

Environment

16.1. INTRODUCTION

Since sustainable development is the cornerstone of all efforts by the government, therefore, concern for environment – its protection, renewal and enrichment – has been reckoned as obligation towards the betterment of all the citizens at large. Pakistani cities are facing problems of urban congestion, deteriorating air and water quality and waste management while the rural areas are witnessing rapid deforestation, biodiversity and habitat loss, crop failure, desertification and land degradation. There is increasing realization that many of these issues are compounded by climate change. Environmental degradation is intrinsically linked to poverty because of the overwhelming dependence of the poor on natural resources for their livelihoods – whether agriculture, forestry, fisheries, hunting etc. Poverty combined with a burgeoning population and rapid urbanization, is leading to intense pressures on the environment. Significant strides have been made in Pakistan for forwarding the environmental agenda identifying itself as an integral element of the national mainstream development with Mid-Term Development Framework 2005-2010, which also lends itself to address sustainable environmental development as a vehicle for economic-growth.

Pakistan's natural resources are increasingly under stress due to rapid population growth and environmentally unsustainable practices. Although densely settled, Pakistan's terrain is largely arid or semi-arid. Only 8% of the country's area receives more than 500 millimeters (mm) of rainfall per annum, mainly in the form of monsoon rain spread across 3 summer months of the year (IUCN, 2008). This sub humid zone is essentially limited to the ecologically fragile uplands, comprising geologically recent mountains and foothills.

According to Asian Development Bank's, Country Environment Analysis Report, 2008, pressing environmental concerns facing the country relate broadly to the *management of scarce natural resources (green issues), pollution and waste management (brown) and potential vulnerabilities to natural hazards and climate change*.

According to the World Bank Report 2006, collective estimated 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 include; *Illness and premature mortality caused by air pollution (indoor and outdoor), (almost 50 percent of the total damage cost); Diarrhea diseases and typhoid due to inadequate water supply, sanitation and hygiene (about 30 percent of the total), and Reduced agricultural productivity due to soil degradation (about 20 percent of the total) development concern*.

The Government of Pakistan along with various international donor agencies¹ has highlighted a number of environmental issues. The main concerns belonging to critical areas have been listed below;

- ▶ **Water:** Declining per capita availability, pollution of water bodies, groundwater depletion, and inadequate service delivery.

¹ State of Environment Report 2005-2006, Pakistan Millennium Development Goals Report 2006, Planning Commission, Strategic Country Environmental Assessment Report by World Bank, 2006, Asian Development Bank Report, 2008

- ▶ **Energy:** Inefficient use, high transmission losses, air pollution (caused by vehicles and industries).
- ▶ **Health:** Impact of air pollution, impact of water pollution, lead exposure.
- ▶ **Irrigated agriculture:** Soil erosion, water-logging, salinity, and sodicity, rangeland degradation and desertification, intrusion of saline water into freshwater.
- ▶ **Biodiversity:** Low forest cover, deforestation, loss of habitats and species extinction.

Diverse and complex environmental issues call for complementary policies that address environmental realties while facilitating development. The Government of Pakistan has been keenly pursuing policies aimed at curbing environmental hazards. The **National Conservation Strategy (NCS)** adopted in 1992, supported by the World Bank through the **Environmental Protection and Resource Conservation Project (EPRCP)**, was the first initiative aimed at preventing environmental degradation. In 1997 the first environmental legislation in the form of **Pakistan Environment Protection Act** was promulgated along with supporting institutional mechanisms to provide sustainable and efficient use of limited resources.

In a further initiative to strengthen implementation of the NCS, the **National Environmental Action Plan (NEAP)** was approved in early 2001. The key policies and programmes that have stemmed from NEAP include: *Air and Water Quality Monitoring, Clean Drinking Water for All, Pakistan Wetlands Programme, National Sanitation Policy, Sustainable Land Management to Combat Desertification in Pakistan, Environmental Rehabilitation and Poverty Reduction through Participatory Watershed Management in Tarbela Reservoir etc.* The United Nations Development Programme (UNDP) has been supporting the implementation of this initiative though the NEAP Support Programme (NEAP-SP). In March 2007, NEAP-SP entered its second phase.

Environmental data in Pakistan, is collected, compiled and published by a host of organizations, which include federal agencies, provincial agencies, research institutes and NGOs. For better coordination of material the Ministry of Environment (MoEnv) under the NEAP-SP has created the **National Environmental Information Management System (NEIMS)** with an overall objective to promote the national capacity in developing, managing and utilizing environmental information for informed decision-making.

The linkages between environment and poverty through the impact of environmental degradation on livelihoods, health and vulnerability have been explicitly recognized in **Pakistan's Poverty Reduction Strategy Paper I (PRSP)**, circulated in December, 2003. The rural poor comprise 34% of the rural population and include mainly landless households or small tenant farmers. In the absence of any formal sources of employment, their livelihoods are linked to agriculture and the use of natural resources. According to ADB Report, 2008, there has been an impressive decline in national poverty during 2001-2005. Rural poverty, however, has fallen more slowly than the national average despite satisfactory growth in the agricultural GDP in 3 of the 4 years of poverty decline. One implication of this is that poverty in Pakistan is more concentrated in rural areas.

The **PRSP II** released in February 2009, has aligned itself with **Millennium Development Goal 7**, which is specific to environmental sustainability. Its targets include; *integration of the principles of sustainable development into country policies and programmes and reversing the loss of environmental resources, such as including: biodiversity conservation, climate change mitigation and adaptation, phasing out ozone depletion substances; sustainable access to safe drinking water, sanitation and hygiene; controlling outdoor and indoor air pollution, reduction of vulnerability to natural disasters, and significant improvement in the lives of squatter settlement dwellers e.g. by providing access to secure tenure.*

Government of Pakistan has also declared **2009** as the **National Year of Environment**. In this regard the current year was kicked off with a Regional level workshop on Climate Change which was inaugurated by the Prime Minister of Pakistan.

It is encouraging to note that Pakistan's overall policy framework takes into account environmental considerations to an extent by setting targets as well as allocating resources for environmental programs. It is critical however that the existing environmental legislation be reviewed

and updated to align with the new growth and development strategy. In the absence of a coordinated endeavour, it is likely that policy, legislative and institutional gaps may persist, undermining the functional capacity of progressive initiatives. For this purpose it is essential to ensure effective enforcement of environmental rules and regulation. Public institutions such as **Environment Protection Agencies (EPA)** both at federal and provincial levels should be entrusted with the necessary authority and more importantly its management capacity should be enhanced.

Table-16. 1: The MTDF 2005-10 and MDG's targets and achievements

Name of Sector/Sub-Sector	Physical Target of MTDF period			Achievement of Targets
	Year 2004-05	2009-10 Targets	MDG Targets 2015	
Forest cover including State and private forests/ farmland (%age of total land area)	4.9%	5.2%	6.0%	5.2%
Area protected for conservation of wildlife (%age of total area)	11.3%	11.6%	12.0%	11.3%
GDP (at constant factor cost) per unit of energy as a proxy for energy efficiency	27,000	27,600	28,000	N.A
No. of petrol & diesel vehicles using CNG fuel	380,000	800,000	920,000	>2,000,000
Access to sanitation (national)%	42	50	90	44
Access to clean water (national)%	65	76	93	65
Number of continuous air pollution monitoring stations	0	4	--	7
Number of regional offices of Environmental Protection Agencies	0	8	16	6
Functional Environmental Tribunals	2	4		4

Source: Planning Commission of Pakistan

A **Medium Term Development Framework 2005-2010 (MTDF)** adopted by the GoP in mid-2005 coincided with the 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.

The MTDF 2005-10 and MDG's targets and achievements reported by the Planning Commission of Pakistan are given in Table 1.

The Government of Pakistan has made a considerable increase in its funds allocation for

Environmental projects in the **Public Sector Development Programme (PSDP)**. Overall, an allocation of Rs 6,500 million has been made in the federal PSDP 2008-09. However, the release of these funds has been a serious issue for the Environment sector due to financial crunch faced by the country.

There are about **55 projects** under implementation, which fall in the brown, green and capacity building components/sub-sectors of environment such as: *mass awareness, environmental education and environment protection; preparation of land use plan; fuel efficiency in road transport sector; protected areas management; forestry; biodiversity; watershed management; hospital waste management; environmental monitoring;*

capacity building of environmental institutions; natural disaster early warning and mitigation; improvement of urban environment; etc.

16.2. AIR POLLUTION

The National Conservation Strategy (NCS) of Pakistan, published in 1992, considers air pollution in conjunction with water pollution, and places considerable emphasis on these issues. Air pollution by its very nature is highly visible and has noticeable impacts on human health and on the environment. As such, it has received considerable attention as one of the primary environmental issues in the country. Nevertheless, measuring air pollution and assessing the extent of air quality degradation is a complex process.

According to the World Wide Fund (WWF) fact sheet, major air pollutants include: Suspended Particulate Matter, Volatile Organic Compounds, Carbon Monoxide, Nitrogen Oxides, Sulphur Oxides, Sulphur Dioxide, Lead & other heavy metals, Ground Level Ozone and Fuel wood. Sources of air pollution have been highlighted as Motor vehicles, Industry, Municipal Solid Waste, Smog and Medical waste.

The World Bank Report 2006 gives an estimated 35 percent of Pakistan's population living in cities. A substantial body of research demonstrates that high concentrations of suspended particulates in urban areas adversely affect human health, provoking a wide range of respiratory diseases and heart ailments.

Given the lack of enforcement of motor vehicle fitness regulations, the increase in air pollution from vehicle population alone could be alarming. The problem is compounded by the fact that the average life of vehicles in use in the country is quite long. As a result, vehicles in Pakistan are estimated to emit 25 times the amount of carbon monoxide, 20 times the amount of hydrocarbons and 3.6 times the amount of nitrous oxide of an average vehicle in the United States (GoP/IUCN, 1992).

Though many cities are adversely affected, air quality monitoring is restricted to the six major

cities of Karachi, Lahore, Islamabad, Peshawar, Quetta and Rawalpindi. Ambient concentrations of particulates in these cities lie consistently above World Health Organization (WHO) guidelines, and are on average two to four times the recommended levels. Studies conducted in Lahore and Karachi, the two largest cities; suggest that carbon monoxide, cadmium and lead levels in particular may exceed thresholds recommended by the United States Environmental Protection Agency (USEPA). (GoP/IUCN 1992 and SUPARCO, 1999).

According to Pakistan Environmental Protection Agency (EPA) and Japan International Cooperation Agency (JICA), 2006, common gases emitted by vehicles include carbon monoxide, nitrous oxides, and ozone, and are dangerous to human health beyond certain levels of concentration. Poly-aromatic hydrocarbons released by diesel-powered vehicles are known carcinogens, while smoke from diesel engines has aggravated already elevated levels of airborne soot. Nitrous oxides are emerging air pollutants with the highest concentrations recorded in Karachi, followed by Lahore, Quetta, Peshawar, and Islamabad. Industries located in urban areas are the main source of sulfur dioxide (dangerous to human, animal, and plant life) while brick kilns powered by low-grade coal are notable sources of soot.

Table-16.2: Growth in CNG Sector

As on	CNG Station	Converted Vehicles
December, 1999	62	60,000
December, 2000	150	120,000
December, 2001	218	210,000
December, 2002	360	330,000
December, 2003	475	450,000
December, 2004	633	660,000
December, 2005	835	1,050,000
December, 2006	1,190	1,300,000
16th May, 2007	1,450	1,400,000
February, 2008.	2,063	1,700,000
April, 2009.	2,760	>2,000,000

Source: HDPI (<http://www.hdip.com.pk>)
OGRA, IANGV (<http://www.iangv.org>)

It is encouraging to note however that the government has been quite successful in taking

preventive measures to curb the emission of poisonous gases. Pakistan has become the largest user of Compressed Natural Gas (CNG) in the world, as per the statistics issued by the International Association of Natural Gas Vehicles (IANGV). Presently, more than 2 million vehicles are using CNG as fuel and 2,760 CNG stations are operational in different parts of the country (as on April 2009) (see, Table 2). The CNG used as fuel has grown substantially in the transport sector, replacing traditional fuels while greatly reducing the pollution load in many urban centers. As a result, Pakistan has the largest fleet of vehicles running on CNG in South Asia, and is third worldwide after Argentina and Brazil. In addition to this, the government is also on the look out for replacing more polluting “diesel fuel” in road transport sector. For this purpose the administration will offer suitable incentives to investors for the introduction of CNG buses in the major cities.

Latest statistics collected by the MoEnv suggest that the use of coal in power sector has persistently shown a decreasing trend during the last five years. This has mainly been caused by the conversion of a number of plants to natural gas. Likewise, there has been a considerable reduction in coal usage for domestic purposes.

The use of biomass fuels in unventilated rooms has been identified as the primary cause of **indoor air pollution**, particularly in rural areas. Women and children are most affected by it as they are more exposed and vulnerable to smoke inhalation. According to ADB report 2008, about 86 percent of rural households and 32 percent of urban households use biomass fuels for cooking purposes. Most urban households, however, have switched from biomass fuels to cleaner and more convenient sources of energy. 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.

16.2-I. Measures to Improve Air Quality:

The GoP has ensured the implementation of an **Environmental Monitoring System (EMS)** to monitor the air quality at both Federal and four Provincial Capitals; this will help in managing the ever deteriorating air quality in major cities. The Government has also given a road map for introducing Euro-II² compliant vehicles in the country under the given road map. The Euro-II compliant Petrol Vehicles shall be introduced from 1st July, 2009.

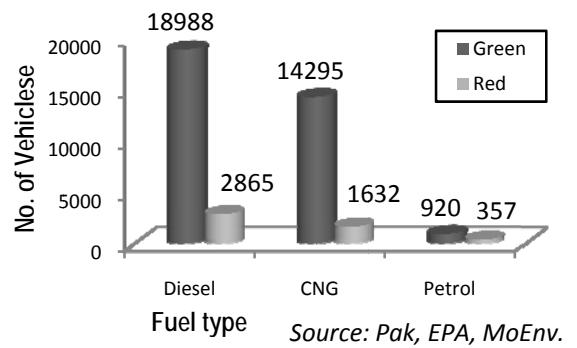
A successful pilot activity of **Vehicle Emission Testing System (VETS)** is under way in Islamabad. Pakistan Environmental Protection Agency (EPA) and Islamabad Traffic Police (ITP) has carried out emission test of 39,057 (Thirty Nine Thousand and Fifty Seven) vehicles since 2005, out of which 34,203 (87.57 %) vehicles have been cleared and have accordingly been issued green stickers, 4,854 (12.43 %) vehicles causing pollution have been issued red (warning) stickers (see, Table-3 and Figure 1).

**Table- 16.3: Vehicular Emission Testing in Islamabad
(May, 2005 - 31st September, 2008)**

Fuel Type	Green/ Compliance	Red/ Non Compliance	Total Checked Vehicles
Diesel	18,988	2,865	21,853
CNG	14,295	1632	15,927
Petrol	920	357	1277
Total	34,203	4,854	39,057

Source: Pak, EPA, MoEnv

Fig-1: No of Vehicles Vs fuel type



Source: Pak, EPA, MoEnv.

² Euro norms refer to the permissible emission levels from both petrol and Diesel vehicles, which have been implemented in Europe.

Air Quality Monitoring System has been provided to both the Federal and Provincial governments through Pak, EPA. The information collected after analysis of data has been given in Table 4.

Table 16.4: Ambient Air Quality Index (02-03-2009)

ISLAMABAD						
	Safe Limit		Unhealthy for Sensitive group			
	Good	Moderate		Unhealthy	Very Unhealthy	Hazardous
ISD-AQI (Air Quality Index)	0 - 50	51 - 100	101 - 150	151 - 200	201 - 300	301 - 500
AQI Particulate Matter (PM) 2.5 = 166						
LAHORE						
	Safe Limit		Unhealthy for Sensitive group			
	Good	Moderate		Unhealthy	Very Unhealthy	Hazardous
LHR-AQI (Air Quality Index)	0 - 50	51 - 100	101 - 150	151-200	201 - 300	301 - 500
AQI Particulate Matter (PM) 2.5 = 166 Mobile Station: at Hockey Stadium						
PESHAWAR						
	Safe Limit		Unhealthy for Sensitive group			
	Good	Moderate		Unhealthy	Very Unhealthy	Hazardous
PWR-AQI (Air Quality Index)	0 - 50	51 - 100	101 - 150	151 - 200	201 - 300	301 - 500
AQI Particulate Matter (PM)2.5 = (As per AQI calculator)						
* AQI is not calculated due to maintenance of anlyser						
KARACHI						
	Safe Limit		Unhealthy for Sensitive group			
	Good	Moderate		Unhealthy	Very Unhealthy	Hazardous
KHI-AQI (Air Quality Index)	0 - 50	51 - 100	101 - 150	151 - 200	201 - 300	301 - 500
			↑			
AQI Particulate Matter (PM)2.5 = 101 (As per AQI calculator)						
QUETTA						
	Safe Limit		Unhealthy for Sensitive group			
	Good	Moderate		Unhealthy	Very Unhealthy	Hazardous
BAL-AQI (Air Quality Index)	0 - 50	51 - 100	101 - 150	151 - 200	201 - 300	301 - 500
AQI Particulate Matter (PM)2.5 = (As per AQI calculator)						
<i>Source: Pakistan, Environmental Protection Agency</i>						

16.3. WATER POLLUTION

Water pollution mainly refers to the contamination of water bodies such as lakes, rivers, oceans, and groundwater caused by human activities, which can be harmful to organisms and plants that live in these water bodies. It occurs when pollutants are discharged directly into water bodies without treating it first. Being recognized as one of the most important life-supporting elements in the world's ecological systems, water, has particular importance for the arid ecosystems such as the Indus plains in Pakistan.

The Indus delta's ecosystem has been degraded by diversions for irrigation since the major barrages have acted as barriers to migrating fish and rare mammals such as the Indus dolphin. Many riverine wetlands have been drained and converted to agricultural land. Outside the Indus Basin, water is even more limited. According to ADB report, 2008, in parts of Balochistan, geological water is being mined, while in Quetta Valley, the water table is overdrawn by 26 million m³ each year—it is estimated that the aquifer will be exhausted by 2020.

The existing water resources in Pakistan and the world over are under imminent threat due to rapid industrialization, over exploitation, soil erosion, deforestation and untreated discharge of municipal and industrial wastes to rivers and other water bodies. In the South East Asian region where water has become a vital challenge, Pakistan is severely affected by the effects of water scarcity and is already ranked as the 12th most vulnerable country on a worldwide scale according to the Agriculture and Rural Development Unit South Asia Region, World Bank, 2008. With an average rainfall of below 240mm a year, Pakistan is already one of the most water-stressed countries in the world, and will move to outright water scarcity by 2025 according to the International Water Management Institute (IWMI), due to a high level of population growth. Thus, the demand for water is likely to grow from 4% to 15% of aggregate water demand in the next twenty years.

Contrary to most countries, Pakistan suffers from its dependency on a single river system and on the

glaciers of the western Himalayas. As a result, the country faces serious threat of being exposed to the scarcity of water caused by climate change. The downstream location of our water in the western rivers makes pollution and especially salinity major problem, with 15 tons of salt accumulated every year in the Indus Basin (World Bank, 2006). The GoP realizes that a pragmatic approach to safe and unpolluted water, should involve transboundary management and interdependence. The need for bilateral and multilateral agreements on water cannot be overestimated. This action can be implemented through subsidies allocated to regional and national programs, and through quotas and performance indicators.

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. In urban areas, most water is supplied from groundwater except for the cities of Karachi, Hyderabad and a part of Islamabad, where mainly surface water is used. In rural areas with saline groundwater, irrigation canals serve as the main source of domestic water. World Bank report 2006 estimates, more than 1.6 million DALYs³ are lost annually as a result of death and disease due to diarrhoea, and almost 900,000 as a result of typhoid. Diarrhea and typhoid mortality in children accounts for the bulk of the losses, reflecting the vulnerability of children to these diseases. Data from World Water Forum suggests water pollution causes 60 percent of infant mortality in Pakistan and is now one of the leading causes of death in the country.

16.3-I. Measures to Restore Water Quality:

According to the 2008 **Millennium Development Goals (MDG)**, significant improvements have been made in sanitation facilities and access to safe water. In order to achieve desired results however, the number of people benefiting from these programs must increase substantially, especially in the rural areas. In its 2000 Millennium Declaration, the United Nations resolved to halve the proportion

³ DALYs are standard measures that combine disparate health effects using a consistent common denominator.

of people without sustainable access to safe drinking water, by 2015. In addition to this the UN has identified water as a new priority target on its agenda through the implementation of the “**Water for Life**” program (2005-2015), in the 2008 MDG Report, and the recently held “**World Water Day**” on March 22nd 2009.

The MoEnv has recently prepared the Draft on **National Drinking Water Policy** in collaboration with **United Nations International Children Emergency Fund (UNICEF)** and through an extensive stakeholder consultation process both at the Federal and Provincial levels. The Policy will be finalized and submitted in the forthcoming **Pakistan Environmental Protection Council (PEPC)** meeting along with **National Drinking Water Quality Standards**.

Realizing the importance and role of sanitation in the improvement of environment as well as the commitment to achieve the MDG sanitation goals, the MoEnv launched the **National Sanitation Policy of Pakistan** before the Federal Cabinet soon after the **Second South Asian Conference**. The primary focus of sanitation policy is on the safe disposal of excreta away from the dwelling units and work places by using sanitary latrines. The policy resolves to meet the MDGs and targets whereby the proportion of people without sustainable access to improved sanitation will be reduced by half, by the year 2015 and 100 percent population will have access to sanitation facilities by 2025.

The Ministry in collaboration with UNICEF, Water & Sanitation Programme (World Bank), Water Aid, Rural Support Programme Network (RSPN) etc, launched awareness and training programmes in the year 2008, the **International Year of Sanitation (IYS 2008)**. Installation of **water filtration plants** in different areas is underway. The implementation of which is targeted to be completed within this fiscal year. Sustainability of these water filtration plants needs to be ensured through compliance of already deliberated operation and maintenance aspects.

16.4. LAND DEGRADATION AND DEFORESTATION

The latest figures released by the MoEnv estimated that about 38 percent of Pakistan's irrigated land is waterlogged; the productivity of soil is being lost due to salinity and sodicity. An estimated 16 percent of land is saline and the application of agricultural chemicals has increased by a factor of almost 10 percent since 1980. Salinity imposes direct economic losses, through reduced yields and less visible indirect losses through changes in farming practices or the cropping mix. Pakistan has naturally saline soils, but the problem has been compounded by consistent mismanagement of irrigation and human induced soil erosion.

According to figures released by the Forest Wing at MoEnv, Pakistan has about 3.8 million ha of rangeland (see, Table 5). The ADB report suggests that the alpine grasslands of NWFP, the Northern Areas, and AJK remain relatively intact, but 85–90% of the country's arid and semi-arid rangeland has been degraded as a result of the fivefold increase in livestock numbers since Independence in 1947. In addition, the influx of more than 5 million Afghan refugees in the 1980s has transformed community pastures in the tribal areas of NWFP and northern Balochistan into open access rangelands.

The GoP is following a multi-pronged policy for food, energy, water, and forest conservation. Undoubtedly, forests occupy a pivotal role in an era of energy crisis, in which fuel wood production on farmland may serve as a renewable source of energy besides providing livelihood for farmers. Forests also provide multiple ecological-services such as watershed protection, soil conservation, biodiversity habitat and play a vital role in assuring eco-system resilience. In this context it is extremely disquieting to note that the Juniper forests, located in the province of Balochistan are continuously being cut beyond their regeneration capacity. Mangrove forests along the coast of Sindh play an economically significant role in protecting ports from the excessive accumulation of silt, providing breeding grounds for commercially important shrimp and fish larvae,

and offering sanctuaries for migratory birds (ADB, 2008)

Estimated deforestation rate over the 1990-2005 period is 2.1 percent or 47 thousand hectares annually. According to World Bank Report, 2006, 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.

Table- 16.5: Forest Area under the Control of Provincial/Regional Forest Departments (By vegetation type) (Hectares) (000)

Vegetation Type	NWFP	Punjab	Sindh	Balochistan	NAs	AJK
Coniferous forests	844.784	49.338	-	145.098	0.282	407.527
Irrigated Plantations	-	150.000	98.18	0.115	0.087	-
Riverine forests	-	58.414	241.12	14.177	-	-
Scrub forests	87.947	257.182	-	574.234	0.100	9.308
Coastal Forests	-	-	344.85	17.139	-	-
Mazri	24.282	-	-	-	-	-
Linear Plantations	2.000	19.144		-	200 Km	-
Private Plantations	734.487	-	-	-	0.014	-
Range lands	150.000	2679.116	457.55	375.073	0.212	149.905
Total	1843.5	3213.2	1141.7	1125.8	0.69	566.74

Source: Forest Wing, MoEnv

16.4-I. Measures to Enhance Forest Cover:

Trends and prospects of deforestation vary greatly depending on climatic conditions and social responses. Various tree planting projects are under implementation and the tree cover in the country (state and privately owned) has increased to 5.2% (see, table 1). To achieve the MDGs targets of vegetation cover of 6% by 2015, the Planning Commission proactively interacted with the MoEnv and the Provincial Forest Departments to come up with project for afforestation/reforestation to meet the MTDF and MDGs targets. As a result, 5 projects of forestry resource development costing Rs. 11.5 billion are under implementation in order to achieve a 6% vegetative cover target.

The main constraints in developing forest resources are water shortage and lack of funds. To overcome these constraints, non-traditional and innovative approaches need to be adopted. Forest Departments should promote native and less water demanding trees besides introducing water harvesting and conservation techniques. Supplementary financial assistance is being provided under PSDP but other international

sources of funding need to be explored. **Clean Development Mechanism (CDM)** is emerging as a potential source of income for tree growers in return for their service to sequester carbon. The MoEnv, as the focal point for CDM, is providing all possible technical assistance to tree farmers by getting them involved in carbon trading under CDM. Projects aimed at conservation and development of juniper forests with an estimated cost of Rs. 493.166 million and sustainable land management unit cost of Rs. 238 million, are underway in this connection.

Table-16.6: Trees Planted (In Million)

S #	Year	Spring	Monsoon	Total
1	2001	83.039	47.111	130.15
2	2002	66.752	39.705	106.457
3	2003	55.018	38.398	93.416
4	2004	63.166	58	121.166
5	2005	65.799	30.654	96.453
6	2006	57.17	35.34	93.51
7	2007	61.48	33.66	95.14
8.	2008	73.31	38.12	111.43

Source: Forest Wing, MoEnv

In order to enhance tree cover in the country, **tree planting campaigns** are held each year. The tree planting campaigns involve all government departments, private organizations and NGOs. The achievements during 2001-08 have been documented in Table 6.

The **Federal Forestry Board** constituted in 1954 to provide a platform for the improvement of forest policy remained dormant. This board has been reconstituted by the government and comprises the representatives from the Provincial Forest Departments in AJK, NAs, NGOs, progressive farmers and other stakeholders.

The President of Pakistan launched a **Mass Afforestation Programme** on December 22, 2008. This programme will be spread over a period of five years and shall largely be sponsored by private entrepreneurs for planting trees on state and other suitable lands. In this connection, MoEnv, has requested the chief secretaries of all provinces to provide the details of suitable lands that can be brought under tree cover. Private entrepreneurs are an integral part of this programme. Many private companies are expressing great interest in investing in environmental forestry as part of their Corporate Social Responsibility (CSR).

16.5. CLIMATE CHANGE: IMPACT AND ADAPTABILITY IN PAKISTAN

The Nobel Peace Prize winning report by the Intergovernmental Panel on Climate Change (IPCC) has highlighted the fact that the worsening trends are expected to accelerate to a point of no return. In its 2007 assessment, the first working group established by the United Nations' IPCC places the probability that global warming has been caused by human activities at greater than 90%. Further changes in the world's climate are now inevitable. The IPCC's second working group concludes in the summary of its findings (April 2007) that human-induced warming has indeed had a discernable influence on many physical and biological systems.

According to the South Asia Region, World Bank Group, about 70 percent of South Asians live in rural areas and account for about 75 percent of the poor. Most of the rural poor depend on agriculture

for their livelihoods. Agriculture employs about 60 percent of the labor force, but contributes only 22 percent of regional GDP. With rural economies tied to climate sensitive sectors such as agriculture, the poor are likely to be disproportionately affected by the calamities of climate change. The Himalayan ecosystem sustains some 1.5 billion people who live directly in the floodplains of its many rivers (e.g. Brahmaputra, Ganges, Indus, and Meghna). The receding trends of glacier masses threaten water supplies, livelihoods and the economy of the region. With melting glaciers, flood risks would increase in the near future. In the long term, there can be no replacement for the water provided by glaciers, and this could result in severe water shortages.

Climate Change poses a serious threat for Pakistan because of the impact it will have on glaciers releasing water for crops. The receding glaciers will increase water flows in the Indus basin, followed by permanent reductions. Sustained water availability for agriculture will help reduce our food insecurity. In addition to a web of mini-dams and check dams, a chain of large dams are needed in order to protect the downstream populations and their livelihoods from flash floods, the human suffering this entails, and the damage they can inflict on sparse infrastructure.. Changing patterns and temperament of the monsoon is another area which will affect crop production.

The rural population in more fragile ecosystems (such as the mountain regions and rain-fed agricultural areas), the urban poor, and communities living downriver on the Indus and coastal areas will be at huge risk. According to ADB report, 2008 the risk of hunger will also increase because of declining crop productivity owing to heat stress. In addition to this, critical concerns include:

1. Increased intrusion of saline water along the Sindh coastal zone due to an accelerated rise in sea level;
2. Frequent and stronger cyclones caused by rising sea surface temperatures that will affect Karachi and other coastal settlements;

3. Heat strokes brought on by summer temperature spikes; and
4. The spread of disease vectors encouraged to breed in stagnant water bodies during mild winters.

16.5-I. Mitigation Measures

It is possible to adapt to climate change by devising anticipatory response strategies to minimize the adverse impacts. Neighboring countries like India and China have developed national plans of action on climate change. The main challenge is to develop an understanding of how climate change could affect Pakistan's uplands and rivers, its agro-ecological zones and subzones in the Indus Plain, and coastal lands.

Pakistan's Planning Commission has recently established a task force to investigate the impact of climate change on the country's agriculture, economy and natural resources. Pakistan has actively participated in the following Climate Change related initiatives:

- ▶ United Nations Framework Convention on Climate Change (UNFCCC) was adopted in 1992 at Earth Summit at Rio de Janeiro to meet the challenge of Climate Change. UNFCCC aims at stabilization of Greenhouse Gas (GHG) concentrations in the atmosphere. The convention was signed by 154 states. Pakistan signed the UNFCCC as Non Annex- I Party in June 1994 and it became effective for Pakistan, as Party, on 30th August 1994.
- ▶ The Kyoto Protocol was adopted under the UNFCCC at the 3rd Meeting of the Parties held in Kyoto, Japan, which entered into force on 16th February 2005. Under the Protocol, developed countries (Annex-1 parties), agreed to reduce their combined Greenhouse Gas emissions by 5.2% below the 1990 level during the period 2008-2012. Pakistan adopted the Kyoto Protocol in 1997 and acceded to it on 11th January 2005. The Protocol introduced Clean Development Mechanism (CDM) in order to achieve sustainable development goals in developing countries of the World.

▶ The Government of Pakistan after its accession to the Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC) in January 2005 has declared the Ministry of Environment as the Designated National Authority for Clean Development Mechanism under the Protocol. The CDM Cell has now been strengthened to ensure institutional sustainability of the Cell in the Ministry through the Public Sector Development Programme (PSDP) Fund with a total cost of Rs. 38.93 million for a period of three years (July 2006- June 2009). The project aims at strengthening of the CDM Secretariat and enhancing the capacity of CDM staff and project proponents in developing, managing and approval of the CDM projects.

▶ The Government in collaboration with various concerned organizations has recently initiated the Technical Advisory Panel (TAP) on Climate Change. TAP is expected to provide the requisite input to the government to combat the threat of climate change by an enabling policy, regulatory framework and vulnerability assessments of Climate Change. The official launch of the TAP was held on February 15, 2008.

The economy of a country will, to a large extent, determine the ability to adapt and resist the various effects of Climate Change. The adaptation measures that can be taken as part of the macroeconomic policy framework can focus upon;

- ▶ Strengthening economic and institutional development,
- ▶ Increasing fiscal insurance, government budgets must allow for adaptation expenditures, environmentally related taxes, more commonly known as green taxes⁴, can curb the emission of pollutants,

⁴ The Green Tax Commission was appointed in Norway in the year 1994, and assessed how to change the tax system away from taxation on labor and towards activities that imply increased use of resources and harmful emissions in a long term perspective.

- ▶ Financial Markets can reduce the macroeconomic costs of adapting to Climate Change by generating price signals that create incentives for people to move to lower-risk areas and reallocating capital to newly productive sectors and regions.

The coming era is bound to see conflicts in the area of energy and water resources if timely strategies are not devised at the national and international levels. Pakistan has been blessed with a strategic location that enhances its capacity to gain advantage from natural resources, provided these resources are managed in an efficient and productive manner.

An ever increasing population and depleting natural reservoirs of water, land, energy etc, combined with their degradation, demands urgent attention not in just conserving the existing resources but also devising new and efficient techniques to utilize and excavate new reservoirs.

So far the Government has taken significant initiatives in collaboration with international agencies to counter complex issues responsible for environmental degradation. A pragmatic approach towards multifarious challenges requires in depth and focused research, without which desired results will remain unachievable.