

Pakistan

Strategic Country Environmental Assessment

South Asia Environment and Social Development Unit
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World Bank Office Islamabad

20A Shahrah-e-Jamhuriyat
Ramna 5
G-5/1 Islamabad
Pakistan
Tel: (92-51) 227 9641-6
Fax: (92-51) 227 9648
www.worldbank.org.pk

The World Bank

1818 H Street, N.W.
Washington DC 20433, USA
Tel: 1-202-473-1000
Fax: 1-207-477-6391
www.worldbank.org

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ACRONYMS AND ABBREVIATIONS

AQS	Air Quality Standards	NEPPS	National Environmental Performance Partnership System
CETP	Combined Effluent Treatment Plant	NEQS	National Environmental Quality Standard
DALY	Disability Adjusted Life Years	NGO	Non-Government Organizations
EA	Environmental Assessment	NWFP	North West Frontier Province
ECNEC	Executive Committee of the National Economic Council	P&D	Planning and Development
EIA	Environmental Impact Assessment	PCAP	Pakistan Clean Air Program
EIS	Environmental Information System	PCRWR	Pakistan Council for Research in Water Resources
EPRCP	Environmental Protection and Resource Conservation Project	PEPA	Pakistan Environmental Protection Act of 1997
ESI	Environmental Sustainability Index	PEPC	Pakistan Environmental Protection Council
FAO	Food and Agricultural Organization	PHED	Public Health Engineering Department
FERTS	Fuel Efficiency Improvements in the Road Transport Sector	PM	Particulate Matter
GHG	Greenhouse Gases	PRSP	Poverty Reduction Strategy Paper
I&M	Inspection and Maintenance	PSQCA	Pakistan Standards and Quality Control Authority
IEE	Initial Environmental Examination	PWRC	Provincial Water Regulatory Commissions
MTDF	Medium Term Development Framework	SCEA	Strategic Country Environment Analysis
NCCWS	National Coordination Committee on Water and Sanitation	T&D	Transmission & Distribution
NCS	National Conservation Strategy	TMA	Tehsil Municipal Administration
NEAP	National Environmental Action Plan	USEPA	United States Environment Protection Agency
NEP	National Environment Policy	VES	Vehicular Emission Standards
NEPF	National Environmental Protection Fund	WASA	Water and Sanitation Authority

Vice President	:	Praful Patel, SARVP
Country Director	:	John W. Wall, SACPK
Sector Director	:	Jeffrey S. Racki (Acting), SASES
Sector Manager	:	Jeffrey S. Racki, SASES
Task Leader	:	Paul Jonathan Martin, SASES

Table of Contents

PAGE

MAIN REPORT

EXECUTIVE SUMMARY	i-vi
1. Environmental Challenges of Accelerated Growth.....	i
2. Scope and Process of the SCEA.....	i
3. A Framework for Assessing Environmental Outcomes	ii
4. Rising to the Challenge: A Proposed Way Forward	ii
5. Developing Priority Interventions for Capacity Building	vi

CHAPTER I. Context and Objectives:

Environmental Challenges to Growth and the Response.....	1
1. Environmental Challenges to Growth.....	1
2. The Response of the Government of Pakistan and Development Partners.....	1
3. Objectives of the SCEA	2
4. A Framework for Assessing Policy Effectiveness	2
5. Preparation of the SCEA: Scope and Process	3
6. Structure of the Report.....	4

CHAPTER II. Environmental Issues and Impacts.....

1. A Snap-Shot for Setting Policy Priorities	6
2. The Costs of Environmental Health Risks	8
3. The Costs of Natural Resource Degradation.....	14
4. Global Comparisons of Environmental Sustainability.....	20
5. Conclusions: Environmental Degradation as a Constraint to Growth	21

CHAPTER III. Institutions for Environmental Management:

Closing the Links in Institutional Design and Strengthening Capacity	23
1. Legal and Policy Framework: the Basis of Institutional Design and Direction.....	23
2. Institutional Design: the Vertical Division of Responsibilities.....	24
3. The Horizontal Division of Responsibilities: Mainstreaming and Upstreaming	26
4. Environment and the Judiciary: Strengthening a Vital Link.....	27
5. Are Resources for Environmental Management Adequate?	29
6. Moving Forward: Strengthening Institutions through NEP Implementation.....	31

CHAPTER IV. Reinforcing the Environmental Impact Assessment System

1. The EIA Framework: Establishing Oversight and Ensuring Coverage	35
2. Strengthening the EIA Process: Meaningful Public Consultation and Disclosure	36
3. Promoting Quality of EIA Content and Implementation	37
4. EIA and Public Sector Investments: Mainstreaming and Upstreaming	39
5. Strengthening the EIA System.....	40

CHAPTER V. Urban Air Quality: Addressing a Growing Threat to Health.....

1. Urban Air Quality in Pakistan: Unhealthy Concentrations of Particulate Matter.....	41
2. Pakistan Clean Air Program: the Challenge of Institutional Design.....	43
3. Air Quality Monitoring: Supplementing Capacity through Outsourcing.....	44

4. Strengthening the Regulatory Framework for Urban Air Quality Management	45
5. Moving Beyond Inspections and Enforcement: a Range of Incentives for Clean Air	46
6. Support for Air Quality Management: the Role of Development Partners.....	49

CHAPTER VI. Water Supply and Sanitation:

Protecting Sources and Safeguarding Supplies.....	51
1. Water Supply and Sanitation in the context of Water Resource Management	51
2. Drinking Water Sources: Declining Availability, Deteriorating Quality.....	52
3. Extent and Sources of Water Contamination	52
4. Institutional Design for Water Quality Protection	54
5. Setting a Regulatory Foundation: Use-Based Standards for Water Sources	56
6. Building Local Capacity to Provide Water and Sanitation Services.....	57
7. Creating Tiered Capacity to Regulate Drinking Water Quality	58
8. Opportunities for Development Partner Support	59

CHAPTER VII. Recommendations and a Proposed Way Forward.....

1. Strengthening Linkages in Institutional Design	61
2. Updating the Regulatory Framework.....	62
3. Building Institutional Capacity for Environmental Management.....	64
4. Reinforcing Incentives and Accountability.....	66
5. Rising to the Challenge: a Proposed Way Forward	67

TABLES

Table 2.1 Annual Cost of Urban Air Pollution Health Impacts	12
Table 2.2 Annual Attributed Incidence of Lead Exposure	13
Table 2.3 Annual Health Cost due to Lead Exposure (Billion Rs.).....	13
Table 2.4 Indoor Air Pollution.....	14
Table 2.5 Wheat Yields (Kg/Hectare).....	15
Table 2.6 Estimated Annual Cost of Agricultural Losses from Soil Salinity, Erosion & Rangeland	19
Table 2.7 Costs of Annual Deforestation (Million Rs).....	20
Table 2.8 Desert Countries ($\geq 50\%$ land classified as desert).....	21
Table 2.9 Densely Populated Countries (≥ 100 persons per km^2)	21
Table 3.1 EPA Staffing Levels	29
Table 5.1 New Vehicle Emission Standards & Corresponding Fuel Quality for Metro Cities	46

FIGURES

Figure 1 The Environmental “Production Function”	ii
Figure 1.1 The Environmental “Production Function”	3
Figure 2.1 Share of Costs of Environmental and Natural Resource Damages.....	6
Figure 2.2 Income and Infant Mortality	8
Figure 2.3 Estimated Costs from Water related Mortality and Morbidity	11
Figure 2.4 Annual DALYs lost from Urban Air Pollution.....	12
Figure 2.5 Agricultural Productivity Declines with Canal Releases in Sindh	16
Figure 2.6 Eroded Lands in Pakistan in 1993-2003	17
Figure 4.1 EPA Performance Statistics	36

Figure 5.1	Particulate Matter less than 10 microns (PM10; 48-hour averages).....	42
Figure 6.1	COD Levels in Surface Water	53

BOXES

Box 2.1	The Coastal Zone	7
Box 2.2	Measuring the Economic Impacts of Illness and Premature Death	10
Box 3.1	Environmental Federalism - Oversight Mechanisms in the United States	26
Box 3.2	Empowering Citizens to Promote Environmental Compliance	28
Box 3.3	Environment Funds: Experience from Bulgaria	30
Box 3.4	Incentive-Based Partnerships: the US Experience.....	31
Box 3.5	Instituting Performance Based Grants in Pakistan.....	32
Box 4.1	EIA Capacity Building – a Successful Model in NWFP	38
Box 5.1	Federal/State Partnerships for Clean Air in the USA	44
Box 5.2	Air Quality Index	48
Box 6.1	Beneficial Use Water Standards in the State of Minnesota	57

APPENDICES

Appendix 1 - Measures Proposed in the Pakistan Clean Air Program	69
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VOLUME II: TECHNICAL ANNEX

The Cost of Environmental Degradation in Pakistan - An Analysis of Physical and Monetary Losses in Environmental Health and Natural Resources

(This Technical Annex is made available on a CD-Rom attached to this report).

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FOREWORD

The present Government has earmarked economic development as its priority area. Industrialization, population pressures and a tremendous increase in vehicular traffic have posed serious threats to the environment in Pakistan. The Ministry of Environment is fully aware of the importance of environmental conservation as an ingredient of economic development.

In the present century, there is an imperative need to look at our past to set our sustainable priorities for the future. It is high time for us to enhance our efforts in protection of the environment. We need to set realistic goals and then strive to achieve them in a sustainable and cogent manner. There is a need to integrate economic, sustainable development and environmental conservation into our national policies. Pakistan has covered a number of milestones, from preparation of National Conservation Strategy in 1992 to the formulation of National Environment Policy in 2005.

The Ministry of Environment recognizes the contribution made by the World Bank in supporting its efforts. In the past, the Environmental Protection and Resource Conservation Project supported by the World Bank has helped the Ministry in various fields. The report “Strategic Country Environmental Assessment” portrays the status of selected environmental challenges in Pakistan. Upon the request of the Government, the World Bank has covered the priority areas in environment as identified during the National Stakeholders Conference, 2005. The World Bank team has produced the report after prolonged interaction with Federal and provincial agencies in Pakistan.

The report is expected to pave the way for future support from the World Bank.

Makhdoom Syed Faisal Saleh Hayat
Federal Minister for Environment

EXECUTIVE SUMMARY

1. Environmental Challenges of Accelerated Growth

1. Pakistan is the most urbanized country in South Asia, with a booming economy. Economic reforms have paid their dividend and the country has achieved record growth rates, buoyant levels of investment and sustainable fiscal balances. Long term growth rates too have been reasonable, averaging 2.6 percent since 1960, exceeding most other countries in South Asia. Despite this remarkable record, however, the natural resource base is stressed and the burden of disease remains high, threatening to undermine growth prospects.

2. The urgency of addressing Pakistan's environmental problems has probably never been greater. Conservative estimates presented in this report suggest that environmental degradation costs the country at least 6 percent of GDP, or about Rs. 365 billion per year, and these costs fall disproportionately upon the poor. The most significant causes of environmental damage identified and estimated in this report are (i) illness and premature mortality caused by air pollution (indoor and outdoor), (almost 50 percent of the total damage cost); (ii) diarrhoeal diseases and typhoid due to inadequate water supply, sanitation and hygiene (about 30 percent of the total), and (iii) reduced agricultural productivity due to soil degradation (about 20 percent of the total).

3. The magnitude of these costs indicates that environmental decay has become a serious development concern. Furthermore, accelerated growth and urbanization present additional environmental challenges, such as toxic air and water pollution, and hazardous solid waste. Capturing the development dividend of growth calls for complementary policies that address environmental issues while facilitating development. Pakistan has a commendable record of efforts to promote conservation and longer term sustainability, from the National Conservation Strategy of 1992 through to the adoption of a National Environment Policy (NEP) in 2005. Implementation of these initiatives remains a challenge, however. Whether judged in terms of regional performance or environmental stress factors, there is significant scope to better ensure the sustainability of Pakistan's economic growth.

2. Scope and Process of the SCEA

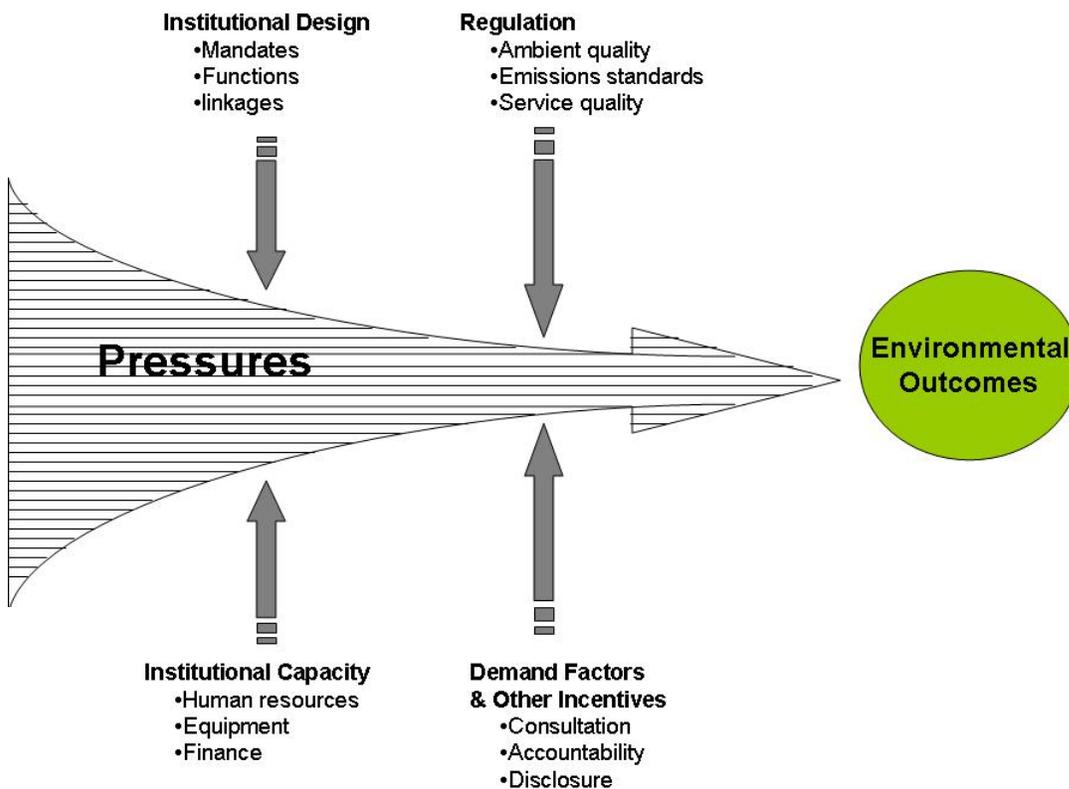
4. In approaching the wide range of Pakistan's environmental challenges, it was agreed with the Government that the SCEA should focus on a select set of issues of particular concern in the context of growth and urbanization. These were selected in consultation with Federal and provincial environmental authorities based on a consideration of the scope to achieve improvements in the near term, while influencing trends over a longer period. This process led to a focus on the Environmental Impact Assessment (EIA) system, the principal instrument to manage the environmental risks of new investments, and the management of air and water quality. While recognizing the importance of action in many other areas for the sustainability of growth in Pakistan, the selective focus of this report echoes government priorities to confront the environmental challenges of rapid industrial and urban growth.

5. Following the initial scoping consultation, development of the SCEA continued through a consultative process that sought guidance from provincial and local representatives of government and civil society. An initial analysis was discussed at a National Stakeholder Conference, and the resulting recommendations are incorporated into this report.

3. A Framework for Assessing Environmental Outcomes

6. Environmental outcomes are influenced by (i) the level of environmentally damaging activities (pressures), and (ii) environmental policies, regulations and institutions, which are critical mediation factors. Institutional performance is one of the critical factors that determine environmental outcomes. Institutions are responsible for enforcing government policies, and consequently *institutional design* affects environmental outcomes. To discharge their mandates effectively, institutions require adequate human, physical and financial *resources*, backed by legislative authority. Finally, *incentives* establish how effectively institutions utilize their available resources and fulfill their mandates. Public pressure and accountability is vital in providing feedback on performance and avoiding the perils of interest group capture. The relationship between environmental pressures, mediating factors and environmental outcomes may be seen as an environmental “production function”, as represented schematically in Figure 1, below.

Figure 1: The Environmental “Production Function”



4. Rising to the Challenge: A Proposed Way Forward

7. This study shows that environmental degradation in Pakistan has already translated into socio-economic problems and that addressing these problems would pay economic dividends – strengthening the growth potential and productivity of natural assets and lowering the incidence of disease. The data presented in this report demonstrate that Pakistan will not “grow-out” of environmental problems. Relative pressures and priorities will change: as economies grow, urban

degradation and industrial pollution become more significant relative to other environmental damage factors. Following the analytical framework described above, the report analyzes the main binding constraints to improving environmental performance as falling into four categories, (i) gaps in institutional design, (ii) gaps in the regulatory framework, (iii) capacity limitations, and (iv) gaps in incentives and accountability. Of these weak incentives and low levels of public accountability remain the critical constraints on performance. Public scrutiny of performance is ultimately a source of strength that leads to stronger institutions with greater public trust and support. The principal features of these constraints are summarized below, together with recommendations for moving forward to more sustainable economic growth.

Strengthening Linkages in Institutional Design

8. Constitutionally, Federal and provincial governments share the concurrent legislative authority for environmental pollution and ecology. Within this environmental federalist structure, appropriate roles for national authorities include policy formulation, provision of resources and oversight to provinces, and public reporting, while provincial authorities play the primary role in implementation and monitoring. Bringing greater clarity to this structure would reduce the institutional design constraints to environmental performance, particularly through actions in the areas highlighted below:

- ***Establishing Guidelines for Oversight of Delegated Authorities:*** guidelines are required for effective Federal oversight of environmental authorities delegated to the provincial level, establishing (i) the adequacy of provincial regulations and resources, (ii) provincial commitment to share information for performance monitoring, (iii) arrangements for funding assistance, and (iv) mechanisms for conflict resolution and the suspension of delegated authorities when necessary.
- ***Oversight of Environmental Clearances:*** guidelines would facilitate Federal oversight of provincial EIA clearances. Pakistan EPA reserves the right to review any environment report and to suspend clearance authority if it believes this power has been misused. This right has never been exercised, however, limiting the effectiveness of the Federal mandate, and ultimately of the EIA system itself.
- ***Creating Partnerships for Clean Air:*** the Pakistan Clean Air Programme (PCAP) will require partnerships between multiple tiers and sectors of government, with (i) Pakistan EPA responsible for setting air quality and emissions standards, (ii) implementation of these standards delegated to provincial environmental authorities, (iii) integration of air quality management with urban planning by municipal authorities, and (iv) policies for clean air in the industry, energy, fuel and transportation sectors.
- ***Defining Roles for Water Quality Protection:*** it is useful to distinguish roles for water quality protection as being (i) protection of surface and groundwater sources, primarily involving environmental authorities and irrigation departments, (ii) the provision of water and sanitation services by local governments, and (iii) regulation of drinking water quality through a tiered approach, with local governments conducting routine monitoring, provincial authorities carrying out regular oversight, and Federal agencies providing quality assurance.

Updating the Regulatory Framework

9. Pakistan currently lacks standards for the quality of ambient air and water. Such standards are the foundation upon which emission control strategies are based, and usually specify schedules for attainment as well as monitoring methods. The regulatory framework needs to be updated to incorporate standards in the following priority areas:

- ***Developing Health-Based Air Quality Standards:*** Ambient air quality standards are required as a basis for emission control strategies, specifying limits for key pollutants and monitoring methods. While safeguarding public health should be the main consideration, the costs and likelihood of attainment should also inform the standard-setting process.
- ***Vehicle Emission and Fuel Quality Standards:*** updated Vehicle Emission Standards for new registration and in-service vehicles are required, linked to standards for fuel quality. In particular, the cost of moving to lower sulphur diesel and alternate fuels needs to be evaluated against the potential economic benefits in terms of lower emissions and better health.
- ***Establishing Use-Based Water Quality Standards:*** The lack of ambient water quality standards is a significant gap in the regulatory system. The NEP identifies the need to establish a use-based system for classification of water bodies, to provide a clear basis for regulation of pollution discharges.
- ***Drinking Water Quality Standards:*** There are currently no formal drinking water quality standards in Pakistan. MoE should take a lead in establishing these as part of a broader framework for the protection of drinking water quality.

Building Capacity for Environmental Management

10. With significant new resources proposed for environmental purposes in the Medium-Term Development Framework, funding may be less of a constraint than the ability to effectively utilize available resources. This presents an important opportunity to develop capacity in environmental authorities at Federal, provincial and local levels, to mainstream the development of environmental management capacity in key sectoral agencies, and to upstream such capacity in planning departments, focusing in particular on:

- ***Strengthening Capacity for Effective Environmental Impact Assessments:*** Capacity building for more effective EIAs needs to address four weaknesses, (i) a lack of expert input for technical reviews, (ii) a widespread unawareness of requirements and procedures, both in government and the private sector, (iii) the lack of a system to identify projects, both public and private, required to submit an EIA, and (iv) weak enforcement of EIA clearance conditions. Technical assistance would assist EPAs in many of these areas, and adoption of EIA training programs similar to that of NWFP would help broaden awareness of EIA requirements.
- ***Improving Technical Capacity for Air Quality Management:*** There is a need to engage trained technical staff for air quality monitoring, inspection and analysis of information. International experience indicates that it is often more cost effective to use the skills and resources of private or academic institutions than to build in-house capacity. Where such opportunities exist in air quality management or other areas (for example, strengthening

the EIA system), outsourcing should be considered as a way of expanding technical capacity.

- ***Building Capacity to Protect Water Quality:*** Federal and provincial environmental authorities will require substantial technical assistance for water quality monitoring and stakeholder consultation to establish use-based standards for priority waterbodies, and their subsequent clean-up. The need for physical investments is greatest at the local level, to upgrade and expand water supply and sanitation services, combined with technical assistance to help TMAs develop partnerships with the private sector for service provision. To regulate drinking water quality, local capacity is required for routine monitoring, supported by provincial resources for regular oversight, and by quality assurance at the national level, requiring a significant level of expert input, equipment and training.
- ***Mainstreaming and Upstreaming:*** Environmental cells have been created in a few key agencies, but require additional resources to prepare adequate EIAs, and effectively implement associated Environmental Management Plans. The establishment of environment sections in planning departments is significant, and their limited permanent capacity should be supplemented with expert assistance to conduct environmental reviews and advise on environmental management plans. The effective promotion of sustainable development in national planning will require more rigorous analysis of environmental constraints to growth and poverty reduction, for which MoE will require additional resources to contract the necessary analytical expertise.

Reinforcing Incentives and Accountability

11. Accountability to stakeholders is essential for sound environmental management, and will only be achieved by ensuring stakeholders are informed and empowered. Opportunities to strengthen environmental accountability in Pakistan include the following:

- ***Public Consultation and Disclosure of EIAs:*** Measures to strengthen accountability in the EIA process include (i) requiring project proponents to develop a public consultation plan, (ii) creation of EIA information centers at Federal and provincial levels, (iii) public disclosure of all EIA filings on a website for easy access by the public and private sector, and (iv) public provision of a non-technical summary of EIA decisions.
- ***Public Information to Support Clean Air and Safe Water:*** The public provision of air quality information, including the daily publication of an Air Quality Index in major cities, will build support for air quality improvement initiatives and enable the issuance of health alarms when necessary. Similarly, public information regarding drinking water quality not only protects public health, but builds support for water supply investments, and most importantly, for the recovery of operation and maintenance costs.
- ***Empowering Civil Society:*** Public support for environmental compliance can be reinforced both by involving concerned civil society stakeholders in environmental decision-making and oversight, and by supporting public interest advocacy through legal associations and the establishment of environmental law clinics at universities.

5. Developing Priority Interventions for Capacity Building

12. This report finds compelling evidence for the need to address urban environmental problems as a high development priority. Rising to the challenge will require not only a strategic program of capacity building, but also the establishment of incentives to encourage improved performance in environmental management at all levels of government.

- **Incentive Based Partnerships:** One approach to building capacity and encouraging improved environmental performance at different levels of government is to develop incentive-based partnerships between the Federal and provincial EPAs, as well as between provincial authorities and local governments. These would link the transfer of financial support with performance against indicators in agreed action plans, based on local priorities set within NEP goals. Two important pre-requisites for such an approach to function effectively are (i) the translation of the NEP's broad directions into specific targets, and (ii) the establishment of an efficient system of performance-based transfers, combining transparent decision-making with the minimum number of administrative hurdles.
- **Pakistan Clean Air Program:** This Program is being developed by MoE as a vehicle to support a range of initiatives for urban air quality management, involving a variety of sectors, levels of government and development partners. The complexity of the issues to be addressed suggests that the PCAP might best be supported as a stand-alone program for capacity building particularly at the provincial and local level, complementing broader incentive-based partnerships for NEP implementation.
- **Managing Natural Resources:** Over 60 percent of Pakistan's population is rural and depend on natural resources (agricultural soils, water, rangelands and forests) that are strained and degrading. Despite the economic significance of these assets there is a paucity of accurate information that is needed to guide effective policy interventions. A further priority is to update and refine assessments of the status and use patterns of key natural resources in order to enhance their productivity and contribution to growth and development.

Possible Areas for World Bank Assistance

13. Based on its current dialogue, the World Bank is strategically placed to support these initiatives. Support for the NEP could focus on providing technical assistance to MoE for the development of provincial action plans. As action plans are defined, the Bank would consider investment support for their implementation. For implementation of the PCAP, the Bank can provide technical assistance based on air quality management experience in other South Asian cities, with the possibility of subsequent investment support as plans become more concrete. In addition to providing assistance for implementation of the NEP and PCAP, the Bank also plans to support further analysis of selected priority concerns in managing natural resources. Potential issues to be addressed include sustainable management of land and water resources, with the focus on long-term environmental sustainability dimensions, including newly emerging challenges of global climate change, rangeland management, coastal zone development, as well as selective studies analyzing in more detail environmental priorities, institutions and future strategies at the sub-regional or local level.

I. CONTEXT AND OBJECTIVES – ENVIRONMENTAL CHALLENGES TO GROWTH AND THE RESPONSE

1. Environmental Challenges to Growth

1. Pakistan has achieved impressive macroeconomic results over the last five years, with ambitious reforms resulting in an acceleration of growth from 3.3 percent in 1997-2002 to over 6.5 percent during 2002-2005. Despite these achievements, social and natural resource indicators continue to demonstrate the daunting development challenges facing the country, and in particular the importance of strengthening environmental management to reduce risks to health and natural resource productivity, and to sustain economic growth.

2. Pakistan's infant and child mortality rates are the highest in the South Asia Region, with the prevalence of childhood diarrhea and acute respiratory infections, both associated with poor environmental quality, the second highest. With more than one-third of the population living in towns and cities, Pakistan is the most urbanized country in South Asia, and exposure to urban and industrial pollution is a rapidly growing concern. Overall, environmental health risks are estimated to contribute more than 20 percent of the total burden of disease. At about 25% of GDP, the contribution of agriculture to Pakistan's GDP is close to the regional average, but the sustainability of this production is subject to greater environmental threats than in other South Asian countries. The irrigated share of crop land (80 percent) is almost twice the regional average, but nearly 40% of this area is water-logged, and 14 percent is saline. Forest and rangeland production is also at risk, with rates of deforestation about ten times the regional average, and rangeland productivity estimated to be only one-third of its potential, with up to 80 percent of rangeland degraded.

3. Pakistan's environmental challenges, and the difficulty of integrating sustainability criteria in the policy and planning processes, threaten the country's poverty reduction efforts and long-term economic growth. The limits of resource-intensive development are indicated by World Bank estimates which suggest that when the costs of natural resource depletion, pollution and consumption of fixed capital are factored in, gross national savings are cut by half. The linkages between environment and poverty through the impact of environmental degradation on livelihoods, health and vulnerability are explicitly recognized in Pakistan's Poverty Reduction Strategy Paper (PRSP), which was presented in December, 2003, and emphasizes sustained rapid growth as the basis for poverty reduction. While the legislative framework for environmental management is largely in place, and many aspects of the Government's reform agenda can be expected to have positive environmental outcomes, the PRSP recognizes the urgent need to strengthen the capacity of the institutions charged with its implementation.

2. The Response of the Government of Pakistan and Development Partners

4. Since adopting the National Conservation Strategy (NCS) in 1992, the Government of Pakistan has made considerable progress in raising public awareness of environmental issues, and establishing a regulatory and institutional framework for environmental management. Implementation of the NCS over the period 1992–1999 was supported by the World Bank through the Environmental Protection and Resource Conservation Project (EPRCP). Although the Project contributed to the development of new institutions, the enactment of environmental legislation, and the promotion of environmental awareness and environmental education, the effectiveness of the institutions and legal framework is yet to be fully realized.

5. The NCS sought to double conservation-related investments to an average of US\$500 million a year. The midterm evaluation of the NCS indicated that the average total investment in conservation for the period 1993–98 was about US\$180 million a year, or less than 20 percent of the estimated need. In a further initiative to strengthen implementation of the NCS, the National Environmental Action Plan (NEAP) was approved in early 2001. The NEAP was designed to provide direction for the Ministry of Environment by focusing on four core program areas: clean air, clean water, solid waste management, and ecosystem management. While some additional capacity has been established at the federal level with the assistance of UNDP, the NEAP project approval process was not integrated with the Government’s budgeting system, and as a result has not succeeded in mobilizing additional financial resources for environmental programs, and has not provided a strategic impetus for improved environmental management. Reflecting these shortcomings, the Pakistan National Human Development Report published by UNDP in 2003 reiterated the need to strengthen systems and capacities in environmental management at all levels, in particular the professional capabilities of the Federal and provincial Environmental Protection Agencies.

6. The Government’s program for implementing the PRSP agenda is embodied in the Medium Term Development Framework 2005-2010 (MTDF), which was adopted in mid-2005. Finalization of the MTDF coincided with approval of a new and far-reaching National Environmental Policy (NEP), with the goal to “...protect, conserve and restore Pakistan’s environment in order to improve the quality of life of the citizens through sustainable development”, and establishing directions for water supply and management, air quality, waste management, forestry, biodiversity, energy efficiency, and agriculture. Most importantly, the MTDF incorporates a significant increase in the budget allocated for environmental management to support implementation of the NEP.

7. It is against this background of important new commitments to strengthen environmental management for sustainable growth that the Government of Pakistan and the World Bank have developed this Strategic Country Environmental Assessment (SCEA). As the Bank prepares a new Country Assistance Strategy, proposing a lending program of up to US\$ 1.5 billion per year in which fast-disbursing development policy lending may form up to half of the total, the SCEA is intended to help ensure that efforts to support poverty-reducing growth and environmental management are mutually reinforcing,

3. Objectives of the SCEA

8. The principal objectives of the SCEA are to: (i) review the status of selected high-priority environmental concerns; (ii) assess the capacity of the environmental institutions charged with addressing these concerns; and (iii) to propose initiatives and possible Bank support to help strengthen this capacity. The main audience for the SCEA is governmental, in particular environmental and planning authorities at Federal and provincial levels, as well as World Bank teams seeking to strengthen environmental management capacity through development policy, sectoral and dedicated environmental operations.

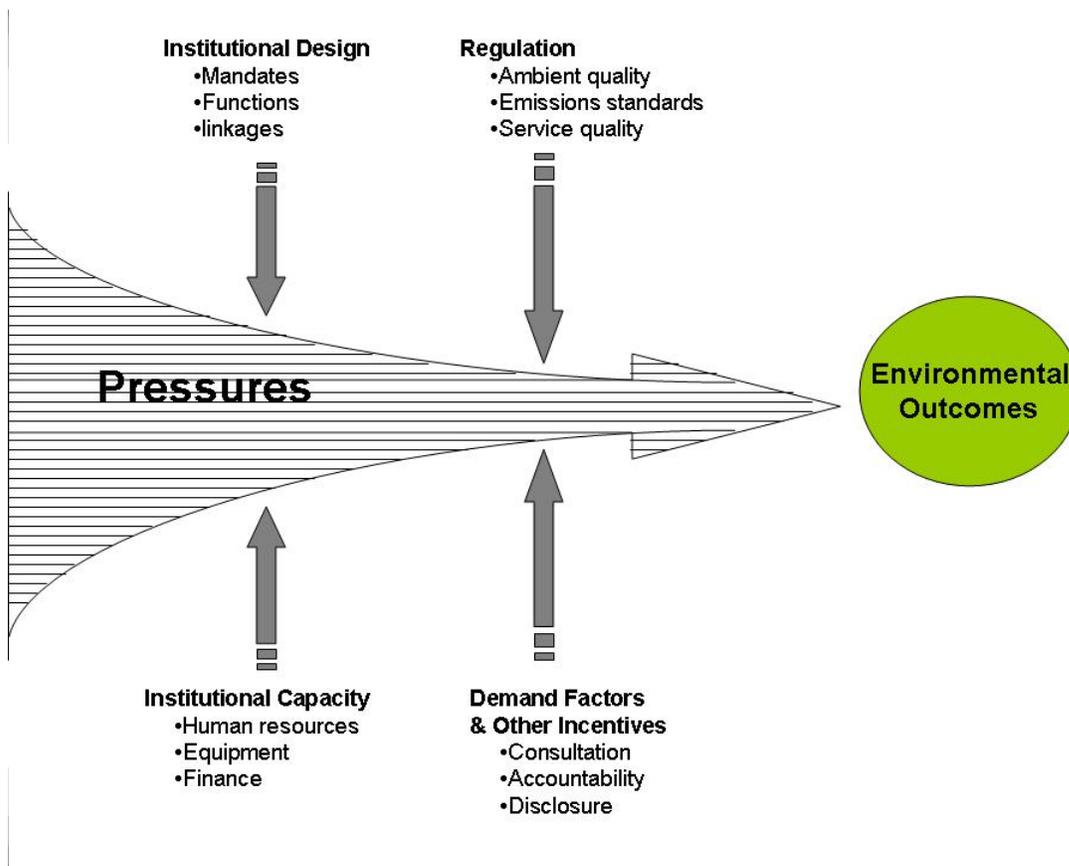
4. A Framework for Assessing Policy Effectiveness

9. What determines environmental outcomes? This report conceptualizes the problem as an environmental “production function” or process, where a multitude of inputs interact to create an output - environmental quality. The first and most obvious factor that determines environmental outcomes is the level of environmental pressure, which is shaped by the scale, composition and efficiency of economic activity. These impacts are mediated and influenced by government

policies which define legal parameters, such as permissible levels of pollution, allowable levels of resource degradation, production techniques and consumption patterns. Institutions are responsible for enforcing these policies, and ambiguous, opaque or overlapping mandates are likely to generate perverse outcomes, while clear delegation of powers is likely to promote greater accountability and virtuous outcomes. To discharge their mandates effectively, institutions require adequate human, physical and financial resources, backed by legislative authority. The most critical factor in determining environmental outcomes, however, is the level of accountability, which establishes how effectively institutions utilize their available resources and fulfill their mandates.

10. Figure 1.1 provides a schematic summary of the key drivers of environmental performance, and provides a conceptual framework for this report, which examines the pressures, institutional design, regulations, capacity, and accountability that help determine environmental outcomes in Pakistan.

Figure 1.1: The Environmental “Production Function”



5. Preparation of the SCEA: Scope and Process

11. Development of the SCEA was based on a participatory process, beginning with a launch workshop held in November, 2004, to help identify and agree on a set of high priority environmental concerns to form the focus of the assessment. Based on this workshop, which was attended by the State Minister for Environment and some sixty representatives from Federal and provincial environmental and planning authorities, it was agreed that SCEA should focus on (i)

the environmental impact assessment system, (ii) urban air quality, and (iii) water supply and sanitation. In addition to their significant poverty and development implications, these issues were identified as areas with potential for high impact interventions, based on a consideration of the mandates of the federal and provincial environmental authorities.

12. The EIA system is the most visible tool used to address environmental concerns in sectoral investments, and air quality and water pollution are prominent issues, particularly affecting the quarter of Pakistan's population living in cities. The selective focus of this report does not necessarily reflect the economic significance of these environmental problems, but instead responds to the priorities identified at the launch workshop, and the prominence of urban issues and the EIA process in public discourse.

13. Following the launch workshop, a team of consultants¹ was selected to lead the consultation process, data collection and analysis, and to prepare a draft report which was discussed at a National Stakeholder Conference held in May, 2005, in Islamabad. Prior to this Conference, provincial consultations were held in Lahore, Karachi, Peshawar, and Quetta, each involving a variety of representatives from the private sector, civil society and government. Following the National Stakeholder Conference, the consultants' report was made publicly available on the website of Pakistan Environmental Protection Agency.² Drawing on the comments subsequently received, this final version of the report has been prepared by the World Bank in close consultation with the Ministry of Environment.

6 Structure of the Report

14. This report is arranged in seven chapters. The following two chapters provide overviews. The first presents estimates of the costs of environmental degradation, and the second examines the institutions established to address these. The following three chapters examine in more detail the three focus areas selected during the consultative scoping process: the environmental impact assessment system, urban air quality, and water supply and sanitation. The final chapter of the report draws together a set of key recommendations, and proposes a way forward to apply these recommendations and strengthen environmental management in support of sustainable economic growth.

¹ AAB (Pvt.) Ltd.

² (<http://www.environment.gov.pk/>)

II. ENVIRONMENTAL ISSUES AND IMPACTS

15. With its immense altitudinal variation Pakistan spans a number of ecological regions – ranging from coastal ecosystems, through deserts and flood plains to the mountains of the Himalayas and Hindu Kush ranges. Each of these ecosystems has played a crucial role in providing the platform for economic development and growth. The rangelands which cover the bulk of the landmass, sustain a growing livestock industry. The coastal zones of Sindh are highly productive ecosystems, with over 200 species of fish and a thriving shrimp industry. The forests are a valuable source of timber and provide vital ecological services that protect watersheds and maintain soil productivity. The waters of the Indus have converted deserts and arid plains into productive farmland. As a result, agriculture remains the country's principal occupation, accounting for over 60 percent of exports and 25 percent of GDP.

16. Accompanying this rich natural heritage is a booming economy. Economic reforms have paid their dividend and the country has achieved record growth rates, buoyant levels of investment and sustainable fiscal balances. Long term growth rates too have been reasonable and have averaged 2.6 percent since 1960, exceeding most other countries in South Asia. But this remarkable record is blighted by other pressures. Poverty stubbornly persists, diseases are widespread and the natural resource base on which the economy depends, is stressed, threatening to undermine growth prospects. Many of the environmental and developmental challenges facing Pakistan are common across the region and much of the developing world. The decline in forest cover, degrading soils and rising levels of air and water pollution are some of the problems that Pakistan shares with its South Asian neighbors.

17. But at the same time there are important differences. Pakistan is largely arid and uniquely disadvantaged by its dependence on a single river – the Indus - for its surface water. The country is therefore more vulnerable to the consequences of basin degradation and water pollution than any of its neighbors. Agricultural growth is further threatened by depleting soil fertility, degrading rangelands and encroaching deserts, while the coastal wetlands of Sindh, deprived of water, are losing their productive potential. An estimated 70 percent of the population is rural and relies heavily on natural resources for their livelihoods. Consequently, a degrading resource base directly affects poverty outcomes. In short, many of the economic challenges facing Pakistan have their genesis in environmental problems.

18. In Pakistan, as elsewhere, environmental decay is both a cause and consequence of poverty. A fragile and damaged resource base is a major cause of poverty: agricultural yields are lower on degraded land; as forests are depleted access to vital livelihood resources declines. To subsist the poor are compelled to mine and overuse the limited resources available to them. This has created a vicious downward spiral of impoverishment and environmental degradation.

19. The aim of this chapter is to chart the country's environmental record, focusing on the links between the environment and the economy. The fundamental message is that neglect of the country's natural assets has come at a significant economic cost and addressing these problems would pay economic dividends – strengthening the growth potential of the economy, reducing poverty and the incidence of disease. The chapter provides estimates of the economic costs of environmental degradation, developed at the request of the Government of Pakistan at a workshop held in Islamabad. A comprehensive description of the data, methodology and analysis is provided in the Technical Annex to facilitate regular updating of the economic dimension of environmental degradation and promote greater research.

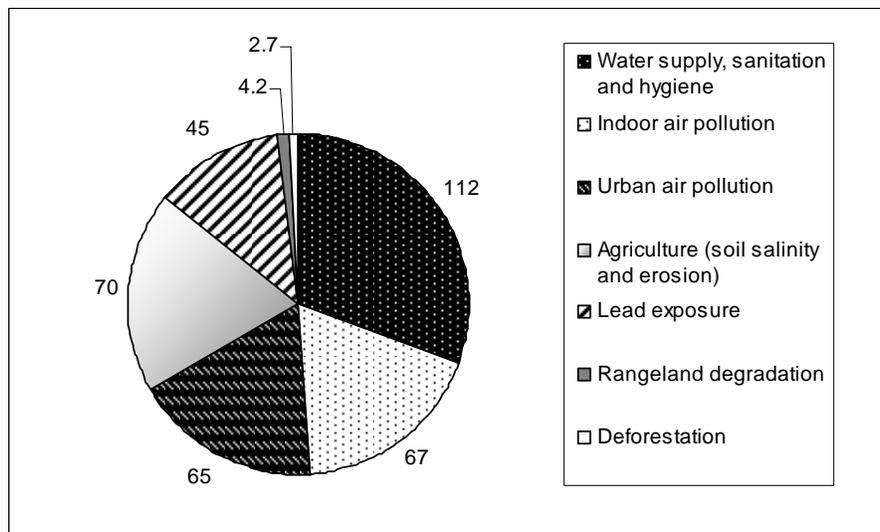
1. A Snap-Shot for Setting Policy Priorities

The Economic Consequences of Environmental Degradation

20. Pakistan's environmental problems are a concern, not just because of the intrinsic virtues of promoting responsible environmental stewardship, but also because of the economic consequences of environmental degradation. Using conservative estimates this Chapter finds that the mean annual cost of environmental degradation is approximately 6 percent of GDP.³ The costs are of a similar magnitude to the recent growth performance recorded in the National Accounts. The implication of this continuing degradation is that despite record GDP growth rates many development indicators continue to show limited improvement.

21. The mean estimated annual cost of environmental and natural resource damage is about 365 billion Rs. per year or 6 percent of GDP. This figure is an approximation and is based on those parameters for which reasonable estimates are available. The contribution of each source of degradation to this total is indicated in Figure 2.1. The highest cost is from inadequate water supply, sanitation and hygiene (Rs. 112 billion) followed by agricultural soil degradation (Rs. 70 billion) and indoor air pollution (Rs. 67 billion). Urban air pollution (particulate matter) adds another Rs. 65 billion. The estimated cost of lead exposure is about Rs. 45 billion. Rangeland degradation and deforestation cost are the lowest at about 7 billion Rs. in total. These low estimates are somewhat misleading and reflect the lack of data that has led to partial estimation of values and the already low productivity of these resources. To guard against overstatement, the estimates are based on conservative assumptions and therefore represent the lower bounds of damage. They also omit several important categories of loss – most notably fisheries and coastal zone degradation - for which there is no adequate data (Box 2.1). As a consequence calculations of the relative share of damage must be interpreted with the utmost caution since the magnitude of total damages is unknown since the impacts of natural resource degradation have been underestimated.

Figure 2.1: Share of Costs of Environmental and Natural Resource Damages (Rs. Billion per Annum)



³ These estimates are based on a study commissioned to support preparation of the SCEA, in response to a request from MoE. The detailed study is attached as a Technical Annex.

22. Since water supply, sanitation and hygiene issues dominate the costs it is tempting to argue that policy efforts should focus on this sector. But this would be premature and does not necessarily follow from these findings. To determine the optimum sequence of interventions, expected policy benefits need to be compared with the anticipated costs. The aggregate estimates provided in this Report are the first step in addressing this issue. The next task is to identify and rank the returns from various policy investments. In practice policy priorities are guided by the need to accommodate diverse and often conflicting objectives. The information provided in this chapter is a useful complement to the process and provides a rational and transparent basis for decision making.

Box 2.1: The Coastal Zone

The estimates in this study are partial and ignore a number of significant environmental issues because of limited data. Perhaps the most significant omission is that of the mangroves of the Indus Delta. The interaction of riverine and deltaic ecosystems created a rich resource base that has sustained coastal communities. But reduced river flows have led to the intrusion of sea water into the Indus Delta, rendering agricultural land barren, contaminating ground water and causing degradation of the coastal eco-system. Satellite imagery shows a steady decline in the mangrove forests. In 1990 mangrove cover was estimated at 160,000 ha and by 2003 coverage had shrunk to 106,000 ha. Habitat degradation has resulted in a range of economic losses, including the depletion of fisheries, loss of agricultural land and forests. Surveys conducted by IUCN in two districts of Sindh (Badin and Thata) suggest that the human toll has been substantial.⁴ Sea water intrusion may have affected over 135,000 people and led to losses in excess of \$125 million. Despite the presumed scale of the problem, there is little accurate data on the environmental and economic costs which can be used to guide policy decisions. With growing water scarcity the country will face ever more difficult trade-offs between competing demands for water that need to be managed in ways that maximize benefits to the entire nation. Sound economic management calls for policies that factor in the full range of externalities - social, economic and environmental.

Economic Growth and the Environment

23. Economic growth is the main vehicle for promoting development and reducing poverty in a sustainable way, so it could be argued that environmental degradation is the inevitable price to pay for economic success. This is typically justified in terms of an empirical regularity termed the Environmental Kuznets Curve which shows that as countries develop, pollution intensity increases at first and then declines. It would be misleading to assume that this empirical finding implies that environmental neglect is an economically prudent development strategy. In many cases prevention or mitigation of damage may be more cost effective than neglect. In the short run environmental interventions may lower profits or utilize scarce public funds, but these costs need to be compared to the associated benefits.

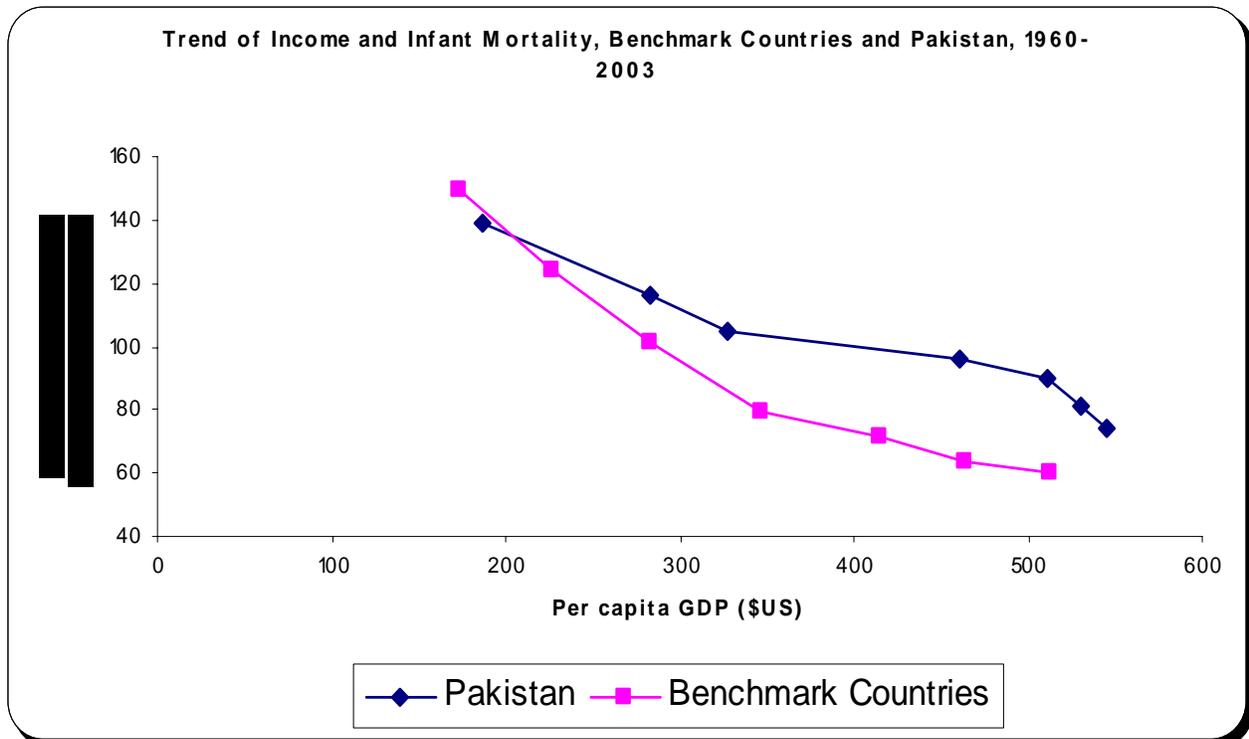
24. Environmental degradation disproportionately affects the poor and vulnerable, hence interventions that mitigate environmental damage also help to convert growth into broader development benefits. To illustrate the importance of these issues, Figure 2.2 compares the relationship between income and infant mortality in Pakistan to that of other countries in the same income group.⁵ Initially infant mortality rates in Pakistan were lower than the average for its income group, but thereafter Pakistan grew much faster than the other countries, but disappointingly it lagged behind on infant mortality. A similar pattern holds for other measures

⁴ IUCN, 2003 *Indus Delta, Pakistan: Economic Costs of Reduction in Freshwater Flows* Paper # 5

⁵ All countries are ranked in order of their level of income in 1960, and the third lowest income group which has the similar level of income to Pakistan is taken as the "low income" countries.

of environmental performance and development. For instance Pakistan’s rate of deforestation between 1990 and 2000 has been greater than that of other countries in its income group. What these examples illustrate is that development outcomes are a consequences of *policy choices* and there is no assurance that a country can simply “grow-out” of environmental problems. Put simply, any given amount of growth can deliver higher development benefits if there are policies in place to address the negative externalities that impede progress, such as impacts on health and degradation of the productive resource base.

Figure 2.2: Income and Infant Mortality



2. The Costs of Environmental Health Risks

25. Good health is not only a crucial part of well-being, but contributes directly to economic growth. The most direct economic effect of improved health is in terms of greater productivity and educational outcomes. A healthy population also frees up resources consumed by health care for other productive purposes. Economic growth is the essential first step in poverty reduction, but it brings with it environmental challenges that can impede and constrain the growth process. Air and water pollution, unsafe waste disposal, land degradation and the exposure to agro-industrial chemicals are among the leading causes of illness and child mortality in developing countries. All of these hazards are preventable, often through simple and cost effective interventions.

26. The World Health Organization estimates that environmental health hazards account for over 20 percent of the overall burden of disease worldwide. This is comparable to malnutrition and is larger than all other preventable risk factors. The vast majority of environmental health impacts are in developing countries where there is a strong correlation between the level of poverty and the environmental burden of disease. The poor are exposed to greater environmental

health risks because of the surroundings in which they live, the lack of basic services and their greater vulnerability due to malnutrition and inadequate health care. So poverty and illness reinforce each other, contributing to exclusion and economic deprivation.

27. This chapter examines the health impacts from three major sources of pollution, contaminated water, urban air pollution and indoor air quality. Due to lack of data the costs associated with hazardous waste and exposure to industrial and agricultural chemicals are not included. The health effects are presented in three forms: in terms of the affected population, Disability Adjusted Life Years (DALYs)⁶ and economic costs. To translate health effects into a monetary metric the *Cost of Illness Approach* is used to measure the effects of illness. The cost of illness includes: medical costs, income lost and the “avoidance costs” associated with actions taken to prevent or mitigate the risks of illness (e.g. boiling contaminated drinking water). Mortality impacts are monetized in two ways. Child mortality is valued using the *Human Capital Approach*, which measures the discounted value of income lost due to premature death. Adult mortality is measured in terms of the *Value of Statistical Life* using estimates from global studies, adjusted for income and exchange rates. Box 2.2 provides a brief overview of the methodological issues. To guard against overstating damages, modest assumptions are used to parameterize impact and cost coefficients. The Technical Annex provides comprehensive details of the damage estimates, assumptions and sources of data.

The Health Effects of Water Quality, Sanitation and Hygiene

28. Pakistan is an arid country with low, unreliable rainfall averaging 250 mm a year. Classified as water stressed, the country uses almost all of its available water supplies in most years. Population growth coupled with the demands of industrialization and urbanization are expected to create conditions of absolute water scarcity in a few decades. Water shortages are compounded by water quality problems. Untreated pollutants from industrial, agricultural and urban sources are released directly into water bodies intended for human consumption, with little regard for assimilative capacity of eco-systems. The result is heavily polluted water around towns and cities and a high incidence of disease, especially among the urban poor.

29. The links between water quality and health risks are well established. Inadequate quantity and quality of potable water and poor sanitation facilities and practices are associated with a host of illnesses such as diarrhoea, typhoid, intestinal worms and hepatitis. Limited by data problems this study focuses on the two most common water related illnesses, diarrhoea and typhoid, and estimates that more than 1.6 million DALYs are lost annually as a result of death and disease due to diarrhoea, and almost 900,000 as a result of typhoid. Diarrhoeal and typhoid mortality in children accounts for the bulk of the losses, reflecting the vulnerability of children to these diseases. From a policy perspective the more informative estimate is presented in Figure 2.3 which summarizes the costs of water related mortality and morbidity. The total health costs are estimated at Rs 114 billion, or approximately 1.81 percent of GDP. Striking are the high proportion of costs due to premature child deaths, followed by the mortality impacts of typhoid in the older population.

⁶ DALYs are a standard measure that combine disparate health effects using a consistent common denominator. DALYs adjust the years of healthy life lost to illness and premature mortality, with a weighting function that corrects for the impacts of death and illness at different ages. Though DALYs provide a useful summary measure of the physical effects of illness and death, they provide little information about the economic consequences of ill-health.

Box 2.2: Measuring the Economic Impacts of Illness and Premature Death

The consequences of morbidity and premature mortality are complex and varied. To make meaningful comparisons across diseases and risk factors it is necessary to aggregate these impacts using a common unit of measure. DALYs (Disability Adjusted Life Years) are the standard measure used to bring disparate health effects to a common denominator. DALYs measure the years of healthy life lost to illness and premature mortality, with a weighting function that adjusts for the impacts of death and illness at different ages.

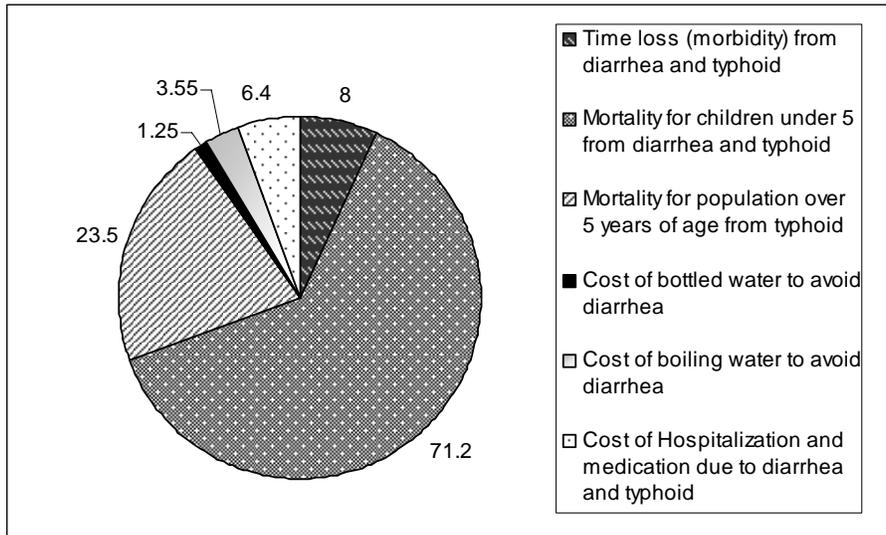
While DALYs provide a useful indicator of the effects of illness and premature death on physical well-being, they provide little information on the economic impact of diseases. Mortality and morbidity impose costs on individuals, households and society at large. These include the direct costs of illness such as expenses related to clinical visits, hospitalization, treatment and care giving. In addition there are indirect costs from loss of earnings and impaired productivity. These are termed the costs of illness and are relatively simple to compute. Medical costs are calculated by determining the type of treatment provided and the associated costs. Earning losses can be determined using the Human Capital Approach which calculates the discounted value of income lost through either sickness or premature death. Further adjustments can be made for the unemployment rate to reflect the probability of obtaining paid work.

However, illness and premature death also impose more subtle and less visible forms of economic loss. For instance workers generally demand higher wages for riskier jobs, or they may purchase safety equipment to reduce the risk of death and injury. Alternatively individuals often take costly averting actions (e.g. installing water filters in homes) to minimize health risks. These examples demonstrate that individuals routinely trade income for outcomes that lower the risks of mortality and avoid the pain suffering associated with illness. A number of approaches have been developed to measure these losses. One method termed the hedonic wage approach infers risk premiums from observed differentials in wage rates. Another approach, that is more relevant to environmental health studies, is termed the contingent valuation method and uses surveys to elicit preferences for avoiding illness, death and pain. The cost of illness approach ignores these values and therefore underestimates the economic consequences of premature mortality and morbidity. It should therefore be treated as the lower bound of the true costs of premature mortality and morbidity.

Unfortunately, most hedonic and contingent valuation studies have been conducted in developed countries where data is more widely accessible. There are no estimates available for Pakistan. Under these circumstances it is common to transfer the estimate from one country to another, after making appropriate adjustments for differences in income, exchange rates and other relevant factors. The key concern in transferring values across countries relates to income differences. Economists treat health as a normal good which implies that the willingness to pay for good health rises with income and wealth. Hence estimates transferred from high to low income countries need to be adjusted for differences in income. Income elasticity is the measure used to capture variations in the demand for health across income levels. A number of studies find that an income elasticity of 0.4 should be used to transfer estimates from one country to another. This implies that a 1 percent reduction in income induces a 0.4 percent decline in the demand for health outcomes. To guard against exaggeration, this report uses a more conservative income elasticity of 1, which implies that the decline in the demand for health is proportional to income changes.

Further complications arise in transferring the societal losses from the death of children from one country to another. There is little consensus on the appropriate adjustment factor. Taking a conservative approach this report values the economic losses from premature child mortality simply in terms of the loss of future income. This clearly underestimates the true economic losses, but has the advantage of precluding overstatement of damages.

Figure 2.3: Estimated Costs from Water-Related Mortality and Morbidity (Rs. Billion per Annum)



Urban Air Pollution

30. With an estimated 35 percent of its population living in cities, Pakistan is the most urbanized country in South Asia. Its cities continue to grow, offering employment opportunities, amenities and facilities not found elsewhere in the country. But rapid urbanization has been accompanied by environmental problems such as pollution, waste management, congestion and the destruction of fragile ecosystems. Urban air pollution remains one of the most significant environmental problems facing the cities. A substantial body of research demonstrates that high concentrations of suspended particulates adversely affect human health, provoking a wide range of respiratory diseases and heart ailments. The most hazardous are fine particulates of 10 microns in diameter (PM10) or smaller. Worldwide, fine particulates are implicated in 500,000 premature deaths and 415 million new cases of chronic bronchitis.⁷

31. In urban Pakistan, as elsewhere, the major sources of fine particulate pollution are vehicles, combustion of fossil fuels in factories, and power plants. The problem is aggravated by an aging fleet of vehicles in poor mechanical condition and low levels of fuel efficiency. Over the past decade the number of diesel trucks in major cities has increased dramatically, creating an additional source of pollution. Though many cities are adversely affected, air quality monitoring is restricted to the six major cities: Karachi, Lahore, Islamabad, Peshawar, Quetta and Rawalpindi. Ambient concentrations of particulates in these cities lie consistently above World Health Organization guidelines, and are on average two to four times the recommended levels (the detailed data are presented in Figure 5.1).

32. Most of Pakistan's urban population lives in cities where air quality is unmonitored. Excluding these cities from the analysis of health impacts would clearly represent a serious omission. To address this problem PM10 concentrations are estimated using a World Bank model of particulate emissions. Two sets of estimates are presented, to capture the potential imprecision of the forecast values.

⁷ WHO

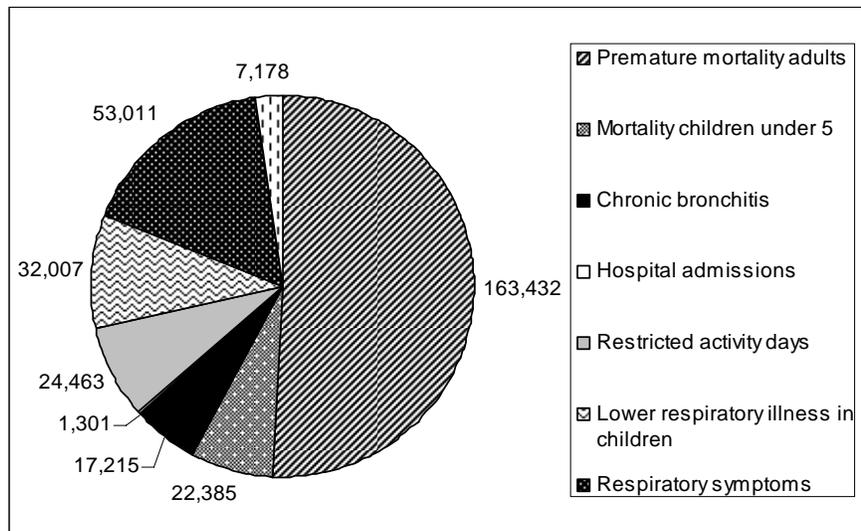
33. An exposure-response relationship exists between concentrations of particulates and health outcomes. The health impacts identified in this report are based on epidemiological assessments recommended by the World Health Organization and include chronic bronchitis, mortality caused by a higher incidence of lung cancer, cardiopulmonary and respiratory problems. The annual health effects of ambient particulate air pollution are presented in Table 2.1. Urban air particulate pollution is estimated to cause around 22,000 premature deaths among adults and 700 deaths among young children. The total health costs are between Rs 62-65 billion, or approximately 1 percent of GDP.

Table 2.1: Annual Cost of Urban Air Pollution Health Impacts (Billion Rs.)

Health end-points	Attributed Total Cases	Total Annual Costs
Premature mortality adults	21,791	58-61
Mortality children under 5	658	0.83
Chronic bronchitis	7,825	0.06
Hospital admissions	81,312	0.28
Emergency room visits/Outpatient hospital visits	1,595,080	0.80
Restricted activity days	81,541,893	2.06
Lower respiratory illness in children	4,924,148	0.84
Respiratory symptoms	706,808,732	0.00
TOTAL		62 – 65

34. In terms of annual DALYs lost, as indicated in Figure 2.4, mortality accounts for an estimated 60 percent, followed by respiratory symptoms. The bulk of losses are due to adult premature mortality, which is consistent with evidence from other assessments that find adults to be more vulnerable to respiratory symptoms and in greater danger of lung cancer.

Figure 2.4: Annual DALYs Lost due to Urban Air Pollution



Airborne Lead Pollution

35. Airborne lead is one of the most harmful particulate pollutants. Young children are especially vulnerable since lead poisoning causes learning disabilities, hearing loss and behavioural abnormalities. In adults lead absorption is responsible for hypertension, blood pressure problems and heart disease. Lead exposure can come through breathing and ingesting lead particles. The original sources of lead can include leaded gasoline, industrial lead emissions to air, water, and land (e.g., from smelters), leached lead from lead pipes carrying drinking water, contaminated food, lead paint, and pottery. Once in the environment, lead accumulates in soil and water. Significant amounts of lead were added to gasoline (0.42 g/l in regular gasoline and 0.84 g/l in high octane gasoline), until, recognizing the gravity of the problem, the government intervened to ban lead from gasoline. In 2001-2002 all major refineries announced that they would move to production of lead free gasoline (Paul *et al*, 2003). However the health impacts will persist for several decades as lead deposits accumulated in soils and water tend to dissipate slowly over time.⁸ As a result numerous studies in Pakistan report elevated levels of lead in blood samples.⁹

36. Table 2.2 presents the mortality and morbidity impacts attributable to lead exposure. The incidence of gastrointestinal disease is highest, followed by anaemia, but it is the impact on IQ that is most troubling. Since IQ loss is irreversible, it deprives thousands of children each year of opportunities, lowers productivity and earning capacity and imposes high human and economic costs on the country.

Table 2.2: Annual Attributed Incidence of Lead Exposure

	Cases	DALYs Loss
Mortality: Cardiac, ischaemic, hypertensive, cerebrovascular	1114	21095
Morbidity:		
Gastrointestinal effects	660000	121,896
Anaemia – children	500000	10667
Anaemia – adults	655000	4,225
Cardiovascular disease – adults		21095
Mild Mental Retardation – children	170000	177940

Table 2.3: Annual Health Cost due to Lead Exposure (Billion Rs)

	Total cost
Mild mental retardation	6.5
IQ loss children	28-42
IHD, CVD mortality adults	3
GI effects children	260.12
Total cost	38-52

⁸ International experience suggests a 39 percent decrease of lead in blood over 5-year period, or 7.8 percent annually. Hence 0.078 is the correction factor that is applied in this study to reflect annual reduction of lead concentration in blood starting in 2002.

⁹ (White *et al*, 2001, Rahman *et al* 2002)

37. Table 2.3 translates these impacts into monetary costs. The total economic burden is between Rs 38-52 billion a year, or about 0.7 percent of GDP. It should be emphasized that these are highly conservative estimate based on modest assumptions and restricted to the populations of the major cities (36.2 million inhabitants). If the exercise were extended to the entire affected population of the country, the health losses would likely double.

Indoor Air Pollution

38. Indoor air pollution is a serious problem in Pakistan. The use of traditional biomass fuels such as wood, dung and crop residues is widespread across the country. According to the 1998 Pakistan Census 86 percent of rural households and 32 percent of urban households rely on these as their primary cooking fuel. Biomass burnt in poorly ventilated homes has severe health consequences, particularly for women, young children and the elderly who are most likely to be exposed to indoor pollutants. Several studies have shown strong associations between biomass combustion and an increased incidence of chronic bronchitis and acute respiratory infections. Evidence is also emerging of linkages with tuberculosis, asthma, cataracts and low birth weights, though further research is needed to quantify the magnitude of these impacts.

39. Research suggests that the health effects of indoor air pollution vary and depend on the concentration of each pollutant, the mix of pollutants and the levels of exposure.¹⁰ To capture this uncertainty a range of damage estimates are presented. Table 2.4 presents the estimated annual health impacts. Indoor air pollution accounts for over 28,000 deaths a year and 40 million cases of acute respiratory illness. Total annual cost of indoor air pollution is estimated at Rs 55-70 billion, with a mean estimate of Rs 62 billion or approximately 1 percent of GDP. Indoor air pollution clearly represents a significant economic burden and remains an issue that warrants considerably greater policy and analytical attention than is currently given to it.

Table 2.4: Indoor Air Pollution

	Estimated Number of Cases		Estimated Annual Cost (Million Rs)	
	Low	High	Low	High
<i>Acute Respiratory Illness:</i>				
Children (under the age of 5 years) – increased mortality	21,933	31,060	27.83	39.40
Children (under the age of 5 years) – increased morbidity	29,508,800	41,788,200	4.26	6.03
Females (30 years and older) – increased morbidity	10,754,600	15,229,800	2.04	2.89
<i>Chronic obstructive pulmonary disease:</i>				
Adult females – increased mortality	7,408	11,433	25.84	25.84
Adult females – increased morbidity	21,850	33,721	0.12	0.18
Total			60.08	74.34

3. The Costs of Natural Resource Degradation

40. Pakistan’s location at the cross roads of the tropics, deserts and mountains shape many of the natural resource issues confronting the nation. The country has a total area of 79.61 million

¹⁰ (Desai *et al* 2004)

hectares, 70 percent of which is classified as arid and therefore vulnerable to desertification.¹¹ Despite low and unreliable rainfall, 27 percent of the land is under cultivation and 60 percent is classified as rangelands.

41. Agricultural expansion has been fueled by the country’s vast irrigation network. There have been two major epochs of productivity growth. The first phase was marked by the Green Revolution where growth was propelled by the introduction of high yielding varieties and new technology. This was followed by an era of intensification, where productivity increases were driven by higher fertilizer, pesticide and water use. Despite the dramatic increases in productivity, by global standards Pakistan’s performance has not been exceptional. While acknowledging that yields are the product of a host of factors – including geography and policy – the international comparisons in Table 2.5 are instructive in revealing Pakistan’s relative ranking. For instance, Egypt, with broadly similar agro-climatic conditions has yields that are three times higher.

Table 2.5: Wheat Yields (Kg/Hectare)

	2001	2002
Egypt	6358	6006
Mexico	4766	5100
China	3806	3777
India	2708	2770
Pakistan	2325	2262
Turkey	2033	2075
Iran	1703	1984

42. The nation confronts a receding land frontier. Land degradation (salinity, water logging and fertility loss) coupled with the pressures of industrialization have placed physical limits on the ability to expand cropped area and there is little prospect of increasing cultivable land. Estimates suggest that about 40 percent of irrigated land has been affected by either salinity or water logging. Paradoxically in a country where water scarcity is a problem, there is strong evidence that agricultural yields *decline* with water availability. This is illustrated in Figure 2.5 which shows that, excluding the drought years of 2000 – 2002, agricultural productivity in Sindh is inversely related to the amount of the canal water released. This is a direct consequence of over-watering. The supply driven irrigation system encourages farmers to irrigate when water is made available, rather than when it is needed. Since irrigation fees are low and unrelated to consumption, there is a tendency to use all available supplies. The consequence is an increase in waterlogging, damage to soil structure and a reduction in productivity.

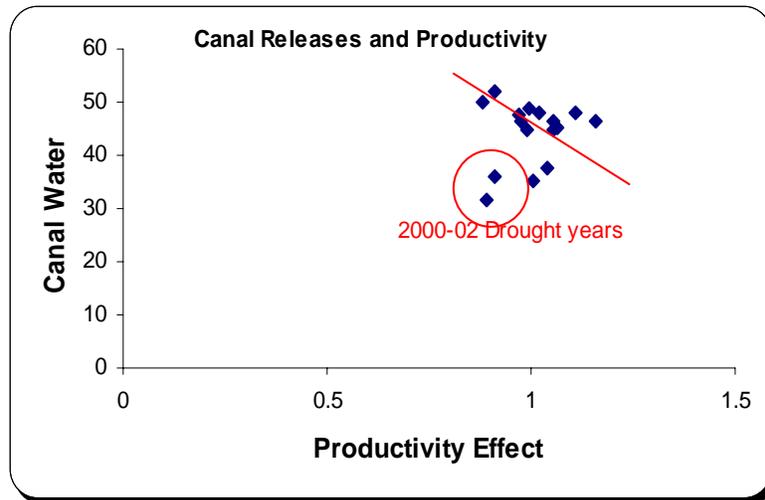
43. Evidence from other sources corroborates this general pattern. Satellite images acquired from 1984-85 (a normal year) and 2000-01 (a drought year) shows that the yield of some crops (notably wheat) in Punjab increased during the drought year. Production function analysis of wheat output across Sindh in 1997-98 reveals a similar trend.¹² The analysis finds that the productivity of irrigation varies substantially across farms in Sindh with “partial elasticities” of water ranging from a low of -0.2 to a high of 0.59. This implies that on some farms additional watering would *lower* output by about 20 percent, while on other water-constrained farms

¹¹ IUCN (2002).

¹² Husain, I, F Marikar and W Jehangir, 2001, *Productivity and Performance of Irrigated Wheat Farms across Canal Commands in the Lower Indus Basin*.

increased irrigation would *raise* output by about 59 percent. The conclusion to be drawn from the evidence is clear. Reallocating water from the profligate to the productive users would confer multiple benefits – reducing the incidence of waterlogging and increasing agricultural productivity. Limited by data availability this study does not provide estimates of the losses due to sub-optimal water allocations, or the consequent impacts on the coastal zone. Instead the focus is on agricultural losses from salinization, soil erosion and rangeland degradation.

Figure 2.5: Agricultural Productivity Declines with Canal Releases in Sindh



Source: World Bank calculations from Pakistan Agricultural Statistics

Salinity Impacts

44. Salinity is one of Pakistan’s most serious problems. Common to other arid regions, Pakistan has naturally saline soils, but the problem has been compounded by consistent mismanagement of irrigation and human induced soil erosion. Official statistics indicate that over 25 percent of irrigated land suffers from various levels of salinity, with over 1.4 million hectares being rendered uncultivable due to excessive salinity levels. Salinity imposes direct economic losses, through reduced yields and less visible indirect losses through changes in farming practices or the cropping mix. These impacts are approximated by the value of “lost” output related to salinity. Two sets of estimates are presented to account for plausible (though not optimal) adjustments to cropping patterns in response to salinity. The total annual cost of yield reductions from salinity is estimated at Rs 15-55 billion. Including lost opportunities from cropping on the 1.4 million hectares of land with high salinity level adds a further Rs 10-18 thousand per hectare.¹³ This brings the total estimated cost of salinity to Rs 30-80 billion, with a mean cost of Rs 55 billion, or 0.9 percent of GDP in 2004.

Groundwater Changes

45. Issues related to groundwater are becoming increasingly urgent and complex. In the major surface irrigation areas, groundwater levels initially rose, contributing to salinity and waterlogging problems. Increased efforts in abstraction of groundwater to manage this concern also led to the widespread use of the better quality groundwater to complement surface irrigation. This informal conjunctive use has been a major contributor to agricultural output but is now also

¹³ Dost (2002).

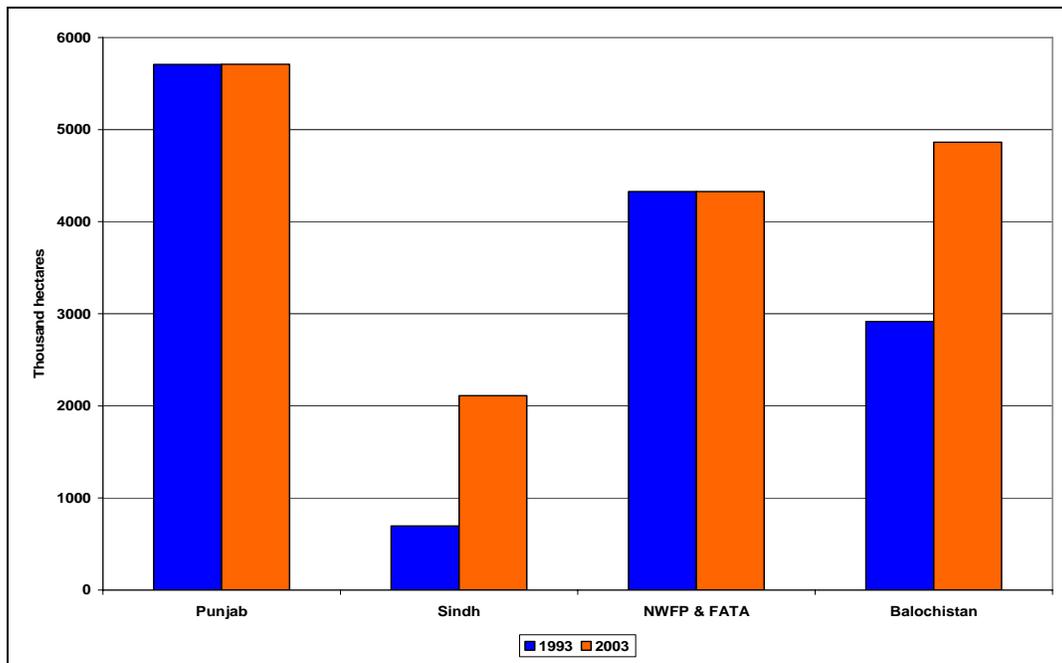
leading to significant drawdown of groundwater levels, as well as associated higher costs and changes in water regimes. The patterns and impacts vary across the country, but generally the existing systems for planning and control are weak, at best. In NWFP, the issues are mainly related to control of waterlogging. In Punjab there are challenges in managing current rates of over-abstraction and there are increasing problems caused by pollution. In Sindh, where much of the groundwater is saline, overexploitation is relatively less but a sound policy and careful management are needed. Use of groundwater has contributed significantly to growth in agricultural productivity, but depletion of the resource and the difficulty of abstraction from lower water levels are imposing both direct and indirect costs, which have not yet been quantified.

Soil Erosion

46. Land degradation is another serious concern. Erosion is accelerating due to anthropogenic factors such as the destruction of natural vegetation and over-grazing. Degradation on arable land caused by wind and water erosion increased by almost 3.5 million hectares from 1993 to 2003¹⁴ and comprised about 18 million hectares in total in 2003. Figure 2.6 presents the distribution of eroded lands by province. The regions most affected by soil erosion during this period are Sindh (about 1.5 million hectare increase in eroded land of which an estimated 360 thousand hectares is an increase in eroded crop lands) and Balochistan (about 2 million hectares increase in eroded land of which an estimated 500 thousand hectares is an increase in eroded crop lands).

47. The estimated economic losses from reduced yields resulting from soil erosion in Pakistan is around Rs 15 billion per year, or 0.25 percent of GDP. Offsite costs such as the siltation of dams and changes in hydrology are not included due to data limitations.

Figure 2.6: Eroded Lands in Pakistan in 1993-2003



Source: Ahmed and Rashid (2003); Brandon (1995).

¹⁴ (Ahmed and Rashid 2003; Brandon 1995)

Rangeland Degradation

48. Rangelands cover the bulk of the arid and semi-arid zones which are characterized by low precipitation and extremes of temperature. The natural productivity of these pastures is generally low and they remain vulnerable to desertification. Livestock are an integral part of the rangeland economy. In the Northern provinces pastoralism is the only livelihood option, and is the principal source of income accounting for over 90 percent of household income. In regions where agro-pastoralism is the main farming activity, the contribution of livestock varies from 30–70 percent.

49. The livestock population has doubled since 1975 and this trend shows little sign of abating. However there is clear evidence that the carrying capacity has been exceeded in most ranges. Overstocking and overgrazing leads to soil compaction, and the removal of vegetation, rendering the soil vulnerable to subsequent wind and water erosion. An FAO survey based on satellite imagery classified 85 percent of the total rangelands as degraded. In addition there has been a substantial reduction in rangeland as areas have been transformed from grazing commons to unproductive deserts. The most substantial reduction of rangelands occurred in the Northern Areas and Balochistan in 1992-1997. In absolute terms rangelands in Balochistan suffered the greatest decline of 3.6 million hectares as result of desertification and denudation of vegetation from drought and continuous overgrazing.

50. Losses on the rangeland are valued in terms of the reduction of fodder yield and approximate Rs 3.6 to 5.4 billion per year. This amount may seem modest when compared to other environmental damages, but there are three important issues which suggest that this estimate grossly understates the development and strategic significance of the rangelands. First the rangelands are home to among the poorest of the country's population, so that the impact of pasture loss is highly regressive, falling disproportionately upon the rural poor. The rangeland population is also highly exposed to natural disasters such as droughts and floods that can lead to absolute destitution. As a corollary, policy interventions that improve rangeland productivity, and so provide a buffer against natural disasters, yield a high poverty dividend. Second, much of the degradation of the rangeland is irreversible. This implies that production losses are suffered in perpetuity and therefore considerably higher than the figures recorded here.

51. Third, even this adjustment does not fully account for the economic significance of the rangelands. In the past, traditional rules and practices assured sustainable use of pastures, but these practices have now largely disappeared as a result of population pressures and other changes. Public interventions on the rangelands have been sporadic and solutions to the problem have remained elusive. This is not surprising since the most degraded lands are in hostile and inaccessible territory. Research finds that poverty and environmental degradation are seldom the *direct* causes of conflict, however, poverty makes conflict relatively more attractive than seeking negotiated peaceful solutions. Consequently, economic factors aggravate existing (social and political) tensions, tipping the balance towards conflict. The dilemma for policy makers is that rangeland degradation creates poverty and thus fuels hostility. This in turn renders interventions ineffectual, suggesting the need for placing a higher priority on the causes and consequences of rangeland degradation, particularly in regions prone to conflict.

52. Table 2.6 summarizes the estimated losses as a result of salinity, soil erosion and rangeland degradation considered above. The mean estimate of the combined losses exceeds Rs. 74 billion annually, equivalent to more than 1 percent of GDP.

Table 2.6: Estimated Annual Cost of Agricultural Losses from Soil Salinity, Erosion and Rangeland Degradation

	Total Loss (billion Rs)		
	Low	Mean	High
Salinity Costs	30	55	80
Soil Erosion	15	15	15
Rangeland Degradation	3.6	4.2	5.4
Total Loss	48.6	74.2	100.4

Forests

53. Forests occupy a relatively small proportion of the land area in Pakistan (some 3 - 5 percent), but nevertheless play a vital role in the country's economy. Forests remain an important source of fuelwood, grazing land, livelihood and government revenue. Forests also provide multiple ecological-services such as watershed protection, soil conservation, biodiversity habitat and play a vital role in assuring eco-system resilience (i.e. stability). However, there is insufficient information to estimate the full economic value of the country's forests, and the estimates provided here are based on assessments drawn from studies in other countries.

54. Data on forest status in Pakistan vary significantly and are highly controversial. Some statistics indicate that forest cover has accelerated rapidly since 1999, with regeneration rates in excess of 5 percent. However, commentators observe that these figures seem high and exceed the regeneration rate of most indigenous forest species. This Report does not contribute to this debate and instead uses the data provided by the Natural Forest Resource Assessment (NFRA). While this seems closest to globally accepted definitions and classifications, the data on forest cover used in this Report are not the same as those published by the Government.

55. The NFRA classification shows that forest cover is declining in Pakistan.¹⁵ The estimated deforestation rate over the 1990-2005 period is 2.1 percent or 47 thousand hectares annually. Forest types included in this definition of forests are coniferous forest, riverain and mangrove forest. It is estimated that the most valuable coniferous forest is declining at the rate of 40,000 hectares annually. Northern Areas and NWFP have the highest annual rates of deforestation (about 34,000 hectares in Northern Areas and 8000 hectares in NWFP). Riverain and mangrove forests are also decreasing at the rate of 2,300 and 4,900 hectares annually. This is an alarming rate given the quite high ecological value of these types of forest.

56. Using this classification, the estimated costs of deforestation in Pakistan are between 206 to 334 million per annum, as summarized in Table 2.7. The direct use values, reflecting local private forest losses, include the losses from sustainable logging, non-timber products, tourism and recreation. The relatively low figure for deforestation losses is due to the omission of a wide range of forest services related to non-use values for which plausible data are unavailable. Small aggregate losses also reflect the low level of forest cover. This of course does not imply that interventions are unwarranted and uneconomic. The effectiveness of policies needs to be determined by comparing the cost of investment to the marginal benefits.

¹⁵ NFRAS (2004).

Table 2.7: Costs of Annual Deforestation (Million Rs)

FOREST SERVICES	ANNUAL COST		
	Low estimate	Mean	High estimate
Direct use values	122	186	250
Sustainable timber production	28	71	114
Fuelwood production	41	41	41
Non timber products	25	25	25
Tourism and recreation	28	49	70
Indirect use values	84	84	84
Direct Plus Indirect	206	270	334

4. Global Comparisons of Environmental Sustainability

57. Having assessed the costs of degradation in Pakistan it is instructive to compare the overall environmental performance with other countries. A number of environmental sustainability indices have been developed to facilitate this process. The most comprehensive and widely quoted measure is the Environmental Sustainability Index (ESI), a collaborative venture of the Yale Center of Environmental Law and Policy and CIESIN at Columbia University. ESI is a composite index of 21 indicators that cover five broad categories of environmental pressure.¹⁶ As with any other aggregate index, the ESI is not without its shortcomings. Given the lack of information in many countries, the rankings are an approximation of sustainability, based on an aggregation of a wide array of indicators.

58. Among the countries of South Asia, Bhutan scores the highest ESI, which is unsurprising for a country with a low level of industrialization and sparse population, consequently facing limited ecological stress. In contrast, as a result of high population density, a pollution intensive industrial structure, a vulnerable natural resource base, and limited capacity to mitigate environmental stress, Pakistan scores the lowest ESI in South Asia. It should be emphasized, however, that the ESI lacks precision in ranking closely clustered countries. Nevertheless, the large disparity between Bhutan and Sri Lanka's score on the one hand, and that of Pakistan, India and Bangladesh on the other, is sufficient to indicate that Bhutan and Sri-Lanka are on a more sustainable growth trajectory than most of their South Asian peers.

59. A further weakness of the ESI is that it gives an equal weight to all its sub-components and so assumes that environmental stresses are uniform in their impact across countries. The problem with this approach is that countries vary in their vulnerability to different environmental pressures. In some countries water scarcity may be a more pressing constraint, while in others ecosystem loss may be a more significant problem. Consequently, the ESI scores are more revealing if used to benchmark the performance of countries facing similar environmental problems and constraints. Tables 2.8 and 2.9 divide countries into two possible categories that include Pakistan – vulnerability to desertification and high population density.

60. Table 2.8 shows that Pakistan remains relatively more susceptible to land degradation than most nations in the arid-zone category. This vulnerability reflects not only the country's water scarcity, but its ability to cope with the problem. For instance, Israel and Oman like

¹⁶ The subcomponents measure performance in the following areas: (1) Environmental Systems, (2) Reducing Environmental Stresses, (3) Reducing Human Vulnerability to Environmental Stresses, (4) Societal and Institutional Capacity to Respond to Environmental (5) Challenges, Global Stewardship.

Pakistan are water stressed, but their higher ESI scores indicate: (i) that they face fewer additional environmental pressures, such as salinity, water logging, or uncontrolled pollution; and (ii) a greater capacity to address environmental stresses.

61. Table 2.9 compares the ESI scores of countries with a high population density. Pakistan lies in the lower half of the distribution. Somewhat surprisingly the ESI scores of India, Sri Lanka and Nepal appear in the upper quartile. Whether judged in terms of regional performance or environmental stress factors, the aggregate sustainability indicators suggest that Pakistan faces a number of environmental challenges that could undermine the sustainability of its remarkable economic performance.

Table 2.8: Desert Countries (≥ 50% land classified as desert)

RANK	COUNTRY	ESI	RANK	COUNTRY	ESI	RANK	COUNTRY	ESI
1	Namibia	56.7	8	Niger	45.0	15	Iran	39.8
2	Israel	50.9	9	Morocco	44.8	16	Saudi Arabia	37.8
3	Kazakhstan	48.6	10	U.A.E	44.6	17	Yemen	37.3
4	Oman	47.9	11	Egypt	44.0	18	Kuwait	36.6
5	Jordan	47.8	12	Mauritania	42.6	19	Uzbekistan	34.4
6	Algeria	46.0	13	Libya	42.3	20	Iraq	33.6
7	Azerbaijan	45.4	14	Pakistan	39.9	21	Turkmenistan	33.1

Table 2.9: Densely Populated Countries (≥ 100 persons per km²)

RANK	COUNTRY	ESI	RANK	COUNTRY	ESI	RANK	COUNTRY	ESI
1	Japan	57.3	8	Poland	45.0	15	Philippines	42.3
2	Germany	56.9	9	Rwanda	44.8	16	Lebanon	40.5
3	Netherlands	53.7	10	Jamaica	44.7	17	Burundi	40.0
4	Italy	50.1	11	Belgium	44.4	18	Pakistan	39.9
5	Sri Lanka	48.5	12	Bangladesh	44.1	19	Trin & Tobago	36.3
6	Nepal	47.7	13	El Salvador	43.8	20	Haiti	34.8
7	India	45.2	14	South Korea	43.0	21	Taiwan	32.7

5. Conclusions: Environmental Degradation as a Constraint to Growth

62. A clear conclusion that emerges from this review is that environmental degradation eventually translates into socio-economic problems which retard development and growth. There is a need to address environmental issues through policies and institutional reforms that create the right incentives for administrators to effectively enforce policies, and for polluters to comply with regulations. In the short term this may increase costs and utilize public funds that could be spent on other development concerns. For instance, controlling emissions will raise production costs, and protecting rangelands will utilize scarce public funds. These costs need to be balanced against the benefits of reducing environmental risks – lower pollution brings health benefits and protecting the rangelands increases the resilience and earning capacity of pastures. This calls for regulations and incentive structures that balance benefits and costs, and maximize the sustainability and growth potential of the economy.

63. For this to be achieved, environmental governance must be fully integrated into economic decision making at the macroeconomic, provincial and sectoral levels. In addition, informed and strategic policy making is not possible without information on critical issues, so improving the

information database in key environmental sectors, and enhancing the dissemination of this information, should be a high policy priority.

64. Based on the conceptual framework presented in the first chapter, the following chapters of this report attempt to identify the binding constraints on environmental performance in Pakistan in terms of institutional design, the regulatory structure, administrative capacity, and accountability. At the outset, two important qualifications are in order. First, data on environmental institutions remain sparse, so the analysis and conclusions are necessarily qualitative. Second, many of Pakistan's environmental problems have a long history, so instant solutions are unlikely to be possible, even if there were complete reform of the environmental sector. As this chapter has demonstrated, however, delays in intervention have costly consequences for economic growth and the well-being of the poorest.

III. INSTITUTIONS FOR ENVIRONMENTAL MANAGEMENT: CLOSING THE LINKS IN INSTITUTIONAL DESIGN AND STRENGTHENING CAPACITY

65. Environmental degradation is highly visible in Pakistan – air and water pollution, land degradation and deforestation are widespread. Consequently there is broad consensus at both the national and provincial levels that there is an urgent need to address environmental problems. Why then has it been so difficult to bring about the reforms needed to improve environmental performance? To answer this question, this chapter adopts the environmental production framework outlined in Chapter I. It begins with a brief review of the environmental legal and policy framework. It then assesses the design, mandates and resources of the key institutions with environmental responsibilities, principally in relation to the management of the impacts of urban and industrial growth.

66. This chapter suggests that the key performance constraints are not primarily a consequence of inadequate legislation or insufficient funding, but rather are the result of a few key weaknesses in institutional design combined with low capacity to apply available resources. In particular, this assessment concludes that the lack of guidelines for oversight of environmental authorities delegated from Federal to provincial agencies is an important missing link in the institutional design. The potential availability of significant development resources for environmental programs presents a golden opportunity to forge such links between levels of government by providing resources for unfunded mandates, and developing incentive-based partnerships that would tie funding to the monitoring of performance and outcomes in the implementation of national laws and environmental policies. In turn, such funding would allow environmental agencies to overcome a shortage of qualified staff by outsourcing a range of technical tasks. At the same time as these key constraints are being addressed, this chapter also notes that opportunities exist to strengthen current mechanisms for the mainstreaming and upstreaming of environmental concerns, and to support the judiciary and civil society organizations in enforcing environmental commitments.

1. Legal and Policy Framework: the Basis of Institutional Design and Direction

After more than two decades of experience with environmental legislation and policy development, Pakistan’s environmental management framework is relatively mature. Despite this experience, however, significant aspects of institutional design and policy direction remain to be resolved, in particular related to the delineation of authorities, and the promotion of local and mainstream initiatives. This section identifies the principal elements of the framework, and concludes that while a relatively comprehensive legal and policy framework has evolved, there remain institutional obstacles to its effective application, which are discussed in more detail in the following sections.

The Legal Framework: Concurrent Responsibilities and Delegated Authorities

67. The Fourth Schedule of the Constitution of Pakistan establishes the concurrent legislative list of subjects for the Federal and provincial legislatures. “Environmental pollution and ecology” is included in the concurrent legislative list, which means that both the federal and provincial governments have constitutionally mandated responsibilities for the management of pollution and natural resources. This is a significant recognition of the shared governmental responsibility for environmental protection, but it also raises important questions regarding the proper alignment and coordination of these roles and responsibilities.

68. The cornerstone of environmental legislation is the Pakistan Environmental Protection Act of 1997 (PEPA) which superseded the Pakistan Environmental Protection Ordinance of 1983. The Act establishes the general conditions, prohibitions, and enforcement for the prevention and control of pollution, and the promotion of sustainable development. The Act also establishes and delineates the powers and functions of the Pakistan Environmental Protection Council (PEPC), Pakistan Environmental Protection Agency (Pakistan EPA), provincial Environmental Protection Agencies (EPAs), and Environmental Tribunals. In particular, the Act creates the authority for delegation of environmental management functions to the provincial EPAs. Nothing in the Act prohibits provincial governments from adopting more stringent standards or regulations. The juxtaposition of the concurrent environmental responsibilities established in the Constitution with the Federal authority to delegate environmental management functions established in the PEPA creates a tension in institutional design which is yet to be fully resolved.

Environmental Policy: Moving towards Demand-Driven Approaches and Mainstreaming

69. The National Conservation Strategy (NCS) was adopted in 1992 as the guiding environmental policy for Pakistan and a Mid-Term Review of its achievements, impacts, and prospects was undertaken in 2000. The Mid-Term Review concluded that the achievements under the NCS have been primarily awareness raising and institution building, and that future initiatives should emphasize improvements in implementation capacity. One of the specific recommendations was to “switch the NCS from a top-down and supply-driven approach to a bottom-up demand driven approach” and thereby foster the development and strengthening of local institutions and the empowerment of user groups to build sustainability. This NSC policy shift signals a growing emphasis on the need to develop the capacity of provincial and local governments for environmental management and the need to empower sectoral interest groups and civil society in the decision-making process.

70. The National Environmental Action Plan (NEAP) was adopted in 2001 with the stated program objective of alleviating poverty through environmental projects. Starting at the federal level, a gradual integration of the programs at the provincial and local levels was envisioned. While some capacity has been built at the federal and provincial level, the NEAP has yet to fully realize its objectives.

71. The National Environmental Policy (NEP) was adopted in 2005 and provides broad guidelines to the federal, provincial, and local governments in addressing environmental concerns and cross-sectoral issues such as poverty, health, trade, and local governance. To achieve its policy objectives, the NEP directs MoE, provincial and local governments to develop plans for its implementation. The NEP provides an opportunity to strengthen relationships between Federal, provincial and local governments for environmental management, adopt innovative governance approaches, and incorporate performance measures in the implementation of agreed programs.

2. Institutional Design: the Vertical Division of Responsibilities

72. Under the PEPA, the Federal government has the authority to delegate any of its environmental management functions and powers to provincial governments, government agencies, or local authorities. Provincial governments in turn may delegate powers to any lower-tiered government agency. This provision establishes a framework for environmental federalism within which environmental management responsibilities are shared among Federal, provincial and local governments. Environmental federalism is built on the belief that governance is strongest when implemented at the level closest to the beneficiary, and is further promoted in Pakistan by the Local Government Ordinance of 2001, which introduced a new system of local

government aimed at promoting responsibility at the local level. According to this Ordinance, rural and urban local councils are responsible for “the prevention of pollution of water or land from such sources and in such manner as the by-laws may provide.”

73. Under environmental federalism, appropriate functions for a national environmental agency include policy development, standard setting, environmental research, and the oversight of federally delegated programs to ensure the enforcement of national laws and policies. Conversely, environmental issues requiring knowledge of local environmental, economic, and social conditions can best be made by those closest to the problem. These issues will involve environmental assessments, permitting, and enforcement, which consequently should be delegated to the provincial and local agencies for decision-making in most cases.¹⁷ Supporting functions such as information management, public outreach, and compliance assistance should be included in the organizational structure for all agencies, but the national agency may be required to play a greater role particularly where provincial and local authorities have limited technical capacity or resources.

74. Implementation of environmental federalism poses the double challenge of defining rules for oversight, and of building the capacity necessary to fulfill delegated responsibilities. To date, these challenges remain largely unmet in Pakistan. Oversight guidelines for the delegation of federal powers to the provinces have not been established, environmental management capacity at the provincial level is uneven, and little capacity has been developed at the local level.

Establishing Guidelines for Oversight of Delegated Environmental Authorities

75. What principles should guide the delegation of powers across tiers of government? Oversight guidelines should allow for delegation of environmental authorities from the Federal to the provincial level under three conditions:

- the provincial government can demonstrate that there are adequate provincial laws and regulations in place to enforce the national objectives;
- the provincial authority has adequate technical expertise, staff, and resources to perform delegated responsibilities; and
- the provincial authority can demonstrate a commitment to share the information that will be needed to monitor compliance and measure performance.

Oversight guidelines should also establish policies for reporting, conflict resolution, training, and funding assistance. In establishing roles and responsibilities under decentralization, Pakistan EPA must tread a careful line between over-management and lack of oversight of delegated programs. The proposed Regional Directorates of Pakistan EPA will play an important role under decentralization to communicate, coordinate, and oversee the environmental responsibilities of the provincial and local authorities. It is critical that the delegation of enforcement functions to provincial and local authorities does not compromise Pakistan EPA’s legally mandated responsibility to ensure compliance with national environmental laws. This is important since provincial EPAs are accountable directly to provincial governments, and

¹⁷ Provision should be made for exceptional cases. For example, Pakistan EPA may take into consideration national implications regarding the compliance record of a large national enterprise at the provincial level. The national agency may need to be involved in a joint inspection, along with the Provincial EPA, of the facility when consistency with national standards has become a major issue or where undue pressure from local interest groups threatens the integrity of the regulatory process.

consequently Pakistan EPA has an important role to play as an autonomous adjudicator.¹⁸ Box 3.1 provides an example how such oversight is applied in the USA.

Box 3.1: Environmental Federalism - Oversight Mechanisms in the United States

The concept of environmental federalism has been practiced in countries including the United States, Canada, Australia, Germany, and India for many years. Perhaps the most acknowledged form of environmental federalism can be found in the United States. National legislation has given the responsibility for establishing environmental policies and standards to the Federal government, but the responsibility for implementing and enforcing those standards has been delegated to the states. For example, under the Clean Air Act, the US Environmental Protection Agency determines geographically uniform standards for common air pollutants and for establishing uniform performance standards for large stationary sources. The states are required to submit state implementation plans for approval to USEPA demonstrating that they can meet those standards, but are left with the discretion in how air pollution control programs will be executed.

Before delegating environmental enforcement responsibilities, the USEPA must first determine whether the state concerned has the capabilities to carry out effective enforcement of the law and has demonstrated its ability to protect human health and the environment. To demonstrate its enforcement capabilities, the state must:

- identify its existing or potential staff capabilities, technical as well as legal;
- identify its ownership or access to necessary equipment or facilities such as laboratories;
- have clearly defined enforcement policies and procedures for addressing environmental violations and pollution releases;
- submit an enforcement work program to EPA, including a budget and description of proposed activities and outputs to be accomplished.
- agree to the enforcement of national laws and regulations and federal oversight by USEPA, including federal intervention when enforcement is not being adequately exercised by the states.

The oversight role of the USEPA is to (i) ensure that the national environmental laws are being effectively enforced by the states, (ii) enhance state capabilities through technical assistance, support, and evaluation, and (iii) analyze and report on the progress of state programs and performance. USEPA Regional Offices formally review state programs at least once a year, relying on required reports, state records, and visits to the states. The reviews are based on objective measures, standards, and expectations that are agreed to in advance in a cooperative agreement.

3. The Horizontal Division of Responsibilities: Mainstreaming and Upstreaming

76. Many environmental issues are cross-sectoral, so there is a need to ensure coordination between the sectors involved. Pakistan has evolved a dual mechanism to achieve this coordination. A high-powered supreme authority, the Pakistan Environmental Protection Council (PEPC), is responsible for approving environmental policy across sectors. The Council is chaired by the Prime Minister, and consists of the provincial Chief Ministers, Federal and provincial ministers of environment, as well as civil society and private sector representatives. The stature of PEPC has given significant weight to its decisions, particularly among government agencies. While PEPC has been successful in adopting explicitly environmental policies, such as the NCS,

¹⁸ At stakeholder meetings during preparation of this report, the provincial character and autonomy of provincial EPAs were strongly endorsed, underlining the value of the National Environment Coordination Committee (NECC) as a forum to provide greater coordination of Federal and provincial EPA's activities, and to address potential conflicts in the exercise of their shared mandates and responsibilities.

NEAP and NEP, it has not yet addressed the need to mainstream environmental concerns into the activities of other sectors. Given the importance of environmental mainstreaming for sustainable growth, it would be extremely valuable to establish PEPC's authority in this regard.

77. In addition to PEPC's potential role in environmental mainstreaming, the other key mechanism designed to ensure inter-sectoral coordination for environmental management rests with the Planning Commission. The Planning Commission has established an Environment Section in the Planning and Development (P&D) Division to address environmental concerns at the policy, planning, project conceptualization, and approval stage of public sector projects, and so may be considered a force for environmental "upstreaming". Provincial planning departments have established corresponding environment sections for environmental screening of project proposals within their jurisdictions. While the establishment of these sections is significant, they lack the capacity and resources to conduct detailed environmental reviews and to engage other ministries in the screening process.

4. Environment and the Judiciary: Strengthening a Vital Link

78. When regulatory avenues for environmental enforcement fail, the judicial system is often the only other recourse for resolving environmental problems or disputes. The judiciary can succeed in enforcing policies and reconciling conflicts with powers that the executive branch agencies simply lack. In 2002, the Global Judges Symposium adopted the Johannesburg Principles of Law and Sustainable Development which affirmed that "an independent judiciary and judicial process is vital for the implementation, development, and enforcement of environmental law." In Pakistan, the judiciary has played an increasingly important role in the enforcement of environmental laws, and should continue to be strengthened through continued support for both judges and advocates. However, it should also be noted that intervention by the judiciary can be costly and should be pursued only as a last resort when other administrative remedies are exhausted.

Supreme and High Courts: Establishing the Right to a Clean Environment

79. The Supreme Court of Pakistan has considered several cases regarding the degradation of the environment and the protection of a clean environment. In the landmark case of Shehla Zia versus WAPDA, the Supreme Court ruled that "while life is not defined in the Constitution, it does not mean nor can be restricted to only vegetative or animal life or mere existence from conception to death; life includes all such amenities and facilities for which a person born in a free country is entitled to enjoy legally and constitutionally." The Court concluded that the right to a clean environment is a fundamental right of all citizens of Pakistan covered by the right to life and right to dignity under Articles 9 and 14 of the Constitution.

80. The Supreme Court has also taken an activist role in environmental policy making. In response to a letter from the Karachi Administration Women's Welfare Society, the Court appointed a Commission to look into complaints regarding health hazards in the use of open storm water drains for the disposal of sewerage and the contamination of water resulting from damaged water and sewerage pipes. The Court subsequently directed the implementation of remedial measures including the repair of water and sewerage pipes. The High Courts in the provinces have also intervened and rendered significant policy decisions affecting future environmental management. One of the most recent examples of court policy intervention is Syed Mansoor Ali Shah versus Government of Punjab which led to the establishment of the Lahore Clean Air Commission. The Lahore High Court appointed the Commission to develop

and submit a report on feasible and specific solutions and measures for monitoring, controlling, and improving vehicular air pollution in the City of Lahore.

Environmental Tribunals: Supporting Channels for Advocacy and Enforcement

81. Section 20 of the PEPA authorizes the federal government to establish as many Environmental Tribunals as it considers necessary and specify the territorial limits or class of cases under which each of them shall exercise jurisdiction. Two Environmental Tribunals have been established - one in Karachi with jurisdiction over the provinces of Sindh and Balochistan, and one in Lahore with jurisdiction over the provinces of Punjab and the NWFP. Like the Supreme Court and Provincial High Court, the Environmental Tribunals are playing an important role in setting and enforcing environmental policy,¹⁹ a role that is set to increase with plans under the MTFD to establish a further three Tribunals by 2010.

82. Given the increasing role that Environmental Tribunals and Courts will play in the future, it is important that they have an understanding of scientific principles and their application to environmental laws, including the concept of environmental risk and indirect impacts, and linkages between causation and harm. Therefore, investment in strengthening the institutional capacity of the Judiciary and Environmental Tribunals should not be overlooked. These institutions should be supported through judicial training programs on environmental laws, issues, and institutions and exchanges with other countries in the region with a judicial “Green Bench.” In addition, the Courts should establish mechanisms to monitor the implementation of court orders either through the establishment of judicially appointed oversight committees or judicially mandated reporting requirements.

Box 3.2: Empowering Citizens to Promote Environmental Compliance

In the Philippines, the constitution explicitly provides for "the right of the people to a balanced and healthy ecology in accord with the rhythm and harmony of nature." This right empowered citizens in the Philippines to file public interest litigation in the Supreme Court which resulted in a landmark decision for the clean up of the Manila Bay. While there is tension between government regulators and civil society organizations over environmental enforcement, the interests of regulators and citizens are in fact similar - ensuring a healthy environment. In many countries citizens are one of the most untapped and overlooked resources for ensuring environmental compliance and enforcement. Active citizen involvement in environmental enforcement can help supplement an agency's efforts by raising public awareness and building popular support for an otherwise controversial enforcement action. In the United States, for example, controversial provisions in the Clean Air Act, such as the vehicle inspection and maintenance program, would not have been implemented without the intervention of public interest advocates.

83. By establishing a constitutional right to a clean environment and demonstrating a willingness to address matters of environmental policy, the Courts have empowered citizens with legal standing in which to enforce environmental laws through administrative and judicial proceedings. While this right has been established by the Courts, there are no citizen suit provisions in the enabling environmental statutes. Existing and future laws should explicitly

¹⁹ In a very recent case, the Punjab Environmental Tribunal directed the Provincial Transport Secretary for the Province of Punjab to explain the reasons for the availability of rickshaws with two- stroke engines in the city of Lahore despite a ban on two- stroke rickshaws that was imposed a year ago.

provide for citizen enforcement. Public interest advocacy is a powerful force for improvements in environmental management (see Box 3.2), and should be supported through environmental law associations and the establishment of environmental law clinics at universities.

5. Are Resources for Environmental Management Adequate?

84. As far as federal financial resources in the development budget are concerned, the planned allocation for the environment is encouraging, with a proposed doubling of the environment budget for the year 2005-2006. Under the Mid-Term Development Framework, the Federal government has indicated a proposed allocation of Rs. 28.3 billion (\$473 million) for the next five years for environmental management projects. Included in the MTF is Rs.135 million (\$2.2 million) for the Pakistan EPA's Activity Based Capacity Development Project (ABCD) and Rs.50 million (\$836,000) for strengthening the capacity of the provincial EPAs, though neither has yet been implemented.

85. The immediate challenge confronting both Federal and provincial environmental authorities is to take swift advantage of the proposed allocation of development resources, and apply them towards programmatic goals in such a way as to strengthen and supplement their still relatively limited levels of permanent staffing and operational budget. For example, the budget for operation and maintenance of critical environmental management systems, such as air and water monitoring programs, is extremely inadequate and a funding program to sustain them is needed. In the longer term, the challenge becomes one of establishing more permanent and predictable sources of funding, in which Provincial Sustainable Development Funds may play a valuable role.

Supplementing Permanent Capacity with Outsourcing and Partnerships

86. The Environment Protection and Resource Conservation Project (EPRCP) supported by the World Bank from 1993 through 1999 played a key role in creating the environmental policy and institutional framework for the Federal and provincial agencies. It also provided critical staff support, but the adequacy and capacity of staff remains a continuing challenge. Table 3.1 reflects the current staffing mix at the federal and provincial level. In its Restructuring Proposal, the Pakistan EPA determined that to meet current and future mandates, it will need an increase of 312 technical staffing positions (grades BPS-16 and above) and an additional 338 supporting staff (BPS 1-15) to be phased over a period of three years. As these staffing increases are unlikely to be met in full, Pakistan EPA will need to consider ways in to augment its resources through outsourcing some of its functions.

Table 3.1: EPA Staffing Levels

Agency	Officers	Ancillary Staff	Total
Pakistan EPA	11	35	46
Punjab EPA	30	133	163
Sindh EPA	12	79	91
NWFP EPA	12 (5 vacant)	36	48
Balochistan EPA	7	40	47

87. Since Provincial EPA's have the frontline responsibility for implementation and enforcement, expanding their laboratory facilities and monitoring capacity deserves attention. Not all functions need to be retained in-house, however, and some may be performed more efficiently through contractual arrangements with private individuals or non-governmental

organizations such as research institutes or universities. Exploring formal partnerships with research or academic institutions with technical expertise might be one avenue for strengthening capacity in this area.

Provincial Sustainable Development Funds: Creating Dependable Sources of Funding

88. Under Section 9 of the PEPA, a Provincial Sustainable Development Fund (PSDF) has been established in each province to provide financial assistance for eligible projects which may include (i) purchase of pollution control equipment, (ii) installation of effluent treatment facilities in industrial estates, (iii) incentives to develop indigenous technology for pollution control, (iv) roundtables, conferences, workshops for pollution abatement, and (v) training and advisory services for industry. PSDFs will derive funds from a range of sources, including grants or loans advanced by the Federal or provincial governments, assistance from donors, and contributions from private organizations. The PSDF Rules further provide that provincial Finance Departments may credit to the Fund every year an amount equivalent to the pollution charges paid by industrial units, and fees received for environmental clearances and other environmental services. PSDFs have not yet been utilized, in part because of the opaque and cumbersome procedures established for the approval of expenditures. Experience from environmental funds elsewhere (see Box 3.3) suggests, however, that they may form important vehicles for the funding of provincial and local government capacity building, as well as project investments in environmental infrastructure. If environmental funds are used, they should incorporate good practices such as effective monitoring and evaluation procedures. In addition, periodic evaluation by independent and outside parties should be conducted to ensure the effective use of the funds and the achievement of environmental policy objectives. Financing through environmental funds will be effective only if the underlying reasons for the environmental problems, such as regulatory and market failures, are simultaneously tackled. Without strengthened environmental regulation and enforcement mechanisms, their effectiveness can be limited. Moreover, experience elsewhere has shown that crucial to the success of these funds is the need to avoid the mismanagement of public funds, for which stakeholders' participation in decision making is needed to maintain transparency and accountability.²⁰

Box 3.3: Environment Funds: Experience from Bulgaria

In Bulgaria, the National Environmental Protection Fund (NEPF) was created under the Bulgaria Environmental Protection Act of 1992. The main objective of the NEPF is to provide financial support to implement the National Environmental Strategy of Bulgaria. The main source of revenue comes from fines and fees collected by the Ministry of Environment, as well as proceeds from fuel taxes and privatization. The Fund's resources are controlled by a Management Board consisting of the Minister of Environment, Deputy Ministers from sectoral agencies such as the Ministry of Energy, Ministry of Health, Ministry of Transport, and Ministry of Regional Development and Construction, and representatives from the scientific and NGO communities. The daily management of the NEPF is carried out by an Executive Bureau within the Ministry of Environment. Annual reports on the activities and financial accounts of the NEPF are provided to the Parliament and available to the general public. To date, the NEPF has helped finance projects for air pollution abatement facilities equipment, wastewater treatment facilities upgrades, conversion to gas at thermal power stations, and the upgrading of bus engines in Sofia.

²⁰ Lovei, M. 1999. "Environmental Funds." Pollution Management Discussion Note (PMDN): In Focus - Number 1 (January 1999). Washington DC, World Bank.

6. Moving Forward: Strengthening Institutions through NEP Implementation

89. The NEP has established an ambitious environmental policy agenda, the achievement of which will require not only a comprehensive capacity building program, but also the establishment of incentives at all levels of government to encourage improved environmental performance and institutional sustainability.

Incentive-Based Partnerships to meet National Goals and Local Targets

90. One institutional approach to linking roles at different levels of government is to develop incentive-based partnerships between the Federal and provincial EPAs based on performance. These would link the transfer of financial support for institutional strengthening with demonstrated performance in improved environmental management. The benefits of an incentive based partnership are that it allows Federal and provincial EPAs to mutually agree upon environmental goals and agency responsibilities, develop a shared strategy of responsibility to achieve goals, and provide incentive funding based on performance. Such an approach is used in the National Environmental Performance Partnership System (NEPPS) that has been successfully adopted by the U.S. Environmental Protection Agency and several states (see Box 3.4), and initial discussions with provincial authorities in Pakistan indicate an interest in exploring this approach further.

Box 3.4: Incentive-Based Partnerships: the US Experience

Under the NEPPS approach, the USEPA and states recognized that environmental programs were expanding with limited resources and effective implementation required a structured planning process to establish joint priorities, allocate responsibilities, and address mutual areas of concern. The elements of effective Performance Partnership Agreements include:

- Description of shared outcome objectives and priorities;
- Description of strategies, tools, and activities;
- Performance indicators for evaluating environmental progress;
- Structure and process for mutual accountability, including clear definition of roles and responsibilities for each party and allocation of resources;
- Process for joint evaluation on how well the partnership is working and implementation of any needed improvements that are identified
- Description of how priorities in the agreement align with the national and state environmental plans.

The scope of Performance Partnership Agreements can cover many topical areas such as controlling priority pollutants, streamlining the environmental assessment process, improving compliance monitoring, and strengthening the enforcement of targeted sectors, as well as many program areas such as air quality, water quality, drinking water, solid and hazardous waste, and natural resource protection.

91. This performance-based approach would fall naturally within the process of developing action plans at the Federal and provincial levels envisioned in the NEP. It is also consistent with current fiscal practices of promoting federalism (see Box 3.5). These action plans would include agreed upon goals and responsibilities around identified priorities, such as strengthened capacity in environmental monitoring, auditing and enforcement, as well as project management. Similarly, provincial governments would, as appropriate, establish performance-based partnerships with district and tehsil governments for environmental functions devolved to local governments. The action plans would also include the development of performance indicators to

measure both the outputs (activities carried out by provincial or local authorities) and outcomes (environmental results) of the partnership. Further building on the vision established in the NEP, funds would be transferred between levels of government upon the successful achievement of the agreed indicators. Two important pre-requisites for such an approach to function effectively are (i) translation of the NEP's broad directions into specific targets, and (ii) establishment of an efficient system of performance-based transfers, combining transparent decision-making with the minimum number of administrative hurdles.

Box 3.5: Instituting Performance-Based Grants in Pakistan

In Pakistan, sharing of federally collected revenue between the federal government and the four provincial governments is governed by the National Finance Commission (NFC) Award. The Award, determines the vertical (i.e. between the federal and provinces) and horizontal (among the provinces) sharing of revenue on criteria of "need". While the horizontal distribution is based on determination of expenditure needs of the national and sub-national governments, the horizontal distribution has been based mainly on population shares. Allowance, however, is made of developmental needs of the provinces by providing federal grants based on notions of backwardness. Moreover, as the Constitution gives the ownership of natural resources to the provinces, the provinces also get "unconditional transfers" from the federal governments, which are simply the pass on of energy-related revenues collected by the federal government.

Although the simple design of the NFC Award has been instrumental in getting it the required political support, it has been criticized for its lack of performance incentive system, which has created some unintended problems, particularly in terms of poor use efficiency of fiscal resources, weak collection of own revenues and non-alignment of policy priorities across governments. While these shortcomings of NFC transfers prompted some of the provinces to establish performance-based grants under their sectoral or sectoral reform programs, the federal government has generally adopted more direct interventions to ensure implementation of national policies.

Performance-based grants, however, are considered as a better option as they can:

- Strike a balance between adherence to national policy goals and ensuring autonomy/efficiency of sub-national governments.
- Provide incentives for sub-national governments to improve their performance by linking the access to and size of the release of grants with their performance in pre-determined areas.
- Supplement the overall needs assessment and monitoring and evaluation systems.
- Through focus and incentives, strengthen the capacity of sub-national development efforts.
- Improve accountability (up/down), participation and citizens' access to information.

Nonetheless, to achieve these objectives, performance-based grants need to be properly designed. In designing such grants, it is better to start with basic institutional requirements, such as improved financial management, good governance, transparency, participation etc. Other key elements are:

- Performance has to be within the control of the sub-national governments.
- Signals should be mutually and inter-temporally consistent and non-conflicting.
- Sub-national governments need to know clearly the defined measures (i.e. both the benchmarks and targets) beforehand.
- Credibility of assessment (of performance) is vital and remains a great challenge.
- Communication of results is crucial.
- In case of Pakistan, it is important that these grants be either built into the NFC framework or be additional to the NFC (and "straight") transfers.

Outsourcing to Build Capacity

92. NEP action plans at the Federal and provincial levels would also provide a strategic direction for initiatives to build technical capacity. These would include support for consultants to assist managerial staff in developing and implementing programs in priority areas, such as the management of air and water quality, expert review of environmental assessments, laboratory and monitoring equipment and analysis, the sharing of innovative practices in regulatory management and compliance incentives, and public participation in environmental decision-making. In moving forward, it is important that Pakistan EPA and Provincial EPAs focus efforts to strengthen institutional capacity in areas where there is comparative advantage in experience, resources, and local conditions. If efforts are made to address all the proposed environmental aspects of the MDTF simultaneously, the agencies may reach beyond their current capacities and resources, which could undermine the achievement of goals in the long term.

Strengthening Bottom-Up Accountability

93. Clarifying responsibilities and improving accountability through top-down partnerships is an important part of the solution. But there are limits to the top-down model of accountability. In hierarchical systems public sector goals are defined in the short-term by measurable indicators – such as staff numbers, or the quantity of infrastructure built, or the number of reports submitted. But the final goal of environmental policy is very different and involves environmental outcomes – the level of pollution or resource degradation. Since environmental outputs are often harder to measure than physical inputs, it is natural for administrative goals to be defined in terms of inputs. But the result is that there is often little correlation between tangible and observable physical measures and the eventual environmental outcome. When affected citizens have no formal role to play in the process, there is no mechanism for identifying policy failures. Given the complexity of environmental problems it is impossible for institutions to implement policies effectively without adequate consumer (citizen) feedback. So there is a need to integrate bottom-up approaches with the top-down hierarchies that exist in government. Public scrutiny of performance is ultimately a source of strength that leads to stronger institutions with greater public trust and support.

94. Creating effective stakeholder accountability is a difficult process, but there are two obvious mechanisms for strengthening accountability. Improving the effectiveness of environmental tribunals is one way of assuring greater accountability. Strengthening the independent judiciary and the role of public interest litigation gives an opportunity to press for policy enforcement when other avenues of accountability have been exhausted. However, stakeholders also need to be directly engaged in the planning, consultation and evaluation of environmental performance. Establishing performance-based indicators that are transparent and regularly reported to the public will help ensure greater stakeholder accountability. Pakistan is particularly well placed to further develop such systems, with the presence of reputable scientific NGOs, legal associations, and academic organizations that have both the skills and knowledge to participate in the policy process in a meaningful and productive manner.

IV. REINFORCING THE ENVIRONMENTAL IMPACT ASSESSMENT SYSTEM

95. As Pakistan pursues its development agenda, growth will continue to bring economic, social and environmental change. The Environmental Impact Assessment (EIA) system is designed to be a key decision-making tool to ensure the integration of economic, social and environmental issues early in the planning process. Its effectiveness as a decision-making tool is determined by the capacity and resources – human, technical, and informational - with which the EIA system is implemented and will have consequences for the country’s long term growth.

96. While recognizing the increasing number of EIAs being submitted for review, and the Government’s commitment to environmental assessment of public sector investments, this chapter identifies a number of opportunities to reinforce the EIA system. In particular, this chapter highlights the need to establish Federal oversight and ensure better coverage of investments, promote the quality of EIA content and implementation, extend the NWFP model for capacity development, and promote meaningful public consultation and full disclosure of EIA documentation.

1. The EIA Framework: Establishing Oversight and Ensuring Coverage

97. The Pakistan Environmental Protection Act of 1997 (PEPA) requires that before a project commences construction or operation, an Initial Environmental Examination (IEE) must be filed with the Federal government and where the project is likely to cause adverse environmental impact, an Environmental Impact Assessment (EIA) must be filed. This requirement under Section 12 of the PEPA applies to both public and private development projects. The Federal agency must communicate its approval or disapproval within four months from the date that the IEE/EIA is filed or otherwise it is deemed approved.

Establishing Oversight of Delegated EIA Authorities

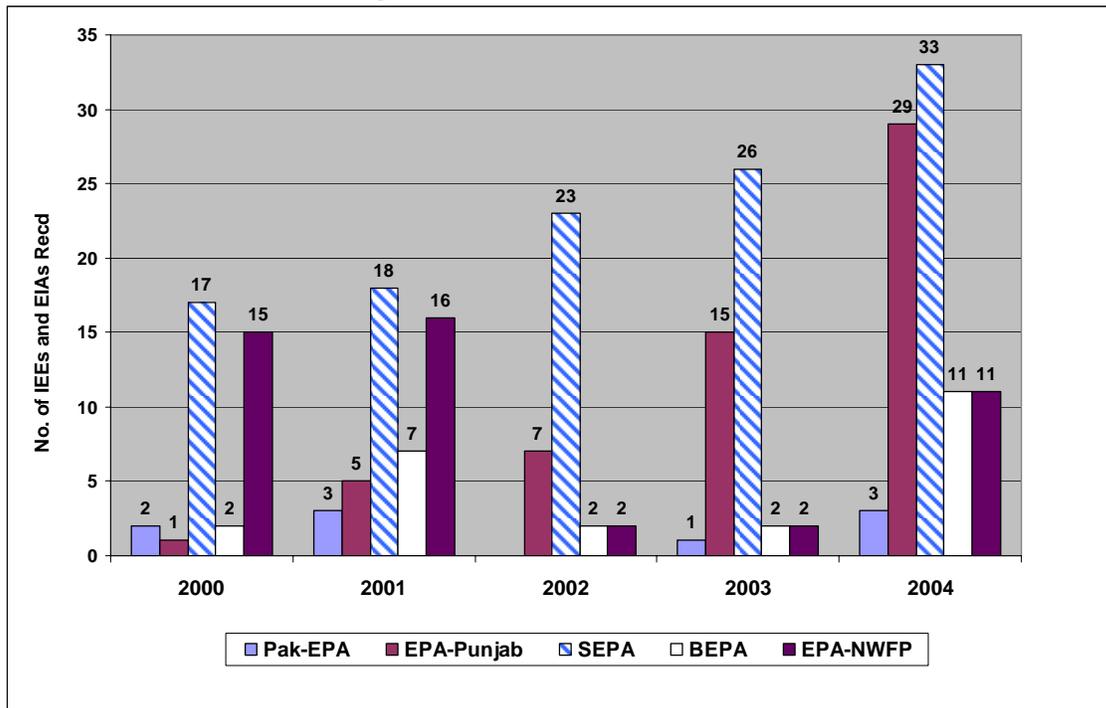
98. The policy and procedures for filing, review, and approval of environmental assessments are set forth in regulations promulgated by the Pakistan EPA. The regulations have established that the Federal EPA has jurisdiction over all IEEs and EIAs, but may delegate its power to provincial authorities pursuant to Section 26 of the PEPA. Federal jurisdiction will be retained for projects on federal land, military projects, and those involving either trans-border or trans-province impacts. In cases where there are trans-province impacts, the parties can agree to have provincial authorities review and manage the environmental assessment, in which case the federal authority will have no direct role.

99. While the provincial authorities have jurisdiction for the vast majority of cases, the regulations specifically reserve the right of the Federal EPA “to review any Environment Report at any time and to suspend the powers it has delegated to any Responsible Authority if it believes those powers have been misused.” This right to review and suspend has not been exercised, but represents a key provision regarding oversight of Federal/provincial conflicts and the determination of an ultimate decision-maker. This right is particularly important when provincial authorities may be subject to political pressure to expedient EIA clearances without proper and adequate environmental review.

Improving EIA Coverage

The EIA regulations provide a sound legal and regulatory framework for the EIA system in Pakistan, and there has been progress in its implementation. As Figure 4.1 indicates, data provided by the Pakistan EPA show an increase in the number of IEEs and EIAs filed in the last five years from 37 in 2000, to 87 in 2004. While the trend is encouraging, the total number of cases submitted is still relatively low. Bangladesh, for example, has a smaller economy with approximately the same level of industrialization as Pakistan, but the Bangladeshi Department of Environment issued more than 1,300 environmental clearances in 2001. This discrepancy serves to underline the fact that there is no system to help environmental authorities in Pakistan identify private sector projects, and as a result it is likely that some smaller projects with potentially damaging impacts are never reported. Federal and provincial EPAs have recently tried to strengthen linkages in the planning and licensing process by requesting Banks to verify environmental clearances before approving financing (as required under the Equator principles), and by requesting utility companies to confirm environmental clearances before providing electricity, water and gas connections to industries. There has so far been little movement on these initiatives, however.

Figure 4.1: EPA Performance Statistics



2. Strengthening the EIA Process: Meaningful Public Consultation and Disclosure

100. The PEPA and EIA regulations emphasize that every review of an EIA should be carried out with public participation. Adherence to these requirements has, however, proven to be challenging. While environmental reports generally state that stakeholders have been consulted, in a number of cases no meaningful public consultation has been pursued. Some project proponents view public hearings as a mere formality and make little attempt to identify and involve local communities that might be impacted by the proposed project. For example, a

review of the public consultation process for a project in Balochistan revealed that only seven to eight persons attended the public hearing, and none came from the project area.

101. The EIA Guidelines for Public Consultation are very clear and specifically state “Proponents should explain their proposals clearly to affected communities, actively listen to the communities’ responses, and make prudent changes to the proposal to avoid or mitigate adverse impacts. Where proponents are able to go beyond this to participation, they will achieve even greater benefits for themselves and for the stakeholders.” These guidelines emphasize that public consultation goes beyond simply listening to public concerns, but more importantly it requires active engagement with the public in the development of acceptable solutions to address those concerns.

102. In building the capacity to conduct more meaningful consultations, Pakistan is fortunate to be able to draw on the expertise of leading NGOs such as IUCN, WWF, and LEAD, which have organized public forums and training programs to raise awareness of the EIA system and the role of public participation. More formal partnerships with such organizations would enable environmental authorities to establish meaningful public consultation as standard practice.

103. Consultation is only meaningful if there is adequate information made available about the project. Under Section 5 of the EIA regulations the project proponent and responsible authority are required to make the EIA available to the public. Compliance with this rule is uneven. While Sindh EPA does disseminate EIAs, and provides dispute resolution mechanisms to address stakeholder concerns, elsewhere only executive summaries rather than the full EIA reports are available to the public. Public access to EIA documents can enhance the ability of the affected communities, NGO’s and others to evaluate potential environmental impacts, identify areas of concern, and suggest possible mitigation measures. Transparency can help not only the affected community, but the regulator and regulated entity as well. Measures to improve public access and transparency of information should be further explored, including the application of information technology to allow the public to review and comment on proposed EIAs electronically.

3. Promoting Quality of EIA Content and Implementation

104. A direct consequence of low levels of stakeholder accountability is that the quality of IEE/EIA reports remains highly variable. In general the quality of reports submitted for highly visible mega-projects is satisfactory, but more often the level of research and information needed to evaluate project impacts is missing. Indeed, consultants have been known to submit reports without visiting affected sites to collect information. It is unlikely that this would be tolerated were there greater transparency, genuine public consultation and inclusion.

105. In the clearance process, there is also a need for a formal system of EIA review or a panel of experts to evaluate the documentation and identify issues in the reports for projects with likely significant impacts. Such a panel of experts would help ensure that the information provided in the EIA is adequate and appropriately used in the decision-making process, and in combination with better stakeholder consultation, would protect against criticism that the EIA may be drafted around a decision that has been pre-determined before it was conducted. In addition, the EIA review should not be confined to impacts and mitigation measures, but should extend to the monitoring and enforcement of agreed measures.

Monitoring and Enforcement of EIA: Matching Capacity to Authority

106. Both PEPA and EIA regulations provide for the inspection and enforcement of EIA provisions. Under Section 6 of the regulations, the responsible authority is given the “full right of entry and inspection of the site, factory or premises at any time prior to, during or after the commencement of the operations relating to the project.” And under Section 17 of PEPA, anyone who fails to comply with the EIA requirements can be fined up to one million rupees, and additional fine of 100,000 rupees for each day the violation occurs. These enforcement tools are seldom deployed, however, so compliance with EIA provisions remains weak.

107. Assuring compliance with EIA requirements must rely on a broad range of mechanisms, including a sound EIA review and monitoring process, environmental awareness and management, and strong enforcement. Unless these enforcement tools are deployed, there will be no perceived or real incentive to comply, or consequence for noncompliance. Under the law, Federal and provincial EPA’s have the authority to issue Environmental Protection Orders (EPOs) and impose penalties. Pakistan EPA could also legally order civil authorities to withdraw utilities to a project that has failed to obtain a No Objective Certificate (NOC), but this power has never been used. A review of the current staffing mix of the Federal and provincial EPAs suggests that strengthening enforcement will require greater capacity of both technical and legal staff in monitoring, inspection, collection of evidence, and prosecution of environmental cases.

Box 4.1: EIA Capacity Building – a Successful Model in NWFP

The government of NWFP has taken the lead in institutionalizing the awareness and understanding of the EIA system in the provinces and government. The NWFP EIA Centre was established at the Pakistan Academy of Rural Development, Peshawar in collaboration with EPA-NWFP for the purpose of building the capacity of public and private sector organizations in the preparation of EIAs, and to enhance the capacity of EPA-NWFP in reviewing and monitoring environmental reports. Funding for the Centre was first proposed in the 2002 Annual Development Plan of NWFP Government for three years and based on its performance, it was recently extended another three years until 2008. It reflects both an important commitment on behalf of the provincial government and a significant recognition of the role that training plays in maintaining an effective EIA system. In the first three years of the program, ten master trainers have been trained and over 165 individuals have received training. Other provinces should be encouraged to institutionalize similar EIA training programs within their jurisdiction in partnership with local universities or other training organizations.

Currently the provinces have not involved local governments in the EIA process. As devolution progresses, building capacity at the tehsil and district levels for environmental management will become increasingly important. The challenge of locating new developments in rapidly expanding urban centers will continue to grow, and with it the importance of integrating local land-use planning with investment decisions. As local governments become more involved in the preparation and review of EIAs, so the need for EIA training centers will continue to grow.

4. EIA and Public Sector Investments: Mainstreaming and Upstreaming

108. Many of the investments with the most significant environmental impacts are those undertaken by the public sector. In all four provinces, the lack of knowledge in sectoral ministries of the EIA requirements for public sector projects is a major challenge to sustainable development. Notwithstanding the list of projects requiring an IEE or EIA, the system has been bypassed in a large number of cases. Recognizing this weakness, the Executive Committee of the National Economic Council (ECNEC) recently issued an order that “In case of development

projects having environmental implications, an Environmental Impact Assessment (EIA) report should invariably be submitted along with the project document at the time of getting approval.” This order is significant both for having been issued by ECNEC, and for clearly linking the approval of public sector projects with the need for environmental assessment.

Mainstreaming Sectoral Awareness: Over-coming Ignorance and Stigma

109. Many government officials are not aware of the legal requirement that development projects must go through the IEE or EIA process. The result is that government departments with significant infrastructure projects, such as agencies dealing with roads, irrigation, power distribution, as well as city and municipal authorities, proceed with public sector projects without conducting any form of environmental assessment. Even among those agencies aware of EIA requirements, there is often a reluctance to file an IEE/EIA report because of the general perception that the EIA requirements are an unnecessary burden to achieving desired economic development goals. Greater training and informational resources are needed to improve public sector awareness of the EIA process, so that sectoral agencies can answer the following questions: What are the EIA requirements? Why are the requirements needed? Who, when, and where must EIAs be filed? What are the consequences for failure to comply? How can compliance be assured? In addition, specific good practice guidelines should be adopted by sector agencies to better inform and guide the sector in the EIA process. This approach has been successfully adopted in several other countries. For example, in Peru, the Ministry of Transportation and Housing has established a registry of those parties authorized to produce an EIS and has produced specific EIA guidelines for roads.

110. The EPA can strengthen enforcement by harnessing the support of other government agencies. In most countries civil authorities can withdraw utilities to projects that fail to comply with environmental regulations. A similar approach needs to be adopted in Pakistan, where a No Objective Certificate (NOC) from the EPA should be made a mandatory requirement for gaining access to gas, electricity or water connections. Other options to increase awareness may include engaging organizations like the small and medium enterprise development authorities (SMEDA), Chambers of Commerce, Associations of the Industries, Ministry of Industries, and representatives of the commercial banks and utility companies. While this may help build trust between the regulator and the industry, it is unlikely to improve compliance unless accompanied by real and credible sanctions for non-compliance.

Upstreaming Environmental Review in the Planning Process

111. The Federal Planning Commission has established a reasonably effective environment section responsible for the environmental screening of public sector projects at the Federal level, and provincial planning departments have also established corresponding environment sections. Due to their limited resources, however, these sections are not able to provide the depth of environmental review required, and EIAs of public sector projects are not conducted systematically. In addition to reinforcing the procedural guidelines necessary to consolidate environmental assessment as an integral element of the public planning process, environmental sections of planning departments would be greatly strengthened if able to contract expert review to supplement their own capacity.

5. Strengthening the EIA System

112. The preceding review of the EIA framework and process in Pakistan identifies opportunities to reinforce this system through improvements in institutional design and technical capacity, and by strengthening incentives through broader public consultation and disclosure of information.

Ensuring Oversight and Coverage

113. Two important weaknesses in the institutional design and regulatory framework of the EIA system are the lack of clarity regarding oversight, and the lack of systematic incentives to ensure coverage. The previous chapter proposed an initiative to establish guidelines for the oversight of authorities delegated from the Federal to the provincial level. These guidelines should explicitly cover Federal authority over environmental clearances. Given the relatively limited number of IEEs and EIAs being submitted for review, there is also a need to develop systems to help environmental agencies identify potentially damaging private and public sector investments at an early stage of development. In this regard, the lack of awareness of EIA requirements, in both private and public sectors, is in part responsible for weak adherence to the EIA process. Potential measures to improve such awareness would include the development of streamlined checklists for project preparation, broader dissemination of the recent ECNEC directive requiring environmental assessment of public sector projects, and the provision of EIA guidelines to industry associations and other civil society groups.

Building Technical Capacity for the Preparation and Review of EIAs

114. While wider public consultation and disclosure will increase incentives for higher quality EIAs, greater technical capacity is also essential for effective implementation of the EIA process. To strengthen the technical skills of both the private sector personnel preparing EIAs and the public sector staff reviewing them, national and provincial EIA training institutes modeled after the NWFP Center should be established. In addition, the limited public sector capacity for EIA review should be supplemented through the use of independent experts to assist environmental authorities in the EIA review process, in particular to help ensure that assessments propose effective mitigation and monitoring measures.

Promoting Public Consultation and Disclosure

115. The EIA Guidelines state that the EIA must be prepared in a way that ensures the maximum participation of affected groups. In practice, public consultation has often been limited and ineffective. Strong public participation has been proven to be an important tool in achieving compliance and also has long term benefits for both project proponents and stakeholders. More effective public consultation could be promoted through a range of measures. A first step would be to require project proponents to develop a public consultation plan which would identify affected stakeholders, and detail how public comments will be solicited and incorporated into project development. A broader initiative would be to create EIA information centers at federal and provincial levels, where project proponents and citizens could inquire about the status of clearances and public hearings, and request access to EIA related documents. In addition, all EIA filings should be electronically maintained on a website for easy access by the public and private sector. Finally, environmental authorities could provide a non-technical summary of EIA decisions, explaining reasons for granting a clearance, agreed measures to address objections from the affected community, and provisions for monitoring and reporting.

V. URBAN AIR QUALITY: ADDRESSING A GROWING THREAT TO HEALTH

116. Rapid urbanization and the associated expansion of industry and transport have led to a rapid decline in the quality of air in South Asian cities, to the point at which the associated health risks are similar to those experienced in Europe forty years ago. One of the most serious environmental health concerns is exposure to fine particulate matter (PM). Worldwide, it is estimated that up to one million citizens of developing countries die prematurely each year primarily as a result of exposure to fine PM. Available data indicate that concentrations of fine PM significantly exceed healthy levels in many Pakistani cities, with mobile sources likely to be the principal source of such pollution.

117. To address the growing threat of poor urban air quality, the MoE is in the process of developing a clean air program incorporating a range of short- and long-term actions to be taken at all levels of government and by a variety of agencies. This chapter considers the principal challenges of institutional design, capacity, regulation, and incentives that will need to be overcome if the clean air program is to achieve its objectives. In particular, this analysis highlights the importance of building partnerships between agencies and levels of government, the potential value of outsourcing some data collection activities, the vital need to establish ambient air quality standards, and the benefits of developing a range of emission reduction incentives based on a foundation of public information and awareness-raising.

1. Urban Air Quality in Pakistan: Unhealthy Concentrations of Particulate Matter

118. Data on urban air quality in Pakistan is scarce. The limited information available, however, indicates that concentrations of particulate matter above acceptable levels for human health have already been reached in a number of cities.²¹ However, even this fragmentary data is based on limited monitoring that does not meet global monitoring protocols that require at least 104 days of monitoring. Results from recent surveys conducted in Karachi, Lahore, Peshawar, Quetta, Rawalpindi and Islamabad by SUPARCO are presented in Figure 5.1. In this study, the highest levels of fine PM were recorded in Lahore and Quetta, but the levels recorded in all the cities exceed internationally accepted standards, with significant consequences for the health of their citizens. These findings confirm the results of a study conducted by Pakistan EPA with assistance from JICA in five cities (Lahore, Faisalabad, Gujranwala, Rawalpindi, and Islamabad), which revealed that fine PM levels have reached 6-7 times the WHO guideline values. As discussed in Chapter II of this report, urban air particulate pollution is estimated to cause around 22,700 premature deaths annually, with the total health costs associated with the deaths and sickness caused by such pollution amounting to approximately 1 percent of GDP.

The Principal Sources of Particulate Matter

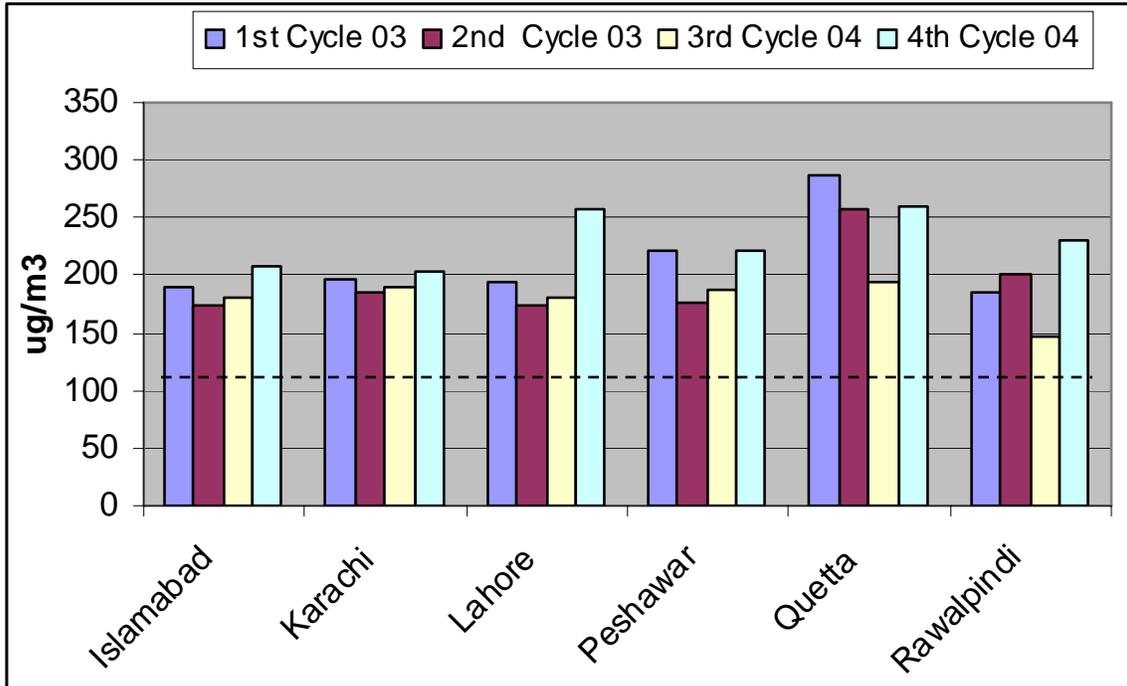
119. The three principal anthropogenic sources of air pollution are vehicular emissions, industrial pollution, and the burning of municipal waste. Of these, mobile sources are the most significant and growing concern. In Pakistan, the number of vehicles has jumped from less than one million to about four million within 20 years. With more than a ten-fold increase, the fastest growth has been in two-stroke delivery vehicles, but the number of diesel trucks and buses has also increased up to three times. International experience indicates that a major share of the

²¹ Data on other pollutants suggest they are not yet a cause for concern.

emission load from motor vehicles can be attributed to a relatively small number of smoky diesel and two-stroke vehicles.

120. The emission of air pollutants is directly related to fuel consumption. Pakistan’s consumption of petroleum products is growing at an annual rate of about 6 percent, almost half of which is consumed by the transport sector. The high content of sulphur in diesel (0.5 percent – 1 percent) and furnace oil (1 percent - 3.5 percent) is a major contributor to air pollution in Pakistan. Higher sulphur content leads to the formation of secondary PM. In contrast, some other South Asian countries have reduced sulphur in diesel to 0.035 percent and in furnace oil to 0.5 percent.

Figure 5.1: Particulate Matter less than 10 microns (PM10; 48-hour averages)



Note: the dotted line across each graph shows the 24-hour standard prescribed for residential areas in India. The WHO does not prescribe a “safe” guideline value for TSP and PM10, however a number of countries have converted the WHO guidelines to standards, after considering what is achievable based on local technical and socio-economic conditions. The monitoring cycles for the data presented were as follows:

Cities	1 st Cycle	2 nd Cycle	3 rd Cycle	4 th Cycle
	(2003)		(2004)	
Karachi	Post Monsoon	Winter	Spring	Summer
Lahore	Monsoon	Post Monsoon	Spring	Summer
Islamabad	Monsoon	Winter	Spring	Summer
Rawalpindi	Monsoon	Post Monsoon	Winter	Summer
Peshawar	Monsoon	Winter	Spring	Summer
Quetta	Summer	Post Monsoon	Winter	Spring

121. Industrial activities, particularly those using dirty fuels, are another important source of air pollution in urban areas. In addition to emissions from large-scale facilities, such as cement, fertilizer, sugar, steel, and power plants – many of which use furnace oil that is high in sulphur content, a wide range of small to medium scale industries (including brick kilns, steel re-rolling, steel recycling, and plastic moulding) cause a disproportionate share of pollution through their use of dirty “waste” fuels, such as old tyres, paper, wood and textile waste. Industrial emissions are further compounded by the widespread use of small diesel electric generators in commercial and residential areas in response to the poor reliability of electricity supplies.

122. The burning of municipal solid waste is a significant, but difficult to quantify, source of air pollution. Almost 48,000 tonnes of solid waste is generated each day, most of which is either dumped in low-lying areas or burned. The burning of solid waste at low temperatures not only generates particulate matter, but also produces other carcinogenic pollutants.

123. A final important source of PM is dust from both natural and anthropogenic sources. The arid conditions result in clouds of fine dust that form a haze over many cities, compounded in by dust storms in the summer months.

2. Pakistan Clean Air Program: the Challenge of Institutional Design

124. The Pakistan Environment Protection Council (PEPC) approved a National Environmental Action Plan (NEAP) in February 2001, in which air pollution control was one of the core programs. Although some key objectives were achieved, including the introduction of unleaded gasoline and a reduction of sulphur in diesel, a number of initiatives are yet to be undertaken. To consolidate ongoing and proposed initiatives for the management of urban air quality, MoE is developing the Pakistan Clean Air Programme (PCAP), which highlights the four major sources of urban air pollution that need to be addressed, (i) vehicular emissions, (ii) industrial emissions, (iii) burning of solid waste, and (iv) natural dust.

125. The main objective of the proposed PCAP is to control the health and economic impacts of air pollution. The PCAP proposes a number of short- and long-term measures that require action at all levels of government. Appendix 1 details the measures outlined in the PCAP, and identifies the agencies responsible for taking action. The multiplicity of agencies and the tiers of government to be involved illustrate the main challenge in implementing the Program.

Roles of Federal, Provincial, Municipal, and Sectoral Agencies: Building Partnerships

126. Pakistan EPA is responsible at the national level for setting air quality and emissions standards, and for defining associated systems for monitoring and enforcement. Responsibility for the implementation of these policies has been delegated to the provincial environmental authorities. An important enforcement tool is the Environmental Protection Order, which can be issued by the Federal or provincial environmental authorities against persons or companies not complying with standards, and may require a range of actions, from the immediate stoppage of operations to measures for the restoration of the environment. A more recent development is the recognition in the NEP of the important role of local governments in environmental management, with active participation from stakeholders. For the management of urban air quality, city authorities are particularly important because of the need to integrate emissions control measures with broader aspects of urban planning, such as the provision of public transport and zoning of industrial developments. The need to meet national air quality goals through programs implemented at the provincial or city level underlines the importance of forming partnerships and

providing incentives between levels of government. The United States provides an example of such an approach, as applied to implement the Clean Air Act (see Box 5.1)

Box 5.1: Federal/State Partnerships for Clean Air in the USA

Under the United States Clean Air Act, the Federal government provides funding support for the establishment of state air monitoring programs as well as other state air quality programs. The Clean Air Act authorizes the Federal government to provide grants for up to 60% of the cost of state air quality programs, while state governments must provide a 40% funding match.

Every state is required to establish a network of air monitoring stations for criteria pollutants, using criteria set by USEPA for their location and operation including quality assurance criteria. The states must provide USEPA with an annual summary of monitoring results at each of the monitoring stations in the state network and more detailed information if requested. To obtain additional information about air quality in strategic locations across the nation, the USEPA has established a network of national air monitoring stations which also becomes part of the state network.

In recent years, the states have assumed much greater funding responsibility straining their local resources and consequently, they have requested additional federal funding to meet the growing challenges in urban air pollution.

127. While the Pakistan EPA and its agencies at various tiers of government can create the framework for effective air quality management, sectoral agencies such as those related to industries, transport, urban development, energy and fuels, have an equally important role in ensuring that air pollution is controlled at source. This necessitates multi-sectoral coordination at the stage of formulating policies, plans, and programs, since the impact on air quality is often caused indirectly.

3. Air Quality Monitoring: Supplementing Capacity through Outsourcing

128. Continuous ambient air quality monitoring stations are to be set up in all provinces with JICA support by 2007. Experience indicates, however, that sustaining an operational monitoring network is a challenge. An important lesson from similar initiatives in South Asia is the need to ensure that sufficient resources are available to operate and maintain the equipment, as well as to retain trained technical staff. Doing so will require clarification of the roles and responsibilities of the Federal and provincial EPAs, as described above, and also presents the opportunity to supplement public sector capacity through outsourcing to the private sector.

129. In order to address the issue of retaining skilled staff, some countries are outsourcing technical air quality management functions to private or academic institutions. In India, some states are moving towards such a model of air quality monitoring, in which the government will essentially purchase air quality data generated by a network operated by a private party or academic institution.²² In the UK and Malaysia the routine monitoring of ambient air quality has been outsourced to the private sector, with the state retaining certain important functions, such as quality assurance audits. In the Philippines, the Environmental Management Bureau is pursuing the outsourcing of stack emissions monitoring for Metro Manila to the private sector.

²² e.g. Maharashtra, see <http://mpcb.mah.nic.in/envtdata/airstrengthening.php>; Andhra Pradesh see <http://www.appcb.org/pcb/online.htm>

4. Strengthening the Regulatory Framework for Urban Air Quality Management

130. As recognized in the NEP, Pakistan's legal and policy framework for urban air quality management is weak, starting with the lack of a Clean Air Act to provide a framework. The NEQS of 1993 provide only a limited set of emissions standards, and do not specify standards for ambient air quality. The vehicles emission standards are too old to be of relevance. Without standards, it is impossible to set up a framework to monitor and regulate ambient air quality. A first priority, therefore, is to establish both health-based ambient air quality standards, and updated emissions standards for mobile and stationary sources, in line with regional and international practice.

131. Given the limited information about the status of urban air quality in Pakistan, creating a framework for UAQM should draw on experience in similar countries. Within South Asia, India, Bangladesh, Nepal, and Sri Lanka have been undertaking efforts to address urban air quality concerns, with varying degrees of success. The experience of these countries, amongst others, can inform the actions that can be taken in Pakistan

Establishing Ambient Air Quality Standards: A Prerequisite for Air Quality Management

132. The NEP recognizes the need to establish and enforce standards for the management of air quality. Ambient air quality standards are the foundation upon which emission control strategies are based, usually adopted as enforceable laws, typically with deadlines and schedules for attainment. It is important to note though, that Air Quality Standards (AQS) are not just limits for each pollutant: they must also specify monitoring methods, locations and frequencies, averaging times and assessment procedures.

133. Pakistan is one the few countries in the world without a comprehensive set of health-based AQS. This is partly linked to the fact that there has been no systematic monitoring, and hence there is a dearth of information on current conditions. With the JICA-funded effort to provide a network of ambient air quality monitoring stations underway, however, it is time for Pakistan to promulgate AQS. These should be formulated based on a review of existing standards in similar countries, as well as WHO guidelines. While safeguarding public health should be the main consideration, the costs and likelihood of achieving the standards should also be used to inform the standard-setting process. That is the reason why the WHO issues "guidelines" and not standards, since the latter are to be formulated by individual countries keeping the local context in view.

Updating Vehicle Emission Standards: Links to Fuel Quality Improvements

134. Pakistan also requires updated Vehicular Emission Standards (VES). Two sets of vehicle emission standards are generally adopted, one for new registration vehicles, and the second for in-service vehicles. While the first is meant to signal to vehicle manufacturers and importers that all new registration vehicles should employ appropriate vehicle emissions control technologies, the second is designed to ensure that all vehicles are appropriately maintained so that the benefits of the emission control technologies are realized during the operation of the vehicles. The current NEQS specify only one set of VES that are outdated when compared to most other countries.

135. The establishment and achievement of VES is intrinsically linked to fuel quality. For example, the level of sulphur in diesel in Pakistan is between 5000 ppm to 10,000 ppm, which is too high to be able to meet Euro II or Euro III emission standards, which have already been

adopted in some South Asian countries.²³ While meeting Euro II emission standards requires 500 ppm sulphur, Euro III requires 350 ppm sulphur in diesel. The cost of moving to lower sulphur diesel needs to be evaluated against the potential economic benefits in terms of lower emissions and better health.

136. Based on the current condition of the vehicle fleet and fuel quality, it would be appropriate to adopt a phased approach to the development of VES and fuel standards. The details of this plan, particularly the use of low sulphur fuels and alternatives such as CNG and LPG, need to be developed in consultation with all stakeholders. A proposed timetable for consideration is provided in Table 5.1 below. MoE would need to consult and coordinate with the Ministry of Petroleum to initiate these much needed changes.

Table 5.1: New Vehicle Emission Standards and Corresponding Fuel Quality for Metro Cities²⁴

Vehicle category	2007	2010	2013
2-wheel	EU Stage II	EU Stage III	..
3-wheel	EU Stage II	EU Stage III	..
Cars	Euro II	Euro III	Euro IV
LCV	Euro II	Euro III	Euro IV
HDV	Euro II	Euro III	Euro IV

Notes: Metro cities include Lahore, Karachi, Rawalpindi/Islamabad, Peshawar, Quetta

5. Moving Beyond Inspections and Enforcement: a Range of Incentives for Clean Air

137. Inspection and Maintenance (I&M) programs are needed to help enforcement of in-use VES, targeted at gross polluters. However, in most developing countries the operation of I&M programs has been fraught with challenges of governance.²⁵ The development of such a program in Pakistan should draw on national experience with voluntary inspection and tune-up programs such as the UNDP-GEF FERTS project, and the GTZ-supported program in Peshawar. It could also draw upon relevant regional experience, such as the testing of in-use vehicles to derive socially acceptable and enforceable VES in Bangladesh. Such programs should be accompanied by support for vehicle repair and maintenance services, demand for which will be stimulated by I&M initiatives. The limitations of I&M campaigns elsewhere point to the need to supplement such efforts in Pakistan with support for a range of emissions abatement measures, such as those considered below.

Other Vehicle Emissions Abatement Measures: Targeting Gross Polluters

138. The NEP 2005 and the proposed PCAP both mention a number of other actions to address emissions from motor vehicles, most of which are presented in Appendix 1. These include travel demand management, modal shift, vehicle technology, strengthened enforcement, capacity building, and awareness-raising. But these are longer-term measures, and prioritization

²³ The Euro standards are a series of progressively more stringent VES developed for application in the European Union and widely used internationally.

²⁴ Proposed by CAI-Asia at the National Workshop for the Improvement of Urban Air Quality in Pakistan, 13-15 December 2004.

²⁵ Reports compiling international experiences can be downloaded from the CAI_Asia website as well as from www.worldbank.org/sarurbanair

of these measures should be a consultative process, taking into consideration the economic, financial, technical and social considerations of range of stakeholders.

139. As proposed in the NEP, carefully-designed vehicle retirement, replacement, and disposal programs may also be considered, targeting the most grossly polluting categories of vehicles. Some suggestions in this regard based on regional experience include:

- Phase-out two-stroke three-wheelers and register only new four-stroke CNG 3- wheelers (as undertaken in Dhaka, Delhi, Kathmandu);
- Replace old diesel buses with new dedicated-CNG buses, and replace old engines with new ones (based on experience in Delhi, Mumbai, and Dhaka). The simple retrofit of old diesel engines is not recommended;
- A maximum age limit for public transport vehicles (adopted in Delhi and Mumbai).

However, the measures mentioned above need to be evaluated based on criteria of cost effectiveness and economic efficiency, besides taking note of stakeholder concerns. The mixed international experience emerging from the use of CNG vehicles for public transport underlines the need for such careful evaluation.

Measures to Reduce Emissions from Stationary Combustion Sources: Compliance Incentives

140. The NEP 2005 and draft PCAP propose a number of measures targeting stationary sources, which in addition to PM and other criteria pollutants, may emit a range of potentially carcinogenic pollutants, including dioxins and furans. Given that in a number of cities industrial clusters are located in close proximity to residential areas, they are likely to significantly affect human health.

141. The proposed measures include the introduction of low sulphur diesel and furnace oil, promotion of alternate fuels, waste minimization and energy efficiency, and pollution control technology. A more draconian measure to reduce human exposure is the relocation of polluting units from areas where they violate land-use regulations. Most of these measures have been tried successfully elsewhere in South Asia. As part of a Canadian-funded program in Kolkata, industrial boilers were enabled to switch to cleaner fuels and technologies through the provision of financial and technology transfer assistance²⁶, and the industry was given a time-frame for phasing-in of tighter emission standards. The challenge for environmental authorities, especially in the case of small-scale industrial sources, is to play the role of facilitator to the extent possible, not to act solely as a regulator. In order to do so, the Federal and provincial EPAs need to work closely with various stakeholders, including industry associations, to design and implement measures that lead to lower industrial emissions, while minimizing costs to industry, and where possible achieving savings through cleaner production.

142. An important co-benefit of controlling local industrial emissions can be the reduction in emission of Green-House Gases (GHGs). This can be achieved by improving combustion and process technologies, energy conservation measures, improving fuel quality (such as reducing sulphur content), switching to less polluting fuels (such as gas fired boilers and generators),²⁷ and

²⁶ <http://www.wbpcb.gov.in/icef/index.html>

²⁷ The World Bank Oil and Gas Sector Review in 2003 highlighted the large potential economic benefits of converting from the use of fuel oil to natural gas.

putting in place end-of-pipe controls such as scrubbers. Following the ratification of the Kyoto Protocol in early 2005, Pakistan is in a position to claim emission reduction credits by reducing the emissions of GHGs. This presents a significant new opportunity for Pakistan to access grant resources to address local and global emissions reduction at the same time.

Reducing Emissions from Dispersed Area Sources: Controlling Dust and Waste Burning

143. The draft PCAP lists the burning of municipal solid waste as a significant source of urban air pollution, including dioxins. The other major dispersed area source is natural dust. A recent study in Pune and Kolkata found that the resuspended dust component (natural plus anthropogenic dust) of fine PM was close to 60 percent. The recommended measures in the PCAP to address dispersed area sources are stated as block tree plantation, afforestation in deserts, sand dune stabilization, paving of shoulders along roads, and the proper disposal of solid waste. Implementing these measures will require a coordinated approach between MoE, provincial EPAs and other departments, and local governments. If successful, these measures can be highly cost-effective in reducing ambient PM levels. A successful example of reducing resuspended road dust is already being practiced in Ahmedabad, where an extensive program of road improvement, including widening and resurfacing, has been taken up by the Municipal Corporation.²⁸

Public Information: the Essential Ingredient

144. As most of the emissions abatement measures considered above will involve trade-offs, either in the application of public resources or by requiring private investment, the PCAP should place considerable emphasis on the provision of public information regarding air pollution, and the associated health and other costs. The analysis and dissemination of air quality data should be done in consultation with local governments, who will be primary users of the data in designing and implementing local air quality management programs. Dissemination strategies should include the daily publication of an Air Quality Index, such as those used in China, Taiwan, Thailand, USA, and proposed in Bangladesh,²⁹ to raise public awareness of the issue, and to provide health alarms in case of serious exceedance of standards (see Box 5.2). The public information strategy should also include the collation and assessment of past monitoring initiatives, to make this data accessible to all relevant stakeholders.

Box 5.2: The Air Quality Index

The AQI is an index for reporting daily air quality, focusing on the health effects one may experience within a few hours or days after breathing polluted air. The US EPA calculates the AQI for five major air pollutants: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, the US EPA has established national air quality standards to protect public health. The AQI can be considered as a yardstick that runs from 0 to 500. The higher the AQI value, the greater the level of air pollution and the greater the health concern. For example, an AQI value of 50 represents good air quality with little potential to affect public health, while an AQI value over 300 and beyond represents hazardous air quality.

²⁸ <http://www.ahmedabadcity.org/streetpartnership.html>

²⁹ <http://www.doe-bd/aqmp/aqi.html>

6. Support for Air Quality Management: the Role of Development Partners

145. A number of development partners have provided assistance in addressing urban air pollution. Under the UNDP-supported National Environmental Action Plan (NEAP) assistance was provided for a range of activities focusing on the control of vehicular emissions, industrial emissions, and indoor air pollution. In addition, the ongoing UNDP-GEF project on Fuel Efficiency Improvements in the Road Transport Sector (FERTS) has generated useful information on ambient air quality as well as vehicular emissions, and remains a useful platform on which to launch further initiatives to address vehicular emissions. Pakistan EPA also has ongoing close cooperation with JICA, which is supporting the establishment of fixed and mobile monitoring facilities for ambient air quality in all four provinces, with associated capacity building. The World Bank is supplementing this assistance with technical advice and linkages with the regional Clean Air Initiative for Asia (CAI-Asia), and is prepared to provide additional support for implementation of the PCAP.

VI. WATER SUPPLY AND SANITATION: PROTECTING SOURCES AND SAFEGUARDING SUPPLIES

1. Water Supply and Sanitation in the Context of Water Resource Management

146. Water is central to many critical environmental issues on Pakistan. On the one hand, the vast Indus Basin system sustains the life and livelihoods of the majority of the population; on the other hand, shortage of water and the uncertainties of rainfall dictate the patterns of activity in most non-irrigated areas. The Indus Basin system receives on average about 100 million acre feet (MAF) of freshwater annually from glacier melt, snowmelt and rainfall. This surface water supply from the Indus River system is augmented by about 50 MAF of groundwater. Domestic water supply, both urban and rural, consumes only about 4 MAF annually or only some 5 percent of total freshwater use in Pakistan.³⁰ Concerns over public health, however, combined with rapid urban growth and demands for better household services, have moved water supply and sanitation issues high on the national agenda.

147. The top priority of the National Water Policy (NWP), approved recently by the Federal Government, is the provision of safe drinking water for all, along with hygienic sanitation for urban and rural populations. The NWP establishes important basic principles including protection of sources, monitoring and maintenance of drinking water quality, and progressive upgrading of facilities for the provision of water and sanitation, on a sustainable basis. It provides a framework within which to establish a single set of rules and regulations for Pakistan's future water management.

148. In accordance with the NWP, the government has decided to form a National Water Council (NWC) to take decisions on water-related issues and inter-provincial conflicts. At the provincial level, Provincial Water Regulatory Commissions (PWRC) will be set up to handle all water-related provincial matters, including domestic water and sanitation. One of the key roles of the NWP and PWRCs will be to provide advice and support to lower levels of government to help them in the improved delivery of water and sanitation services. The constitution of PWRCs is not yet finalized but it is envisaged that these commissions will be functioning in the near future. It will be important for the environmental authorities to be able to provide informed inputs to these commissions. Water supply and sanitation are not mentioned in either the Federal List or the Concurrent List, and therefore the provincial governments have exclusive jurisdiction to enact laws concerning them, which adds an additional layer of complexity.

149. After examining the extent and sources of the threat posed by the declining availability and deteriorating quality of water, this chapter considers the developments in institutional design, regulation, and capacity necessary to meet the NWP's goal of providing safe drinking water for all. In particular, this chapter emphasizes the need to (i) better clarify roles in protecting source water quality, providing water supply and sanitation services, and regulating drinking water quality, (ii) establish use-based standards for the quality of water sources, (iii) build local capacity for water supply and sanitation service provision, and (iv) develop a tiered approach to regulating drinking water quality.

³⁰ 'Pakistan Water Sector Strategy', Ministry of Water and Power, Office of the Chief Engineering Advisor/ Chairman federal Flood Commission, Vol 5 October 2002. [Taken from WCAS Paper no.9.]

2. Drinking Water Sources: Declining Availability, Deteriorating Quality

150. Despite the enormous size of the Indus Basin system, water availability on a per capita basis has been declining at an alarming rate, from about 5,000 cubic meters per capita in 1951 to about 1,100 currently, which is just above the internationally recognized scarcity rate, and is projected to be less than 700 by 2025. Although household use is only a few percent of the total use, increasing competition for resources and continuing degradation of water quality are severely impacting efforts to improve levels of household service provision.

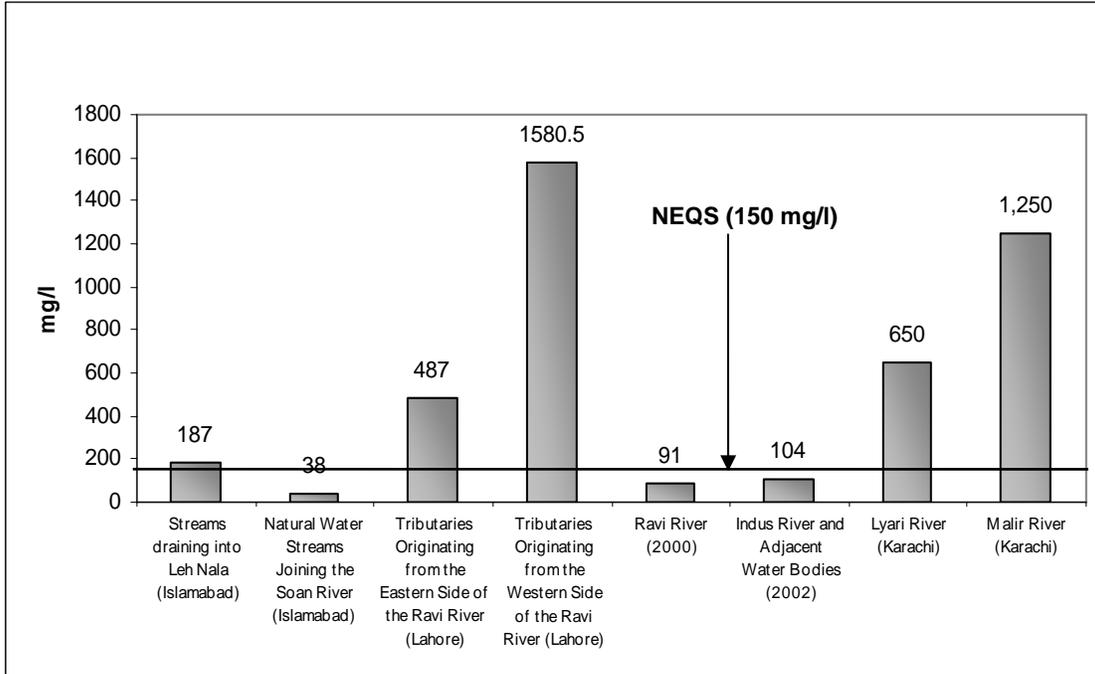
151. The majority of the population rely on groundwater as their principal source of drinking water. This is true both for rural areas and for major cities, apart from Karachi (which gets its water from the Indus), and Islamabad (which has a number of different sources). Pakistan can be divided into five groundwater zones, for purposes of drinking water supply: (i) sweet groundwater areas; (ii) areas where canal or river water is a real alternative; (iii) mountainous and hilly areas where spring water is available; (iv) the eastern desert belt where groundwater is available at increasing depth; and, (v) coastal areas where the groundwater is saline. About 80% of Punjab has fresh groundwater, with saline water in the south and desert areas. In addition, there is some evidence of high fluoride or arsenic content locally in Punjab, and a number of locations have been contaminated by industrial wastewater discharges. Less than 30% of groundwater in Sindh is fresh, with much of the province underlain by highly brackish water, and some instances of elevated fluoride levels. In NWFP, increasing abstraction has resulted in wells now reaching into saline layers, and much of Balochistan also has saline groundwater.

152. Over 60% of the population get their drinking water from hand or motor pumps, with the figure in rural areas being over 70 percent. This figure is lower in Sindh, where the groundwater quality is generally saline and an estimated 24 percent of the rural population get water from surface water or dug wells. In almost all urban centres, groundwater quantity and quality has deteriorated to the extent that the availability of good quality raw water has become a serious issue. Over-abstraction has resulted in declining groundwater levels, and groundwater quality has deteriorated as a result of the discharge of untreated sewage and industrial effluents. Groundwater over-abstraction and pollution have typically been seen as problems for rural and agricultural activities but its broader impact on water supply will make the challenges of surface water transfers to growing urban areas even more difficult.

3. Extent and Sources of Water Contamination

153. There is no regular monitoring of drinking water quality, in terms of either the source of supply or the water as received by the user. A national water quality study was carried out by the Pakistan Council for Research in Water Resources (PCRWR) in 2001. In the first phase of the program, covering 21 cities, all samples from 4 cities, and half the samples from 17 cities indicated bacteriological contamination. In addition, arsenic above the WHO limit of 10 ppb was found in some samples collected from 8 cities. The same study also indicated how the uncontrolled discharge of industrial effluent has affected surface and groundwater, identifying the presence of lead, chromium and cyanide in groundwater samples from industrial areas of Karachi, and finding the same metals in the Malir and Lyari rivers flowing through Karachi and discharging into sea. A second PCRWR study was launched in 2004, and preliminary results indicate no appreciable improvement, while a separate study reported that in Sindh almost 95 percent of shallow groundwater supplies are bacteriologically contaminated. Figure 6.1 summarizes the organic load data from a number of these studies. A comparison of the quality of surface water with the NEQS effluent discharge standard clearly demonstrates the extent of pollution due to the discharge of industrial and municipal effluents.

Figure 6.1: COD Levels in Surface Water



Sources: *Investigation of Air and Water Quality (Lahore, Rawalpindi, Islamabad)*: Japanese International Corporation Agency (JICA), 2000; *Investigation on Industrial Water Quality*. Islamabad: Japan International Cooperation Agency (JICA)/Pakistan Environment Protection Agency, Government of Pakistan, 2001; *Pilot Water Quality Monitoring Program in Sindh*. Draft Final Report. Karachi: Sindh Environment Protection Agency, Government of Sindh, 2002.

154. Although groundwater is still the primary source of drinking water supplies, it is estimated that 40 million residents depend on irrigation water for their domestic use, especially in areas where the groundwater is brackish. The associated health risks are grave, as bacteriological contamination of irrigation water often even exceeds WHO limits even for irrigation. The poor quality of drinking water has major socio-economic consequences for Pakistan. A study conducted by UNICEF found that 20-40 percent of the hospital beds are occupied by patients suffering from water-related diseases, such as typhoid, cholera, dysentery and hepatitis, which are responsible for one third of all deaths. As the analysis in Chapter II presented, the total health costs associated with the deaths and sickness caused by waterborne disease are estimated to amount to more than 1.8 percent of GDP.

Municipal Effluent: the Principal Source of Water Pollution

155. Most surface water pollution is associated with urban centres. Typically, nullahs and storm water drains collect and carry untreated sewage which then flows into streams, rivers and irrigation canals, resulting in widespread bacteriological and other contamination. It has been estimated that around 2,000 million gallons of sewage is being discharged to surface water bodies every day.

156. Although there are some sewerage collection systems, typically discharging to the nearest water body, collection levels are estimated to be no greater than 50 percent nationally (less than 20 percent in many rural areas), with only about 10 percent of collected sewage effectively treated. Although treatment facilities exist in about a dozen major cities, in some cases these

have been built without the completion of associated sewerage networks, and the plants are often either under-loaded or abandoned. In effect, only a few percent of the total wastewater generated receives adequate treatment before discharge to the waterways.

Industrial Effluent: Uncontrolled Hazardous Discharges

157. Although the NEQS are intended to regulate the discharge of industrial effluents to surface waters, in the absence of strong monitoring and enforcement, compliance is very low. It has been reported that in Lahore, only 3 out of some 100 industries using hazardous chemicals treat their wastewater adequately. In Karachi, two of the biggest industrial estates in Pakistan have no effluent treatment plant, and effluent containing hazardous materials, including heavy metals, is discharged directly into the river and harbour. There are, however, plans to install Combined Effluent Treatment Plants (CETPs) in both industrial areas, with ADB support. International experience teaches that the principal challenge will be financing the operation of these plants. In Faisalabad, one of the biggest industrial cities, there is little segregation of domestic and industrial wastes, and although there is a simple effluent treatment plant, its operational efficiency is not known as there is no regular monitoring.

158. The Pakistan EPA has implemented a self-monitoring and reporting program, with the support of some private sector institutions and NGOs, and this is a practical step in moving forward within the practical constraints of the environment agencies. The provincial EPAs/EPDs are also beginning to develop baseline data on industrial discharges which provides a platform for targeted enforcement approaches.

Agricultural Runoff: Evidence of Pesticide Contamination

159. The quantity or quality of agricultural runoff has not been measured or tested at the national level but with an estimated 5.6 million tonnes of fertilizer and some 70,000 tonnes of pesticides used annually, pollution from agricultural sources can be expected in receiving waters. In 107 samples of groundwater collected from various locations in the country between 1988 and 2000, 31 samples were reported to have concentrations of pesticides beyond FAO/WHO safety limits.³¹ A pilot project was undertaken in 1990-91 in Samundari, Faisalabad District over an area of 1,000 km², to look at the extent of groundwater contamination by agrochemicals. Of ten groundwater samples in Faisalabad District drawn from a depth of 10-15m, seven were contaminated with unsafe levels of one or more pesticides (PCRWR, 1991). Although the study concluded that the contamination had reached only the shallow aquifers, evidence suggested that it was gradually reaching the deeper aquifers as well. The contribution of agricultural drainage to the overall contamination of the water resources has not been determined. It is believed to be a small part of the total load but can be important in local hot-spots.

4. Institutional Design for Water Quality Protection

160. In 2004, a National Coordination Committee on Water and Sanitation (NCCWS) was notified, under the chairmanship of the Federal Secretary of Environment with representatives from both public and private sectors, as well as civil society and development partners. The objectives of the NCCWS are to review policies and standards for water supply and sanitation, and to develop plans and projects for the sector. An important institutional step will be to ensure that

³¹ Policy and Strategy for Rational Use of Pesticides in Pakistan. Building Consensus for Action. Islamabad: United Nations System in Pakistan Publication, 2001.

the NCCWS includes the key agencies with relevant power over water resources, particularly the Ministry of Water and Power, and WAPDA. The agenda of the NCCWS should be focused on coordination rather than implementation. The challenge of improving access to safe water and sanitation will not be met by the environmental sector working on its own, and one of the first steps must be to increase the degree of cooperation with other government agencies, as well as communities, to agree on priority issues and to work with them on implementation.

161. The responsibilities of the MoE for water supply and sanitation have been significantly increased through the Ministry's chairmanship of the NCCWS and role as the lead agency of the Clean Drinking Water program. A major task for the NCCWS will be to develop practical proposals for Pakistan to achieve progress towards the Millennium Development Goals for improvement of access to safe drinking water and sanitation. Meeting these new challenges will increase pressure for staff in MoE with the relevant background and qualifications. The challenges of protecting the quality of water sources, and expanding water supply and sanitation coverage are made more difficult by the complex institutional setting. There are three major topic areas where the MoE, provincial environmental authorities, and local governments have a role to play, (i) protection of water sources, (ii) water supply and sanitation service provision, and (iii) regulation of drinking water quality. The appropriate division of institutional responsibilities between each of these areas is considered in more detail below.

Water Source Protection: an Important Role for Environmental Authorities

162. One set of issues relates to the monitoring and protection of water sources, including surface water (all rivers, canals and drains which are used by communities) and groundwater. The NWP recognizes the deterioration in quality of both surface and groundwater, and the urgent need to address this problem. In response, the Policy highlights the need to implement a National Water Quality Monitoring Program. While ad hoc surveys have been conducted, there is no regular or consistent monitoring of source water quality. This clearly should involve the environmental authorities as having a principal responsibility for providing an overview of water quality, but monitoring of canal and drainage water quality is also a mandate of the irrigation departments. The irrigation authorities conduct regular monitoring of salinity and other parameters relevant to their operations, but do not normally test for health-related parameters. Some broader studies have been carried out (e.g. those by PCRWR) but there is no overall water quality monitoring program, and MoE should take the lead in clarifying the needs and practical scope of such a program.

Providing Water Supply and Sanitation Services: a Local Government Mandate

163. Prior to devolution, responsibility for the provision of water supply and sanitation services rested with provincial governments, and was exercised through Development Authorities (DAs) or Water and Sanitation Authorities (WASAs) in urban areas, and provincial Public Health Engineering Departments (PHEDs) in rural areas. As part of the devolution process, water and sanitation are now assigned to tehsils, except in the case of city districts where they are district responsibilities. While MoE has an important role to play in reporting on progress towards the relevant MDGs, and is presently implementing a national mandate to provide water treatment plants under the Clean Drinking Water initiative, in overall terms water and sanitation is an operational function that must have a strong local dimension.

Regulating Drinking Water Quality: a Tiered Approach

164. One of the top priorities of the NEP is to establish the legal and policy framework for providing safe drinking water. MoE should take a lead in developing this framework, with a focus on defining clear roles and responsibilities. The set of activities around standard setting, testing, monitoring and reporting should be one of the focal areas for the Ministry as well as provincial environmental agencies. This does not imply that all the necessary sampling and testing should be done in house, but it should be the objective of the Ministry to be able to provide reliable information and clear advice to both consumers and decision-makers.

165. From the point of view of public health, there is an important need to monitor water supply services, in particular the bacteriological and chemical quality of the water as it is received by users. This is also clearly tied to efforts to upgrade the coverage and overall quality of water services. There have been some studies of the quality of water delivered (for example the PCRWR work) but there is no structured system in place. In 2002, the Pakistan Standards and Quality Control Authority (PSQCA) issued a drinking water quality document, in line with WHO guidelines, but this is a guidance document and is not enforceable on water service providers. Consequently, there are currently no drinking water quality standards in Pakistan to protect users. Once such standards are established, the ideal system for monitoring water supplies would be through a tiered approach, including routine sampling by the operator, monitoring by the local or provincial health or environmental authorities, with oversight, review and consolidated reporting by MoE. Designing and putting such a system in place (which will require resources and skills at all levels) could be an important task for MoE.

5. Setting a Regulatory Foundation: Use-Based Standards for Water Sources

166. Protection of ambient water quality (both surface and groundwater) is an essential part of the mandate of the environment authorities. In this context, the NEP identifies the need to establish a use-based system for classification of water bodies, as a first step in setting objectives for protection and rehabilitation. This must be followed by clean-up of priority waterbodies, to avoid the recurrence of health crises caused by the use of polluted water. Such a program would require the refinement of standards, clarification of responsibilities, better information systems and additional support for the enforcement of discharge standards.

167. Under the Pakistan Environmental Protection Act (PEPA), the discharge of any pollutant in excess of the National Environmental Quality Standards (NEQS) is prohibited, and penalties are prescribed. NEQS have been established for municipal and industrial effluents discharged to inland waters, sewage treatment facilities, and the sea. Pakistan EPA is charged with implementation of PEPA, but has delegated powers to provincial EPAs for implementation of the Act within their respective provinces. At the district level in Punjab, an Environmental Officer is appointed to maintain environmental standards and further delegate tasks within the district and its municipalities. Other laws that relate to the prevention of pollution of water bodies include the Canal and Drainage Act (1873) and the Punjab Minor Canals Act (1905), which prohibit the corrupting or fouling of canal water, and give irrigation authorities powers to control discharges to the irrigation system. In addition, the Sindh Fisheries Ordinance (1980) prohibits the discharge of untreated sewage and industrial waste into water.

168. A significant gap in the regulatory system is the lack of ambient water quality standards, which would guide the use and protection of major water bodies and would provide a basis for priority efforts in enforcing NEQS requirements. Approaches used internationally are usually based on the concept of Beneficial Uses of any water body, such as irrigation, fish breeding and

capture, drinking water supply, and recreation (see Box 6.1). Reasonable goals can be set for each stretch of water in terms of such uses, based on current or proposed future activity. One critical use is drinking water supply (either directly or after water treatment) for which ambient standards should be set to protect of the water source. Once an understanding of critical uses is established, there is a clear and persuasive basis for regulation of pollution discharges and water abstraction in the light of such goals.

Box 6.1: Beneficial Use Water Standards in the State of Minnesota

“Beneficial uses” are the uses that the government decides to make of their water resources. In the USA, the process of determining beneficial uses is spelled out in the federal rules implementing the US Federal Clean Water Act. In the State of Minnesota, seven beneficial uses are defined and these uses and the use-class designations are as follows.

- Drinking water source – Class 1
- Aquatic life and recreation – Class 2
- Industrial use and cooling – Class 3
- Agricultural use, irrigation – Class 4A
- Agricultural use, livestock and wildlife watering – Class 4B
- Aesthetics and navigation – Class 5
- Other uses – Class 6
- Limited Resource Value Waters – Class 7.

In this scheme, the class numbers 1–7 are not intended to imply a priority ranking to the uses.

Source: www.pca.state.mn.us/water/standards/

169. One key action area for MoE should be to review available ambient water quality data, identify priority uses which need to be protected, and develop cooperative programs to implement essential protection measures. A formal process of agreeing Beneficial Uses for the whole water system would be a long and complex process but it should be possible to reach agreement on certain critical water bodies or reaches for short term action. Many of the actions necessary to implement a source protection program are the responsibility of provincial or local authorities and the action are often under the control of private sector industries so a process of discussion and delegation will be required to agree on federal, provincial, and sectoral roles in setting and enforcing ambient and effluent standards.

6. Building Local Capacity to Provide Water and Sanitation Services

170. While the devolution process may have assigned responsibility for water supply and sanitation to local government, unfortunately Tehsil Municipal Administrations (TMAs) have little capacity to undertake these responsibilities. Further, although the NWP stresses the need to engage the private sector in the delivery of urban water supply and sanitation services, there is no Federal or provincial legal framework to guide private-public partnerships.

171. Both rural and urban areas suffer from under-investment in water supply and sanitation, compounded in many cases by the inadequacy of revenues to satisfy maintenance requirements. In rural areas, over 40 million people lack access to safe drinking water, while 60 million lack adequate sanitation. Figures available for implemented schemes may be a poor indicator of actual coverage as many do not serve the entire population for which they were installed, some are in a state of disrepair, and coverage figures mask the poor quality of water being provided.

The situation regarding sanitation is even more serious. Sewerage systems, where they exist, are usually poorly maintained and often contribute to the cross-contamination of water systems and groundwater pollution. The few treatment facilities are often non-functional or ineffective.

172. In the absence of detailed data, it is not possible to make reliable estimates of the costs of upgrading water supply and sanitation. Pakistan currently spends less than one quarter of a percentage point of its GDP on water supply and sanitation. According to rough estimates, to provide adequate drinking water and sanitation to all, Pakistan will need investments in the order of \$5 billion. This excludes operation and maintenance costs, which should be recovered as far as possible through service charges. MoE can take a coordinating role in working with provincial and local authorities to develop better information on the gaps and to prepare realistic programs for upgrading. In practice, however, it is not for MoE to take the lead in implementing such a program.

173. Significant resources have been committed through the Clean Drinking Water program, the goal of which is to provide treated water to urban centers across the country. The Program focuses on the construction of small scale water filtration plants at easily accessible points in areas which suffer from poor water quality. Experience worldwide shows, however, that physical infrastructure provision by itself is not enough to improve basic health indicators. The commitment and ownership of local authorities are essential for sustainable improvements in water supply and public health.

7. Creating Tiered Capacity to Regulate Drinking Water Quality

174. In principle, the quality of drinking water “at the tap” should be regulated and monitored at the local level but only the major city WASA’s have the technical resources for regular monitoring and there is no routine high-level oversight or reporting of the quality of water supplied across the country. In general, local authorities have very little capacity for the operation and control of their water systems and poor water quality is often not flagged until there is a noticeable increase in water-related illnesses. Some TMAs have simple monitoring kits provided by UNICEF which allow them to track basic parameters but this is not the general case. There have been two broad studies in the past five years (by PCRWR) but this does not yet provide an adequate baseline.

175. The ideal system would be a tiered one. At the level closest to the consumer, TMAs should have adequate resources and knowledge for routine monitoring of one or two simple parameters. The objective at this level is essentially to confirm that the basic water system is operating in a stable mode. At the next level, health or environmental authorities at the local or provincial level should carry out regular oversight of the local systems, with some independent sampling and monitoring. The purpose of this work is to check the TMA findings, to carry out more detailed testing on additional parameters, and to provide a comparative picture of different systems and areas to allow decisions to be made on upgrading and expanding systems. The role of MoE at the national level would be quality assurance (including, for example, inter-laboratory comparisons), and consolidated reporting at the national level on trends and achievements.

176. There is limited technical capacity (skills and equipment) to carry out the sampling and testing and it is important to carry out the work as effectively as possible. At the local level, where the objective is essentially to flag exceptions or breakdowns, then very simple methods can be used. For general monitoring, the range of parameters routinely tested should be chosen to be simple, robust and manageable with the testing resources currently available in public and private sector laboratories. There will be a need for some more sophisticated testing, for verification of

the routine work and for occasional monitoring of a wider range of parameters but this again should be carried out mainly using existing facilities, which include PCRWR and MoE's own laboratories.

177. Designing and putting such as system in place (which will require resources and skills at all levels) would be an important task for MoE. The role of MoE would be to ensure that the system provides a level of confidence in the monitoring of drinking water supplies, together with the use of the information to target programs to upgrade and expand the service provided to the population.

8. Opportunities for Development Partner Support

178. Water supply, sanitation and the safeguarding of water quality constitute a very large agenda, and Pakistan needs the support of its development partners in its implementation. JICA has recently initiated assistance with source water quality monitoring equipment and training which can provide the basis for work on water uses and priorities for tackling pollution problems. Areas that have been indicated for possible World Bank support include the development of used-based standards, technical assistance to all levels of government for targeted monitoring and enforcement of discharges, and the establishment of a system to understand and track the quality of water at the point of delivery.

VII. RECOMMENDATIONS AND A PROPOSED WAY FORWARD

179. The urgency for addressing Pakistan’s environmental problems has probably never been greater. Conservative estimates presented in this report suggest that environmental degradation costs the country at least 6 percent of GDP, and these costs fall disproportionately upon the poor. The most significant causes of environmental damage identified and estimated in this report are: (i) inadequate water supply, sanitation and hygiene; (ii) soil degradation; (iii) indoor air pollution; (iv) urban air pollution; and (v) exposure to lead. Whether judged in terms of regional performance or environmental stress factors, there is significant scope to better ensure the sustainability of Pakistan’s economic growth.

180. The preceding chapters of this report have examined the current status of environmental management in Pakistan, focusing on three issues: (i) the environmental impact assessment system; (ii) urban air quality management; and (iii) water supply and sanitation. Suggestions for strengthening environmental management in these specific areas are presented in each chapter. Viewing environmental quality as the outcome of an environmental “production function” involving pressures resulting from economic activities mitigated by a series of institutional, regulatory and other incentives, this report identifies the main binding constraints on environmental performance as falling into four categories: (i) gaps in incentives and accountability; (ii) institutional design; (iii) gaps in the regulatory framework; (iv) capacity limitations. Based on the analysis presented in the preceding chapters, the principal features of these constraints are summarized below, followed by a set of recommendations for reducing these barriers to improved environmental quality and more sustainable economic growth. The chapter concludes with a set of recommendations for immediate action.

1. Strengthening Linkages in Institutional Design

181. Constitutionally, Federal and provincial governments share the concurrent legislative authority for environmental pollution and ecology. In addition, Pakistan EPA has delegated powers under PEPA to provincial EPAs to implement and enforce environmental regulations. Further, the mid-term review of the NCS and the NEP both emphasize the need to develop the environmental management capacity of provincial and local governments. Appropriate roles for national authorities within this environmental federalist structure include: (i) setting national policy and defining environmental quality goals; (ii) providing resources and oversight to provincial environmental authorities; and (iii) publicly reporting on progress in meeting national environmental objectives. Provincial environmental authorities should play the primary role in the environmental clearance process, the implementation of compliance and enforcement, as well as the monitoring of ambient environmental conditions. At the same time, the Federal environmental authority has a legal mandate to ensure the enforcement of national laws and regulations, which includes Federal oversight and suspension of delegated powers. Bringing greater clarity to this structure would reduce the institutional design constraints to improved environmental outcomes, particularly in the areas highlighted below.

Establishing Guidelines for Oversight of Delegated Authorities

182. No oversight guidelines have been established for Federal environmental powers delegated to provincial EPAs. In principle, such guidelines should allow for delegation based on (i) the adequacy of provincial regulations to achieve national objectives; (ii) the adequacy of provincial technical expertise, staff, and resources to perform the delegated responsibilities; and

(iii) provincial commitment to share the information needed to monitor compliance and measure performance.

183. Oversight guidelines should also establish policies for funding assistance, dispute resolution, and provide a basis for Federal suspension of delegated authorities when necessary. Such guidelines would facilitate Federal oversight of provincial EIA clearances, for example. Although Pakistan EPA reserves the right to suspend provincial EIA clearance authority, this has never been exercised, in part for lack of clarity of oversight arrangements, limiting the effectiveness of the Federal mandate, and ultimately of the EIA system itself.

Creating Partnerships for Clean Air

184. MoE is developing the Pakistan Clean Air Programme (PCAP) to consolidate efforts to address the four principal sources of urban air pollution, vehicular and industrial emissions, burning of solid waste, and natural dust. Effective implementation of the program will require the development of partnerships between multiple tiers and sectors of government. While Pakistan EPA is responsible at the national level for setting air quality and emissions standards, and for defining associated systems for monitoring and enforcement, responsibility for the implementation of these policies has been delegated to the provincial environmental authorities. City authorities are particularly important in the management of urban air quality because of the need to integrate emissions control measures with broader aspects of urban planning, such as the provision of public transport and zoning of industrial developments. In establishing policies for clean air, the energy, fuel and transportation sectors will have important roles to play. An essential aspect of PCAP's institutional design, therefore, will be the formation of partnerships and provision of incentives between levels and agencies of government.

Distinguishing Water Supply Roles: Source Protection, Service Provision, and Quality Control

185. In considering the protection of water quality, it is useful to distinguish between the protection of water sources, the provision of water supply and sanitation services, and the regulation of drinking water quality. Protection of surface and groundwater sources should clearly involve environmental authorities, although irrigation departments also have an important role to play. As part of the devolution process, the provision of water and sanitation services is now assigned to local governments, and should continue to have a strong local dimension. The ideal system for regulation of drinking water quality would be tiered, with local governments or operators conducting routine monitoring, provincial authorities carrying out regular oversight of the local systems, and Federal agencies providing quality assurance, and reporting at the national level on trends and achievements.

2. Updating the Regulatory Framework

186. The current NEQS provide standards for emissions and effluent from selected sources, but do not establish standards for the ambient quality of air or water. In addition, aspects of these standards are out-of-date, no longer reflecting current understanding or technologies. The regulatory framework would be significantly strengthened by linking standards for ambient quality with updated standards for emissions, monitoring, and the provision of public information, particularly in the areas described below.

Developing Health-Based Air Quality Standards

187. Ambient air quality standards are the foundation upon which emission control strategies are based, usually adopted as enforceable regulations, typically with deadlines and schedules for attainment. Such standards are not simply limits for each pollutant: they also specify monitoring methods, locations and frequencies, averaging times and assessment procedures. Pakistan lacks a comprehensive set of health-based air quality standards. This is partly linked to the lack of information on current conditions, but with the establishment of an air quality monitoring network underway, it would now be appropriate to develop national air quality standards based on a review of the data generated, standards in other countries, and WHO guidelines. While safeguarding public health should be the main consideration, the costs and likelihood of achieving the standards should also be used to inform the standard-setting process.

Vehicle Emission and Fuel Quality Standards

188. The Vehicle Emission Standards (VES) currently specified in the NEQS are outdated when compared to most other countries. In updating them, the goal should be to set two standards, one for new registration vehicles, and the second for in-service vehicles. Establishment and achievement of VES are intrinsically linked to fuel quality. For example, the current level of sulphur in diesel in Pakistan is too high to be able to meet Euro II or Euro III emission standards, which have already been adopted in some South Asian countries. The cost of moving to lower sulphur diesel needs to be evaluated against the potential economic benefits in terms of lower emissions and better health. Based on the current condition of the vehicle fleet and fuel quality, it would be appropriate to adopt a phased approach to the tightening of VES and fuel standards, developed in consultation with all stakeholders.

Establishing Use-Based Water Quality Standards

189. The lack of ambient water quality standards is a significant gap in the regulatory system. In this context, the NEP identifies the need to establish a use-based system for classification of water bodies, as a first step in setting objectives for protection and rehabilitation. Approaches used internationally are usually based on the concept of Beneficial Uses of any water body, such as irrigation, fish breeding and capture, drinking water supply, and recreation. Reasonable goals can be set for each stretch of water in terms of such uses, based on current or proposed future activity. Once an understanding of critical uses is established, there is a clear and persuasive basis for regulation of pollution discharges and water abstraction in the light of such goals. While a formal process of agreeing Beneficial Uses for the whole water system would be a long and complex process, it should be possible to reach agreement on certain critical water bodies for short term action. A process of discussion and delegation will be required to agree on federal, provincial, and sectoral roles in setting and enforcing ambient and associated effluent standards.

Drinking Water Quality Standards

190. One of the top priorities of the NEP is to establish the legal and policy framework for the provision of safe drinking water. MoE should take a lead in developing this framework, with a focus on defining clear roles, including assigning responsibility for the development of drinking water standards. There is an important need to monitor water supply services, in particular the bacteriological and chemical quality of the water as it is received by users. In 2002, the Pakistan Standards and Quality Control Authority (PSQCA) issued a drinking water quality document, in line with WHO guidelines, but this is a guidance document and is not enforceable on water

service providers. Consequently, there are currently no formal drinking water quality standards in Pakistan to protect users, a gap which should be filled as a matter of priority.

3. Building Institutional Capacity for Environmental Management

191. With significant new resources proposed for environmental purposes in the MTRF, funding is less of a constraint than the capacity to apply available resources. The availability of these resources presents an important opportunity to develop capacity in environmental authorities at Federal, provincial and local levels to implement the strengthened regulatory framework described above, as well as to mainstream the development of environmental management capacity in key sectoral agencies, and to upstream such capacity in planning departments. Effective use of these resources will allow these agencies to address a shortage of qualified staff by contracting technical assistance, focusing on:

- the outsourcing of services to monitor environmental quality, as well as to analyze and disseminate the results;
- the development of environmental standards, particularly in priority areas such as the establishment of ambient air and water quality standards;
- expert input for the review of environmental assessments.

192. In the longer term, Provincial Sustainable Development Funds (PSDFs) are potentially valuable vehicles to build provincial and local government environmental management capacity. PSDF rules allow environmental fees and charges to be credited to these funds, not only strengthening incentives for better performance by environmental agencies, but also raising the possibility of a more sustainable and predictable source of funds for on-going capacity building.

Strengthening Capacity for Effective Environmental Impact Assessments

193. Efforts to strengthen capacity for more effective EIAs need to address four weaknesses in the current system, (i) a lack of expert input for technical reviews, (ii) a widespread ignorance of requirements and procedures, both in government and the private sector, (iii) the lack of a system to identify projects, both public and private, that should be required to submit an EIA, and (iv) the current weak enforcement of EIA clearance conditions.

194. Providing resources to access expert advice would help the Pakistan and provincial EPAs ensure that information provided in EIAs is adequate, and effectively used in the decision-making process. Expert guidance would be particularly useful to ensure that alternatives, mitigation measures and monitoring are appropriately addressed. To build broader awareness of EIA requirements, assistance should be provided to enable all provinces to establish EIA training programs similar to that of NWFP, in partnership with local universities or other training organizations. External technical assistance could also be used to develop systems to ensure better coverage of EIAs, and to provide the additional technical and legal capacity required to help enforce implementation of environmental management measures identified in EIAs.

Outsourcing Technical Functions for Urban Air Quality Management

195. In order to manage urban air quality, it is critical to monitor criteria pollutants and conduct emissions inspections of priority sources. The primary responsibility for this should rest with provincial EPAs. International experience underlines the need to ensure sustained resources for the operation and maintenance of monitoring equipment, and to retain trained technical staff.

To address these issues, outsourcing technical functions to private or academic institutions should be considered, drawing on international experience with private sector contracts for air quality monitoring, the operation of emissions inspection and vehicle maintenance programs, as well as initiatives to reduce emissions from corporate vehicle fleets.

Building Capacity to Protect Water Quality

196. The emphasis of the NEP on ensuring the safety of water supplies highlights the need to increase resources for this purpose at all three levels of government, with an emphasis on coordination at the Federal level, enforcement at the provincial level, and investment locally. The three priority areas for strengthening the capacity of MoE, provincial environmental authorities, and local governments are: (i) protection of water sources; (ii) water supply and sanitation service provision; and (iii) regulation of drinking water quality.

197. Protection of ambient water quality (both surface and groundwater) is an essential part of the mandate of the environment authorities. The establishment of a use-based system for classification of water bodies and the subsequent clean-up of priority waterbodies will require significant resources over a lengthy period. Even during the initial process of agreeing Beneficial Uses for selected critical water bodies, Federal and provincial environmental authorities will require substantial technical assistance for water quality monitoring and stakeholder consultation.

198. The need for physical investments is greatest at the local level, where the devolution process has assigned responsibility for water supply and sanitation to local governments. The NWP stresses the need to engage the private sector in the delivery of these services, to supplement scarce public resources. To help TMAs meet this challenge, there is an urgent need to develop legal frameworks to guide private-public partnerships.

199. The ideal system for regulation of drinking water quality would be a tiered one, with local capacity for routine monitoring of a few simple parameters, provincial resources sufficient for regular oversight of the local systems, and MoE providing quality assurance and consolidated reporting at the national level. Designing and putting such a system in place will be an important task for MoE, requiring a significant level of expert input, equipment and training.

Mainstreaming and Upstreaming

200. Many of the investments with the most significant environmental consequences are those undertaken by the Federal or provincial governments, for example in roads, irrigation and power. In November, 2004, ECNEC issued a notice reinforcing the requirement that EIAs should be prepared for all major public sector investments. While environmental cells have been created in a few key agencies, additional resources and incentives are required to increase the capacity of key line agencies to prepare adequate EIAs, and effectively implement associated Environmental Management Plans.

201. The Environment Section of the Planning and Development (P&D) Division is an important force for environmental upstreaming through its mandate to address environmental concerns at the policy, project conceptualization, and approval stages of public sector projects. Provincial planning departments have established corresponding environment sections for environmental screening of project proposals within their jurisdictions. The establishment of these sections is significant, and their limited permanent capacity should be supplemented with expert assistance as necessary to conduct detailed environmental reviews and advise on the preparation of environmental management plans.

202. In order for environmental considerations to be more fully upstreamed into national policy-making, planning and budgeting, MoE must lead the sustainable development dialogue. Within this dialogue, and in particular through the PRSP update process, the effective promotion of sustainable development will require more rigorous analysis demonstrating that environmental degradation is a constraint to economic growth and poverty reduction. The MoE can help guide this PRSP update process by preparing an environment chapter for the PRSP II which would outline the environmental management challenges and opportunities associated with accelerated growth. To produce and help present such analysis, MoE will require additional resources to contract the necessary analytical expertise.

4. Reinforcing Incentives and Accountability

203. Accountability to stakeholders is essential for sound environmental management, and will only be achieved by ensuring stakeholders are informed and empowered. Opportunities to strengthen environmental accountability in Pakistan include measures to improve public consultation and disclosure in the EIA process, the public provision of information on environmental quality, and support for the involvement of civil society in environmental management and enforcement.

Public Consultation and Disclosure of EIAs

204. As recognized in the EIA Guidelines, strong public participation in the EIA process benefits both project proponents and other stakeholders; however consultation in Pakistan has often proven to be limited and ineffective. Possible measures to strengthen this process include: (i) requiring project proponents to develop a public consultation plan, (ii) creation of EIA information centers at federal and provincial levels, (iii) public disclosure of all EIA filings on a website for easy access by the public and private sector, and (iv) public provision of a non-technical summary of EIA decisions.

Public Information to Support Clean Air and Safe Water Initiatives

205. Local and national air quality information dissemination strategies are required, both to build public support for urban air quality improvement initiatives, and to enable the issuance of health alarms in case of serious exceedance of standards. As most emissions abatement measures involve trade-offs requiring public support, the PCAP should place considerable emphasis on the public provision of air quality data and associated health impacts. Dissemination strategies may include the daily publication of an Air Quality Index, as discussed in Chapter V.

206. As with air quality data, the public provision of information regarding drinking water quality not only enables health alerts to be issued, but also builds support for water supply investments, and most importantly, for recovery of the costs necessary to operate and maintain safe water supply systems.

Empowering Civil Society

207. Citizen involvement is an important resource for environmental compliance and enforcement. While there is often a tension between government regulators and civil society organizations, they share an interest in ensuring a healthy environment. Active citizen involvement in environmental enforcement can help supplement an agency's efforts by raising public awareness and building popular support for otherwise controversial enforcement actions.

This role can be reinforced both by involving concerned civil society stakeholders in environmental management, as achieved, for example through the Lahore Clean Air Commission, and by supporting public interest advocacy through legal associations and the establishment of environmental law clinics at universities.

5. Rising to the Challenge: A Proposed Way Forward

208. The approval of the NEP and the significant increase in the Federal budget proposed for environmental management in the MTDF present both a challenge and an important opportunity for Pakistan's environmental authorities. Meeting the challenge and rising to the opportunity will require not only a strategic program of capacity building, but also the establishment of incentives to encourage improved performance in environmental management at all levels of government.

Incentive-Based Partnerships: National Goals, Local Priorities

209. One institutional approach to building capacity and encouraging improved performance at different levels of government is to develop incentive-based partnerships between the Federal and provincial EPAs, as well as between provincial authorities and local governments. These would link the transfer of financial support for institutional strengthening with demonstrated performance in improved environmental management.

210. For its implementation, the NEP calls for a framework of action plans at all three levels of government. To establish incentive-based partnerships, Federal and provincial environmental authorities would mutually agree goals and priorities, performance indicators and needs, and define respective roles and responsibilities. This would fall naturally within the process of developing action plans at the Federal and provincial levels envisioned in the NEP. These action plans would include agreed performance indicators around identified provincial priorities, which would in turn contribute to national goals for the environment as set out in the NEP. Similarly, provincial governments would, as appropriate, establish performance-based partnerships with district and tehsil governments for environmental functions devolved to the local level. Further building on the vision established in the NEP, funds would be transferred between levels of government following satisfactory achievement of the agreed indicators. Two important pre-requisites for such an approach to function effectively are (i) the translation of the NEP's broad directions into specific targets, and (ii) the establishment of an efficient system of performance-based transfers, combining transparent decision-making with the minimum number of administrative hurdles.

Pakistan Clean Air Program

211. MoE is developing the PCAP as a vehicle to support a range of ongoing and proposed initiatives for the management of urban air quality, involving a variety of sectors, levels of government and development partners. The complexity of the issues to be addressed, involving both city-specific and inter-sectoral considerations, suggests that the PCAP might best be supported as a stand-alone program, complementing broader incentive-based partnerships for NEP implementation.

A Strategy for World Bank Assistance

212. The World Bank is strategically placed to support both the development of incentive-based partnerships to meet the goals of the NEP, and the implementation of the PCAP. The Bank's support for the NEP is initially focused on providing technical assistance to MoE for the

development of provincial action plans. Drawing on the lessons of international experience with similar exercises, the aim is to facilitate a process through which provincial authorities will establish their own priorities within the broad matrix of national environmental goals laid out in the NEP. The Bank is prepared to provide analytical support to help provincial authorities establish environmental management priorities based on consideration of economic, technical and social realities, as well as assistance with the definition of monitorable indicators to provide the basis for measuring performance. As action plans are defined, the Bank is also prepared to consider investment support for their implementation.

213. For implementation of the PCAP, while JICA is funding monitoring equipment which will provide necessary data, there is limited capacity to plan and implement specific interventions. The Bank has been asked to bring implementation experience from other cities in the region, which will be provided initially through technical assistance, with the possibility of subsequent investment support as plans become more concrete.

214. In addition to providing assistance for implementation of the NEP and PCAP, the Bank also plans to support further analysis of selected priority environmental concerns. Potential issues to be addressed include industrial and urban pollution, environmental management in the water sector, and sustainable environmental management at the local level.

Immediate Actions

215. The list of recommended actions presented in this report is extensive, and will take a number of years to implement. However, the range of environmental challenges facing Pakistan is also extensive, and ignoring these problems will only result in accelerating economic damage that will impede growth and poverty-reducing development. To catalyze the reform process, there are some priority actions among the proposed interventions that should be immediately initiated by MoE, including:

- establishment of standards for environmental quality, especially ambient air quality standards, use-based ambient water quality standards, and drinking water quality standards;
- establishment of oversight guidelines for the EIA clearance functions delegated to the provinces;
- contribution of an environment chapter to the PRSP update; and,
- development of protocols for the collection, analysis and dissemination of data on natural resource management. While this report has focused on urban and industrial environmental challenges, there are growing problems in sustaining the country's natural resources, and effective interventions are constrained by the paucity of data.

Appendix 1: Measures Proposed in the Pakistan Clean Air Program³²

Short Term Measures	Responsible Agency	Long-term Measures	Responsible Agency
Stop import and local manufacturing of two stroke vehicles	M/O Commerce and M/O Industry	Creation of public awareness and education	M/O Environment and Provincial Environment Department
Restriction on conversion of vehicles from gasoline engine to second-hand diesel engines Launch effective awareness campaign against smoke emitting vehicles	Provincial Government	Setting up continuous monitoring stations in cities to record pollution levels in ambient air	M/O of Environment and Provincial Government
High pollution spots in cities may be identified and control through better traffic management such as establishment of rapid mass transit and traffic free zones	Provincial Government	Introduction of low sulphur diesel and furnace oil and promotion of alternative fuels such as CNG, LPG and mixed fuels in the country	M/O Petroleum and Natural Resources
Capacity building of Motor Vehicle Examiners	Provincial Government	Identify pollution control devices/additives for vehicles and encourage their use	M/O Environment, M/O Petroleum
Regular checking of quality of fuel and lubricating oils sold in the market	M/O Petroleum and Natural Resources	Promotion of waste minimization, proper disposal of solid waste in cities, waste exchange and pollution control technology in industries	Federal and Provincial EPAs, FPCCI, and M/O I&P)
Covering of buildings/site during renovation and construction to avoid air pollution	Provincial Government	Improvement of energy efficiency in vehicles and industry	M/O Environment
Phasing out of 2-stroke and diesel run public service vehicles	Federal and Provincial Governments	Review Motor Vehicle Ordinance to provide for inspection of private vehicles	Federal and Provincial Governments
Base line data collection on ambient air quality using fixed and mobile laboratories	Federal and Provincial EPAs	Establish vehicle inspection centres	M/O Communication and Provincial Government
CNG driven buses will be given tariff preference	M/O Industries and M/O Finance	Block tree plantation in cities, forestation in deserts and sand dune stabilization	M/O Environment and Provincial Forest Department
Fiscal incentives and a financing mechanism are adopted to provide resources to the transporters	M/O Communication and Provincial Government	Shoulders along roads should be paved	M/O Communication and Provincial Government
Launch of effective awareness campaign against smoke emitting vehicles	Provincial Governments		
Establishment of environmental squad of traffic police in all major cities to control visible smoke	Provincial Governments		

³² From Annex 2 of PCAP, 2005.