict of Interest laws already passed by the parliament should be enforced	Concerned Federal and provincial governments	Immediate	By establishment commissions or relevant institutes for implementation of the law.
The environmental policies and commitments should be added in the curriculum of the schools and colleges for inculcating the same in our youth minds	Ministry of Education and Education Departments of the provinces	Immediate	The education policy may be amended to the extent of giving legal coverage to the environmental issues in the curriculum. Ministry of Education, Education Departments and Curriculum Directorates may take action accordingly

LOG FRAMEWORK

Name of The Intervention: All technical staff of the attached/line departments should be giving proper state of the art training required				
	Project	Indicator	Means of Verification	Risks Assumption
Goal	Training of Staff of line/attached departments for implementation of Env/CC policies	Efficient feedback, good coordination	Through evaluation	Under staffing in attached/line departments
Outcome	Efficient and trained HR will help in timely and effective implementation of policies/actions	Meetings Periodical assessment		Frequent transfers of Staff

Outputs	Compliance of policy by departments and other stakeholders		Lack of coordination
Activities	Develop a training and coordination cell in EPA		Master Trainer and availability of necessary funds

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