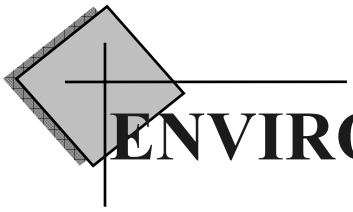

ENVIRONMENT

I. Introduction

Pakistan and other developing countries around the world are increasingly becoming conscious of the fact that, the pursuit of growth and development places a heavy burden on sustainability for now and for the foreseeable future. Development, sans environmental aspects is counter productive in sustaining the pace of progress. The Government of Pakistan believes in the creation of opportunities for the present generation without compromising on the potential of future generations to meet their developmental needs. This notion is easy to define but difficult to implement.

Environmental degradation is fundamentally linked to poverty in Pakistan. Approximately less than one-fourth of the country's population, like in most developing countries, is poor and directly dependent on natural resources for their livelihoods—whether agriculture, hunting, forestry, fisheries, etc. Poverty combined with a rapidly increasing population and growing urbanization, is leading to intense pressures on the environment. This environment-poverty nexus cannot be ignored if effective and practical solutions to remedy environmental hazards are to be taken. In Pakistan, the deterioration of environment continues to affect livelihoods and health thus increasing the vulnerability of the poor to disasters and environment-related conflicts. The current cost of environmental degradation is considerably high. According to a recent assessment made by the World Bank (WB)[1], the cost of environmental neglect and degradation to the economy has amounted to Rs. 365 billion during the current year.

Biodiversity in Pakistan is also under serious threat due to excessive depletion of natural resources. The latest red-list of endangered species in Pakistan, released by the World Conservation Union (IUCN), includes the Blue Whale, Fin Whale, Hotson's Mouse-like Hamster, Indus River Dolphin, Markhor, Urial, Snow Leopard, Woolly Flying Squirrel, Brown Grizzly Bear, Western tragopan, Hobara Bustard, Siberian White Crane, Olive ridly turtle, Green turtle, Marmot, Blackbuck and Sand Cat. The Government of Pakistan has recognized the need to conserve biodiversity by taking several tangible steps including the fulfillment of its commitment to international protocols and conventions. Pakistan became a signatory of National Conservation Strategy and Convention on Biodiversity (CBD) in 1994. Developing the Biodiversity Action Plan for Pakistan, 2000 has been the most significant step in addressing the biodiversity loss in the country. The National Council for Conservation of Wildlife (NCCW) has played a significant role in encouraging the Provincial Wildlife Departments for better management of protected areas particularly national parks of the country.

Critical issues including air and water pollution, ozone depletion, deforestation, land degradation, lack of waste management, desertification and vanishing biodiversity, have resulted in life threatening ecological imbalances all over the world. There is an increasing realization that many of these issues are further compounded by climate change. In line with the increasing global commitments towards environment protection, Pakistan has promptly demonstrated a great deal of resilience and seriousness not only in ratifying almost a dozen of Multilateral Environmental Agreements (MEAs) but has also initiated various national environment programmes aiming at protection of environment. During the last decade, Pakistan has made diligent progress in strengthening the institutions responsible for

[1] Pakistan: Strategic Country Environment Assessment by WB (Sep, 2007)

environmental management at the national level such as:

- Pakistan Environment Protection Agency, and Provincial Environment Protection Agencies/Departments
- Environment Section of Planning & Development Division as well as civil society organizations
- The promulgation of Environmental Legislation
- Establishment of policy framework including formulation of conservation strategies for NWFP, Balochistan and Northern Areas as well as for a few districts
- Establishment of Environmental Tribunals
- Formulation of Sanitation Policy and Energy Conservation Policy

The realization that environmental concerns required urgent attention and needed to be addressed in a focused and effective manner at the national level prompted the Government to adopt a comprehensive initiative in the form of The National Environment Action Plan (NEAP). This multifaceted programme was launched in 2001, and mainly aimed to achieve environmental sustainability and poverty reduction in the context of economic growth. ***The key policies and programmes that have stemmed from NEAP are;*** 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 has been supporting the implementation of this initiative though the NEAP Support Programme (NEAP-SP). In March 2007, NEAP-SP programme entered its second phase. ***NEAP Phase-I successfully achieved the following four targets:***

1. National Environmental Policy
2. National Sanitation Policy
3. Clean Development Mechanism Strategy
4. National Forest Policy and Energy Conservation Policy

The Programme appraised more than 300 project proposals submitted by various stakeholders, while the core team of NEAP-SP prepared more than 60 project concepts. This also included preparation of projects for Public Sector Development Programme (PSDP) e.g. Clean Drinking Water Initiatives, Clean Drinking Water for All, Activity-based Capacity Development, National Bio-Safety Center and Rehabilitation of Rangelands of Potohar Tract of Punjab through participation of local communities.

A wide range of technical, institutional and economic interventions in terms of different projects were grouped under NEAP-SP Phase II that mainly proposed the following three initiatives:

1. Pollution Prevention and Control
2. Climate Change; Ecosystem and Natural Resources Management
3. Environmental Governance, Advocacy, and Partnership

These programmes, in addition to pursuing their technical objectives, will strengthen the institutional capacities of relevant Government institutions. Moreover, the proposed programme will promote equal participation of women and sustainable grassroots projects through its Grassroots Initiatives Programme for Local Environmental Management (GRIP).

With a view to combating environmental pollution in various sectors and at various levels on the national front, the Government of Pakistan has already enhanced allocation for the Environmental projects in PSDP. Overall, an allocation of Rs. 8.0 billion has been made for the environment sector projects in the federal PSDP 2007-08. There are about 52 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. Utilization of funds till January 2008 is less than 25% of allocation; however, the same may considerably improve during the remaining period of the fiscal year. Awareness, knowledge dissemination, adaptation and research on climate change issues are underway in Pakistan through different collaborating agencies i.e. government and non-government. Data collection on environment and environmental economics has also been initiated for sound planning.

Realizing the importance of environmental protection, the Government of Pakistan has substantially increased the Medium Term Development Framework (MTDF) for environment (2005-10) compared to the past. Working group on Environment has been notified to operationalize Vision 2030 in Pakistan. Capacity building of environmental institutions at federal, provincial and local levels and mass awareness would be given high priority to realize implementation of Vision 2030 on sustainable basis. Project Advisory Committee (PAC) of Environmental Fiscal Reforms (EFR) at the Federal Government level has also been established.

At the international level, Pakistan has also shown its commitment to numerous non-legally binding instruments and MEAs such as; The United Nations Convention on Biological Diversity (CBD), Convention on International Trade in Endangered Species of wild flora and fauna (CITES), United Nations Convention to Combat Desertification (UNCCD), United Nations Framework Convention on Climate Change (UNFCCC), Convention on Migratory Species (CMS), Ramsar Convention on Wetlands, Basel Convention on the Control of Trans-boundary Movement of Hazardous Wastes and their Disposal, Rotterdam Convention on the Prior Informed Consent for Certain Hazardous Chemicals, Pesticides in International Trade and the Montreal Protocol, Kyoto Protocol on controlling Green House Gas (GHG) Emissions.

Pakistan has also prepared the National Implementation Plan for Persistent Organic Pollutants (POPs) to ratify the Stockholm Convention. Necessary measures for accession to the Kyoto Protocol regarding the Green House Gas (GHG) emissions have been effectively taken by the Government.

II. Millennium Development Goals (MDG) and Medium-Term Development Framework (MTDF) Targets

Pakistan has effectively dedicated itself to achieving the Millennium Development Goals (MDGs) as adopted by the UN member states in the year 2000. ***Goal number 7 of MDG aims at ensuring environmental sustainability.*** The environmental targets (MTDF 2005-10) and MDG targets 2015 have been listed in Table 16.1.

The specified figures give a comprehensive picture regarding the extent to which Pakistan has achieved MDG and MTDF Targets so far. The Forest Cover including state and private forests/farmlands (%age of total land area) stood at 5.2% during the current fiscal year. The targeted area was 5.2% for MTDF 2009-10 and 6% for MDGs 2015 confirming that the country is doing well in terms of achieving the signified target. It is disquieting to know however that according to international organizations such as IUCN and the World Wide Fund for Nature (WWF) it is feared that Pakistan is experiencing the world's second highest rate of deforestation. This destruction is leading to the wholesale disappearance of trees, shrubs and ground flora, together with the vertebrate and invertebrate fauna they normally support. The loss of forest habitat has had a severe impact on Pakistan's biodiversity, and has serious implications for the nation's natural and agro-ecosystems. The protected area for conservation of wildlife (%age of total area) was estimated at 11.3% while the targeted levels were 11.6% and

12.0% according to MTFD and MDG targets, respectively. The given figures indicate that efforts to conserve wild life have been very effective so far.

Table 16.1: The Environmental Targets: Medium-Term Development Framework (MTDF) 2005-10 and Millennium Development Goals (MDG) 2015 Targets

Name of Sector/Sub-Sector	MTDF 2004-05 Targets	MTDF 2009-10 Targets	MDG Targets 2015	Achievement of Targets July-Mar 08
Forest cover including State and private forests/farmlands (%age of total land area)	4.9%	5.2%	6.0%	5.2%
Protected Area 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	1,700,000
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 (Planning and Development Division)

The number of petrol & diesel vehicles using CNG fuel stood at 1,700,000 for the current fiscal year whereas the targeted levels were estimated at 800,000 in case of MTDF and 920,000 in case of MDGs. The actual number of vehicles is therefore almost double the number of what was targeted. Therefore, Pakistan has already met its MDG target well in advance. This achievement has been made possible because of the tremendous growth in the number of vehicles that are converting to CNG due to the Government's resolve regarding the development of the CNG sector as a cleaner and economical energy alternative.

Access to sanitation (national) was calculated to be 44% for the current fiscal year. Its targeted levels were set at 50% for MTDF 2009-10 and 90% for MDG 2015. The Government therefore needs to accelerate its efforts in this regard. Access to clean water (national) stood at 65% in 2007-08, while the targeted level was 76% in case of MTDF and 93% in case of MDG, implying that the targets will be achieved in due course if the current trend continues.

The number of continuous air pollution monitoring stations and regional offices of Environmental Protection Agencies stood at 6 and 4 respectively for the current year which implies that the targeted levels might be achieved if consistent efforts are made. In addition to this the number of functional environmental tribunals was 4 which already meets the targeted level for MTDF 2009-10.

According to MDG Target 10 of environmental sustainability : "the proportion of people who are deprived of sustainable access to safe drinking water and basic sanitation, must be halved by 2015" whereas target 11 is concerned with improvement of the lives of slum dwellers. In

Pakistan, this target has been adapted to mean proportion of katchi abadis that have been regularized. Target 11 poses a challenge to the Government, as the current proportion of regularized slum settlements is 60 percent, which has to be increased to 95 percent by 2015 according to MTDF target.

III. State of the Environment

III.1. Air

The key factors responsible for air pollution in Pakistan include:

- Rapidly growing energy demand due to relatively higher population growth rates
- A fast growing transport sector and unplanned infrastructure creating hazardous atmosphere in cities
- Widespread use of low-quality fuel, combined with a dramatic expansion in the number of vehicles on roads
- Alarming levels of nitrous oxide and sulphur combined with increasing proportion of dust have further aggravated the situation.

Air pollution levels in Pakistan's most populated cities are among the highest in the world and are likely to still climb further, causing serious health issues. The levels of ambient particulates - smoke particles and dust, which cause respiratory diseases - are generally twice the world average and more than five times as high as in industrial countries and Latin America (Energy Information Administration, 2004). Although Pakistan's energy consumption is still low by world standards, lead and carbon emissions are increasingly becoming major air pollutants in urban centers such as Karachi, Lahore, Rawalpindi and Peshawar.

The country has been benefiting from steady economic growth over the last few years. This has been accompanied by rising urbanization, higher income and affluence, and an increase in the private ownership of motor vehicles. In the absence of any urban transport policies and sustained investments in public transport, most urban citizens rely either on their private motor vehicles or the informal transport sector for urban transport. The resulting urban congestion is straining the capacity of the Government to resolve the urban transport and as a consequence, urban areas of Pakistan are experiencing deterioration in air quality.

In addition to this new passenger car registrations, which have soared since 2001, are expected to continue to rise further. The surge in the demand for cars originated from the increasing affordability of cars on the one hand and availability of car financing from the banking system on the other. Amongst these vehicles, those of serious concern are diesel vehicles using crude diesel oil and motorcycles and rickshaws. Due to overloading, faulty injection nozzles and weak engines, diesel vehicles emit excessive graphitic carbon (visible smoke). Furthermore, motorcycles and rickshaws, due to their two-stroke engines, are the most inefficient in burning fuel and thus, contribute most to lethal emissions.

Replacement of liquid petroleum fuels with CNG is a major step towards protecting environment especially in urban areas where air pollution is fast becoming a menace. Environmentalists recommended fuel switching from liquid fuels to natural gas as a strong measure to protect environment. CNG is a lead-free fuel with no sulphur and particulate emissions and releases $1/10^{th}$ level of carbon monoxide emissions as compared to petrol. It also produces much lower carbon dioxide emissions as compared to petrol and diesel oil thereby helping in mitigating warming effect caused due to greenhouse gas emissions of carbon dioxide.

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.	1190	1,300,000
16^{th} May, 2007	1450	1,400,000
February, 2008.	2063	> 1,700,000

** Estimated figures* *Source: HDIP*

The Government of Pakistan has offered a number of incentives for encouraging the use of CNG in the country. This has on one hand considerably boosted industrial growth while on the other has posed harmful consequences for the environment, although less lethal than petroleum emissions. The government of Pakistan has promoted the use of CNG in a big way. This has led to an unprecedented growth of around 60% per annum in the CNG industry during the last few years. Pakistan is the largest user of CNG in Asia and has become the third-leading country in the world to use CNG to fuel vehicles after Argentina and Brazil. Presently, more than 1.7 million vehicles are using CNG as fuel and 2063 CNG stations are operational in different parts of the country[2] (see, Table 16.2). Use of CNG as fuel in transport sector has observed a quantum leap, replacing traditional fuels. This has consequently helped a lot in lowering the pollution load in many urban centers. An investment of around Rs.90 billion has so far been made in this sector while Rs.20 billion is in pipeline. The CNG industry has created an estimated 85,000 new jobs.

The government has planned to offer incentives to investors to introduce CNG buses in the major cities of the country. In line with a Cabinet directive, the Federal Government is providing incentives in the form of payment of the markup (either complete or partial) of the loans required to purchase new CNG vehicles. In this regard, the cities of Karachi, Hyderabad, Lahore, Rawalpindi, Islamabad, Peshawar and Quetta are phasing out diesel vehicles in favor of CNG buses for intra-city transportation. All new buses, mini buses and wagons will be CNG based or dual fuel vehicles. Provincial governments are also taking initiatives to promote CNG conversions. For example, the Punjab Government is giving 20 percent of the capital cost for purchasing new CNG vehicles. For the last five years, the use of coal in the power sector has been decreasing mainly because a large number of plants have been converted to natural gas. Likewise, there has been a considerable reduction in coal usage for domestic purposes. After the successful CNG programme for petrol replacement, the government is now embarking upon a programme to replace the more polluting diesel fuel used in road transport.

Policies and Programmes

To address the various challenges mentioned above, the Government is implementing various policies and programmes; many of which have come out of the National Environment Action Programme of the Ministry of Environment.

With increasing industrialization taking place in Pakistan, there is an urgent need to ensure that its harmful impact on the environment be minimized. Realizing the issue, **Pakistan Environmental Protection Council (PEPC)**, an apex body for setting up environmental policies in the country, established **National Environmental Quality Standards (NEQS)** which prescribes the maximum discharging limits of emissions and effluents. **Pakistan Environmental Protection Agency (Pak-EPA)** is the designated authority to implement NEQS in an effective manner without compromising the interests and profits of the industrialists. Section 11 of Pakistan Environmental Protection (PEPA, 1997) provides *"no person shall discharge or emit or allow the discharge or emission of any effluent or waste or air pollutant or noise in an amount, concentration or level which is in excess of the National Environmental Quality Standards or, where applicable the standards established under sub-clause (i) of clause (g) of sub-section (1) of section 6.*

a) To achieve this goal, a **Self Monitoring and Reporting tool (SMART)** was developed in consultation with the stakeholders to conduct the analysis of industrial emissions/effluents on their own and provide the same to the concerned Environment Protection Agency (EPA). Reliable self-monitoring is essential to ensure the integrity of data for decision-making. Besides, this policy instrument fosters transparency and easy access to monitoring data of different industries; and it can help demonstrate the existence of 'Eco-Friendly Industrial Units'. This information is required to assess the compliance of the industry with the NEQS. The nationwide launching of SMART was held on 8th March, 2006.

[2] as on February, 2008

The benefits of SMART are multifaceted and extremely important for maintaining the Air quality. Compliance is of tremendous value both from an environmental standpoint and health & safety perspective. Secondly, self-audits can identify where additional pollution mitigation measures are required. Implementation of appropriate pollution prevention measures results in waste minimization, which can provide significant cost savings associated with waste management. Thirdly, industries that are proactive in ensuring compliance with regulations may develop a competitive advantage, as consumers, customers and investors today look for products from companies that have clearly demonstrated a commitment to minimizing their impact on the environment.

b) Under the NEAP-SP, **Green Industry Programme** was launched in the year 2006 by the Pakistan Environmental Protection Agency (EPA) for the promotion of SMART program, with the support of the UNDP, to make the industries responsible for systematic monitoring and reporting of their environmental performance. The key attribute of this programme is the "nation wide reductions in the pollution levels" by providing the flexibility to the industries to choose cost-effective environmental solutions and by promoting pollution control measures and assisting in the identification of regulatory and non regulatory impediments.

III.2. Water and Sanitation

Per capita water availability in Pakistan has been decreasing at an alarming rate due to increase in population that puts Pakistan in the category of 'high stress' countries in terms of limited water resources. In 1951, per capita availability was 5300 cubic meters, which has now decreased to 1090 cubic meter just touching water scarcity level of 1000 cubic meter. In addition to this the fact that Pakistan is an agrarian economy accentuates its dependence on water from its rivers for various purposes ranging from agriculture to power generation. According to an estimate, the Indus River irrigates 80 percent of the 21.5 million ha of agricultural land. Over the years, various pressures on the River Indus, the most important being water extraction for irrigation purposes, has led to substantial pressures on Pakistan's water resources. The increased groundwater utilization for domestic and agricultural use has adversely affected groundwater quality particularly in the irrigated areas with almost 70 percent tube wells now pumping hazardous sodic water.

In light of growing population pressures, rapid urbanization and increased industrialization and extended periods of drought, it has been estimated that an additional 48 Billion m^3 water would be required to meet the growing demands of agriculture and the country's economy by the year 2011. This will likely have a profound impact on the generally arid nature of Pakistan's climate, 10 percent (780,000 ha) of the total surface area of the country is covered by wetlands which are of global importance. There are about 225 significant wetlands in Pakistan identified to date, out of which 19 have been recognized as being of international importance by the Ramsar Convention. The diverse assortment of natural freshwater and marine wetlands that occur within Pakistan support many unique combinations of biodiversity. Due to growing population pressures and habitat loss induced by climate change, the wetlands are facing increasing pressures. It is feared that these wetlands may not be able to take on much additional pressure and their productivity needs to be preserved, enhanced and sustained.

The quality of freshwater is also deteriorating due to losses in the movement of the water from the canal heads to the croplands. The existing water resources are under threat due to rapid degradation, soil erosion deforestation and untreated discharge of municipal and industrial wastes to rivers and other water bodies. Municipal water is treated only in two cities viz. Karachi and Islamabad though the capacity of these treatment plants is much less than the actual quantum of wastewater. Over-fishing and polluted water are reducing the productivity of the marine and inshore fisheries. This situation is precarious, in particular, for mangroves in the coastal zone and certain aquatic wildlife, such as the Indus freshwater dolphin. All of these activities are contributing to the destruction of habitats and, more specifically, to a loss of biodiversity.

The Human Development Report 2006 points out, "the scarcity at the heart of the global water crisis is rooted in power, poverty and inequality". Target 10 of MDG 7 deals with sustainable access to safe drinking water and basic sanitation. Even though there has been an improvement in water supply coverage from 53 percent in 1990 to 66 percent in 2005, however, the MDG target of 93 percent poses a considerable challenge. The National Sanitation Policy resolves to meet the MDG 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 be served with improved sanitation by 2025. Currently, only 44 percent of the population of Pakistan has access to safe sanitation and 65 percent to safe drinking water, whereas the targets for 2015 are 90 percent and 93 percent, respectively.

Policies and Programmes

a) Realizing the importance and role of sanitation in the improvement of environment as well as the commitment to achieving the MDG sanitation goals, the Ministry of Environment undertook preparation of the **National Sanitation Policy** in collaboration with major stakeholders. It involved extensive consultations with communities and other stakeholders at the provincial, district and local levels. The National Sanitation Policy of Pakistan was placed before the Cabinet soon after the Second South Asian Conference on Sanitation held in Islamabad on 20-21 September 2006 and it was approved on **4th October 2006.**

The primary focus of sanitation for the purpose of this Policy is on the safe disposal of excreta away from the dwelling units and work places by using a sanitary latrine and includes creation of an open defecation free environment along with the safe disposal of liquid and solid wastes; and the promotion of health and hygiene practices in the country. The Policy resolves to meet the Millennium Development Goals (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 per cent population will be served by 2025 with improved sanitation.

The provincial governments, AJK, Northern Areas and FATA shall formulate their own strategies, plans and programmes in line with the National Sanitation Policy. It will also be the responsibility of the provincial governments to ensure that city governments and Tehsil Management Administrations (TMAs) follow the Hospital Waste Management Rules 2005 of the Ministry of Environment and the provisions of the Basel Convention on Management of Hazardous Wastes and their disposal.

b) In addition to these developments the Ministry of Environment has also prepared a Draft on **National Drinking Water Policy** in collaboration with UNICEF through an extensive stakeholder consultation process both at the federal and provincial levels. The final draft has been circulated to the concerned Ministries/Divisions and provincial local government and public health engineering departments for their views and comments. The Draft of National Drinking Water Policy would be finalized and submitted to the Cabinet for approval in the near future.

A major MTDF initiative taken in this regard by the Government is the provision of clean drinking water to almost entire population of the country. Government of Pakistan is committed to supply safe drinking water to its people and many emptive as well as preemptive measures have been proposed in the MTDF 2005-10 and national environmental policy to ensure supply of safe drinking water. In this regard **Clean Drinking Water for All Programme** has been launched, whereby; water filtration plants are being established and operationalised in all the Union Councils of Pakistan to provide clean drinking water to people costing around Rs. 15 billion by the end of 2009. This programme is one of the biggest initiatives related to water to come out of the NEAP. The Clean Drinking Water Programme was initiated in two parallel phases. The first is the **"Clean Drinking Water Initiative" (CDWI)** project whereby 544 plants are being installed one in each district and tehsil; and ii) **Clean Drinking Water for All (CDWA)** project whereby filtration plants shall be installed one in each union council and villages. The programme was approved by the Central Development Working Party (CDWP) at a

cost of Rs. 115.09 Million in July 2004 and was included in the Medium Term Development Framework 2005-10. The Clean Drinking Water for All is now a Sub-Programme of Khushal Pakistan Programme and a high level task force has been notified for overall supervision and monitoring of the programme.

c) Various bilateral and multilateral donors/aid/lending agencies have shown their willingness to support government's endeavor in facilitating the accessibility of public to clean drinking water. MTDF 2005-10 is underway to extend the coverage of clean drinking water through water supply schemes to 75 percent by 2010 and sanitation to 45 percent in the same period. It is targeted to provide 93 percent of population with access to clean drinking water by 2015 and 90 percent of the population with access to sanitation. The United Nations officially declared 2008 as the **International Year of Sanitation (IYS)** to accelerate progress for 2.6 billion people world wide who are without proper sanitation facilities. The launch of IYS, which runs through 2008, was organized by the UN Department of Economic and Social Affairs (UNDESA) in collaboration with the UN-Water Task Force on Sanitation.

d) Pakistan formulated a draft *Wetlands Action Plan* that was formally adopted by the Government of Pakistan (GoP) in 2000. In providing an overview of the scope and condition of Pakistan's wetlands, this document highlighted poverty and ignorance as the prime factors contributing to the degradation of wetland resources. The plan presented a list of recommendations for action to be taken by key stakeholders. Through its support for international conventions, Pakistan has demonstrated its commitment to biodiversity conservation in general and wetlands conservation in particular. The adoption of a *Wetlands Action Plan* recently has further demonstrated the GoP's recognition of the importance of wetlands and the need to find sustainable solutions for their conservation.

The Pakistan Wetlands Programme (PWP) funded by the UNDP and the Global Environment Facility (GEF) aims to promote the sustainable conservation of freshwater and marine wetlands and their associated globally important biodiversity in Pakistan. This initiative was taken by the Ministry of Environment and is being implemented by the World Wide Fund for Nature, Pakistan since July, 2005, for seven years. For this purpose a two pronged strategy was devised:

1. The first will provide the required policy, institutional, technical and financial framework and generate positive public support essential for the mainstreaming of wetlands conservation.

2. The second involves the design and implementation of sustainable, participatory management plans for four independent Demonstration Sites, each chosen to be representative of a broad eco-region in Pakistan. It includes specific mechanisms to secure financial sustainability and enhanced replication and proliferation of viable wetlands management interventions in a nation-wide, on-going wetlands conservation initiative.

The general objective is to conserve the globally important wetlands biodiversity in Pakistan while alleviating poverty. It is a US$11.792 million programme funded by a consortium of national and international donors.

A key component of the PWP is to create awareness on all issues related to wetlands conservation. In this regard, the Programme has reached out to all sections of the Pakistani community through trainings, educational activities, conferences, carnivals, school-events and other conscious raising activities. The traveling wetlands carnival toured four of the country's major cities. It is a means of reaching out to the public to raise their understanding for the need to conserve, protect and manage Pakistan's wetlands resources. It stressed the valuable scientific and social roles they occupy within the country and region.

The PWP has conducted a number of surveys for creating awareness regarding the significance of wetlands in the country. In the Salt Range Wetlands Complex (SRWC) a Baseline Ornithological Survey of the Salt Range took place in December 2006. The assessments of five lakes yielded significant populations of terrestrial and wetland birds and it was estimated that more than 40,000 birds were present. Along the Indus Rivers a Flood Season investigation was carried out to establish that, in the majority of cases, the Indus Dolphin could only pass downstream during periods of flooding. This observation has provided useful insight into the realities underlying the current distribution of dolphin in the mainstream of the Indus River and will aid in understanding genetic distributions within the species. Recently, under the PWP, an environmentally significant coral reef thought not to exist in Pakistani marine waters has been discovered. The coral reef is situated on the northern side of Astola Island along the Makran coastline. Coral reefs among other precious assets are deteriorating due to anthropogenic threats, most of which are a direct product of poverty, but many of which are exacerbated by ignorance and negligence of people who need to be guided and trained.

III.3. Land

One of the principal natural resources that Pakistan is endowed with is 'arable land'. About 28% of Pakistan's total land area is under cultivation and is watered by one of the largest irrigation systems in the world. In addition to this, out of a total land area of 79.6 million hectares, only 16 million hectares are suitable for irrigated farming in Pakistan. Hence, majority of the people depend on arid and semi-arid areas to support their livelihoods through agro-pastoral activities.

Persistent Water logging, Salinization and Sodicity is continuously reducing the productivity of fertile soil in the country. It is estimated that about 38 percent of Pakistan's irrigated land is water logged, 14 percent is saline and the application of agricultural chemicals has increased by a factor of almost 10 since 1980.

Land degradation is mainly due to four major causes: water erosion, wind erosion, salinity/sodicity and water logging. Pakistan like most of the developing world, is faced with the challenges of being affected by land degradation and desertification, which are causing environmental problems, including soil erosion, loss of soil fertility, flash floods, salinity, deforestation and associated loss of biodiversity and carbon sequestration.

As mentioned earlier the Forest Cover including state and private forests/farmlands (%age of total land area) stood at 5.2% during the current fiscal year, whereas both environmental and economic standards necessitate that the country should have at least 20-25 percent area under forests. The MDGs however, are not so ambitious and suggest forest cover of 6 percent. About 11.2 million hectares, mostly northern mountain regions, are affected by water erosion. According to an estimate, about 2 million hectares are affected by water logging and around 6 million hectares by salinity and sodicity. Wind erosion is another issue concerning land degradation in Pakistan. About 3-5 million hectares of land is affected by wind erosion in arid regions of Punjab (Cholistan), Sindh (Tharparkar), and Balochistan (Chagai Desert and sand areas along the coast).

Policies and Programmes

Despite the generally arid nature of Pakistan's climate, the region supports an estimated 780,000 ha of wetlands that cover 9.7% of the total surface area of the country. The diverse assortment of natural freshwater and marine wetlands, that exists within Pakistan, support unique combinations of biodiversity. The same resource, however, also sustains an estimated 144 million permanent human residents and 3-4 million displaced persons from adjacent countries. The wetlands of the region are, therefore, generally degrading under a broad spectrum of anthropogenic threats that are mainly rooted in poverty but exacerbated by lack of knowledge and mismanagement.

The Ministry of Environment with the financial support of the GEF-UNDP has launched a full-scale project on **Sustainable Land Management**

(SLM) to Combat Desertification in Pakistan. The programme is to be implemented for a period of two years from 2008-2009. The overall goal of the project is to combat land degradation and desertification in Pakistan in order to protect and restore ecosystem and essential ecosystem services that are key to reducing poverty. The project will depend upon strong commitment of the Government of Pakistan and the involvement of key stakeholders, in particular those at the community level. The project will be implemented in two phases, with the first phase focused on creating an enabling environment for SLM and piloting innovation, and the second phase drawing lessons learned to deepen the policy and institutional commitment to SLM and completing demonstration projects that can later be scaled up and replicated.

III.4. Forestry

Relatively high population growth contributed to the depletion of forestland from 9.8% of Pakistan's total area in 1947 to 4.5% by 1986, despite the forest conservation measures mandated by the Forest Act of 1927. Pakistan lost 14.5% of its remaining forest and woodland between 1983 and 1993. Deforestation has contributed to increased soil erosion, declining soil fertility, and severe flooding.

Currently Pakistan has only 5.2 percent of total land area covered with forest which amounts to 0.03 ha of forest per capita, placing Pakistan among countries with Low Forest Cover. Of the total forest area, commercial forest is just one-third (32.8%) while the rest (67.2%) is utilized for the purpose of soil conservation, watershed protection and climatic functions. The country's forest area is divided into State-owned forests, Communal forests and Privately owned forests. Major forest types existing in Pakistan are Temperate and Subtropical Conifer Forests, Scrub Forests, Riverine Forests [3] (irrigated plantations), Liner Plantations (roadside, canal-side), and Mangrove Forests. Besides these categories, a significant proportion of private farmlands are abundantly covered with trees.

The existing forest resources in the country are under severe pressure to meet the fuel-wood and timber needs of a rapidly growing population. In addition to this the wood-based industries including housing, sports, matches, boat making and furniture are continuously growing in number and capacity.

The MTDF (2005-10) has given significant priority to expand forest covered areas in Pakistan, for which the Government has allocated ample financial resources. Pakistan is committed to increasing forest cover to 5.7 percent by 2011 and to 6 percent by the year 2015 (see table 16.3). An increase of 1.2 percent implies that an additional 1.051 m.ha area has to be brought under forest cover within the next ten years. This will include all state lands, communal lands, farmlands, private lands and municipal lands. In 2001, out of a total of 86.7 m.ha land area of Pakistan including Azad Jammu Kashmir (AJK), 3.317 m.ha was under contiguous forest cover and 0.781 m. ha farmland area was under tree cover which was taken as a baseline for fixing the Millennium Development Goals.

The area protected for conservation of wildlife (%age of total area) was estimated at 11.3% while the targeted levels were 11.6% and 12.0% according to MTFD (2005-10) and MDG (2015) targets respectively. Pakistan is therefore making committed efforts to improve protected areas established to conserve rapidly declining wildlife species in their natural environment, and enhance its existing network of protected areas in terms of quality and quantity.

Policies and Programmes

a) Forest covered area is being lost every year, and Balochistan's Juniper forests, unique in the world, continue to be cut beyond their capacity to regenerate. A project on **'mainstreaming biodiversity in Juniper forest ecosystem'** has been jointly launched by the UNDP and the IUCN.

[3] Riverine forests are disappearing rapidly because of reduced flow of water, unchecked practice of illegally cutting down trees and encroachment upon forest lands in Hyderabad.

The total funding allocated for the project is USD 2.51 million.

b) Forestry, watershed management and biodiversity projects in Mangla and Tarbela Watersheds have been initiated to reduce sediment load, create employment opportunities, alleviate poverty, conserve the natural resources and rehabilitate the degraded land resources - through nurseries and plantations, construction of check dams, soil conservation, establishment of community organizations and terracing, etc. In this regard a five year project of **Management in Tarbela Reservoir** is being undertaken by the Ministry of Environment and being implemented by the Forest Department, Government of NWFP at a cost of Rs. 532.457 million. The project aims to contribute to sustainable resource management in the Tarbela reservoir catchments through consolidating and expanding the social forestry activities in the programme area. Besides replanting over 10,000 acres, the project envisages afforestation over an additional area of 70,000 acres of privately and community owned denuded marginal lands.

The recently initiated mega forestry projects amounting to approximately Rs. 12 billion have been approved by the Executive Committee of the National Economic Council (ECNEC) and will be implemented by all the Provincial Governments including AJK and Northern Areas. The Provincial Governments are implementing these projects with the involvement of all stakeholders including farmers, local communities, forest owners and right holders, civil society organizations & private sector companies.

To achieve the MDGs targets of vegetation cover of 6% by 2015, Planning Commission proactively interacted with the Ministry of Environment and the Provincial Forest Departments to come-up with project for afforestation/reforestation to meet the MTDF and MDGs targets. As a result of timely and effective measures, 5 projects of forestry resource development costing Rs. 11.5 billion have been approved by Executive Committee of the National Economic Council (ECNEC), after more than a year's efforts. Once implemented, these will contribute greatly towards achievements of 6% vegetative cover target. In addition to this various tree planting projects are under implementation as a result of which the tree cover in the country (state and privately owned) has increased to 5.17%.

The Ministry of Environment's Forestry Wing has devised a strategy in accordance with targeted MDG goals for the next 10 years starting from 2005. The Forestry Wing is responsible for coordination and monitoring of forestry sector developments in the country through the office of the Inspector General Forests. It deals with the formulation of forest policy, planning, international coordination, education, training and research in the field of forestry. On the other hand, the implementation of forestry projects comes under the purview of the provincial governments. At the institutional level, the linkages of the Federal Forestry Wing and Provincial Forest Departments will be strengthened with Highway Departments, Irrigation Departments and Pakistan Railways for establishing linear plantations. Further, District Governments and Municipal Administrations will be encouraged with incentives to bring maximum lands under forest cover. Measures adopted for this purpose have been listed below;

Measures to Enhance Forest Cover:

Mass Tree Plantation Campaigns: In order to enhance tree cover in the country, tree planting campaigns are held each year. During the tree planting campaign all the government departments, private organizations, defense organizations and NGOs were involved in planting activities.

Federal Forestry Board: The central Forestry Board was constituted in 1954 to provide a platform for the improvement of Forest Policy, but remained dormant for the most part. The board was therefore reconstituted and renamed as "Federal Forestry Board". The purpose of the board was to develop policies and strategies related to the Forestry Sector and also to monitor the activities of the Provincial Forest Departments including the forest cover changes.

c) Pakistan Mountain Area Conservation Project (PMACP), funded by the Global Environment Facility (GEF) in collaboration with

the Balochistan Forest Department, NWFP and Azad Jammu and Kashmir (AJK) Wildlife Departments, aims to introduce sustainable park management with improvement in park operations, park habitat, wildlife survival and park infrastructure. World Wide Fund (WWF) for Nature, - Pakistan is providing technical assistance in Machiara and Chitral Gol National Parks. The programme is a successor of the earlier 7-year project titled "Mountain Areas Conservancy Project (MACP)" and would build on its achievements. Its primary objective is the conservation of the unique and rare biodiversity species of global significance and would cater for the conversion of MACP into a programme by furthering its successful interventions. This will be crucial in reaching the MDG target of 12 percent protected land areas. The programme is in line with the overall objectives of biodiversity conservation as envisaged in the Medium Term Development Framework 2005-2010 for addressing the green environment issues in Pakistan.

d) Presently, three research and development projects sponsored by the Government of Pakistan are being executed by the Institute namely, Forestry Sector Research and Development Project (FSR&DP) and Strengthening of Forest Products Research (SFPR) and Upgrading and Reconstruction of Pakistan Forest Institute (PFI) Field Station, Shinkiari for Forestry Research, Education and Training. **Forestry Sector Research and Development Project** has been initiated for a period of seven years, having a total cost of Rs. 193.5 million. The main objectives of the project include assessment of existing forest type cover by using Geographic Information System and Remote Sensing techniques and to monitor the changes for subsequent management plans; determination of optimum water requirements of important tree species to enhance wood production; identification, testing and preservation of forest insects, pathogens and their natural enemies for optimum pest management; human resource development and dissemination of research findings to field foresters and communities through electronic and print media, publications, brochures and pamphlets etc.

IV. Climate Change

Since the industrial revolution (about 150 years ago) the increasing anthropogenic (human induced) Greenhouse Gas (GHG) [4] emission is having a noticeable effect on the earth's climate, through the burning of ever greater quantities of fossil fuel in industrial processes and various other means to meet growing demands of people and their energy intensive lifestyles. In addition to high rate of industrial revolution that occurred in the past century, the problem is also inextricably linked to world's population which is growing exponentially. The increasing concentration of GHGs is warming the earth's atmosphere and changing the climate of the planet. This phenomenon is called "*Climate Change"* or "*Global Warming"*. No issue merits more urgent attention or more immediate action than this challenge because it is directly a quest for future survival.

The phenomenal changes in weather and climate are already evident in the form of increase in extreme weather events, more frequent and powerful cyclones and hurricanes, more frequent and floods, droughts, powerful storms, hotter and longer dry periods, reduced winter season, early spring and rapidly increasing desertification. Climate change is also obvious from the fact that the ten hottest years on record have all occurred since the beginning of the 1990s. How the world deals with climate change today will have direct bearing on the human development prospects of a large section of humanity. Failure will consign the poorest 40 percent of the world's population some 2.6 billion people to a future of diminished opportunities. It will also exacerbate deep inequalities within countries which might be a potential cause for future conflict. Climate change is different from other problems facing humanity and it challenges us to think differently at many

[4] Gases like carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydro- fluorocarbons (HFCs), per- fluorocarbons (PFCs) and sulphur hexafluoride (SF_6) etc. are called Greenhouse Gases. These gases surround the atmosphere and function like a blanket around the earth by capturing the infra-red solar radiations and consequently making the earth warmer than it would otherwise be.

levels. Above all, it challenges us to think about what it means to live as part of an ecologically interdependent human community.

The work of Intergovernmental Panel on Climate Change (IPCC) over the last decade has confirmed that average global temperatures are increasing since the industrial revolution, mainly as a result of an increase in concentration of GHGs in the atmosphere and that future global temperature rises of 2.0– 4.5^0C are almost inevitable in the 21st Century. According to the IPCC, the global world temperature has increased by 0.6^0C over the last 100 years and is expected to rise further by 1.4 to 5.8^0C before the end of the present century. Last's year IPCC report highlighted the construction sector as that with the most potential to reduce GHG emissions, and in the most cost effective way. The increases in global temperatures and the associated changes in precipitation, glacier melt and sea level rise is expected to have considerable direct and indirect impacts (both positive and negative) on various socio-economic sectors, such as water, agriculture, health, forestry, and biodiversity. Global warming is evidence that we are overloading the carrying capacity of the Earth's atmosphere. Stocks of GHGs that trap heat in the atmosphere are accumulating at an unprecedented rate.

The regions that are likely to be hurt the most by climate change include Africa, South and Southeast Asia, and Latin America. India and Europe are exposed to catastrophic risk from a change in monsoon patterns and the reversal of the Atlantic Thermohaline Circulation[5] respectively. In contrast, China, North America, advanced Asian countries, and transition economies (especially Russia) are less vulnerable and may even benefit at low degrees of warming (for example, from better crop yield). A Greenpeace report confirms that if the current trend of rise in temperatures continues it might lead to mass migration from India, Pakistan and Bangladesh.

IV.1. Impact of Climate Change in Pakistan

Climate change raises serious concerns for developing countries like Pakistan, with its tremendous social, environmental and economic impacts. The richer industrialized countries are primarily responsible for GHG emissions, but it is the poorer developing countries who would most heavily bear the costs of climate change due to their increased 'adaptation vulnerability'. Developing nations are more at risk mainly due to weak governance, lack of required infrastructure and technology, prevailing scale of poverty and most importantly, the lack of vision and commitment to address this mounting threat.

The agricultural productivity in Pakistan will be affected due to changes in land and water resources. Dry land areas, including arid and semi-arid regions are most vulnerable to these changes, as these regions are already facing significant water shortages and high temperatures. The bio-physical relationships could also be altered due to seasonal changes in cultivating crops which will consequently lead to changing irrigation requirements, altering soil characteristics, and increasing the risk of pests and diseases, thereby negatively affecting agricultural productivity. In the Pakistani context, this vulnerability is particularly high because of its large population and economic dependence on primary natural resources, being basically an agrarian economy.

Water demands of Pakistan mainly depends upon a single river system of Indus, that is fed by glacier systems in Hindukush and Himalayas, which are believed to be receding over the last few decades as a result of Global Warming. This has had a profound impact on the composition of the upper Indus Basin, effecting people living not only in nearby areas but in all areas of Sindh and will result in water shortages for millions of people in the country. Sindh coast had an average of four cyclones in a century however the frequency and intensity has increased manifold and the period between 1971-2001 records 14 cyclones[6]. The recent decades have witnessed a massive decline in mangroves forest in Sindh due to shortage of water

[5] The term Thermohaline circulation (THC) refers to the theoretical hypothesis of global density-driven circulation of the oceans. Derivation is from *thermo-* for temperature and *-haline* for salt, which together determine the density of sea water.

[6] (A Review of Disaster Management Policies and Systems in Pakistan for WCDR, 2005)

flows to Indus Delta. Till 19th Century the delta would receive annually some 150 MAF water from the river system. This amount has gradually been reduced due to a series of upstream dams and barrages.

The aquatic life existing in River Indus will also be adversely subjected to the far reaching effects of climate change. One of the world's rarest mammals which happen to be an indigenous inhabitant of River Indus is the blind Indus River Dolphin. The construction of Pakistan's extensive irrigation system has led to a significant loss in the number of this specie and its population has shrunk in size to the extent that it is now considered one of the world's most endangered mammals. If the current trend continues and no substantial measures are taken to preserve the Indus River Dolphin, then the coming years might have to witness its extinction.

Studies suggest that climate change has adverse impacts on forest resources and natural ecosystems of the country. Forest lands in the northern mountainous areas of Pakistan would shift from one biome to another, which would also result in an increase in the total potential Coniferous Forest area decreasing the productivity of this precious resource.

Scientific evidence of human interference with the climate first emerged in the international public arena in 1979 at the First World Climate Conference. In 1988 the United Nations General Assembly adopted a resolution proposed by the Government of Malta, urging: *"... protection of global climate for present and future generations of mankind."* In the same year, the governing bodies of the **World Meteorological Organization (WMO)** and of the **United Nations Environment Programme (UNEP)** created a new body, the **Intergovernmental Panel on Climate Change (IPCC)**, to marshal and assess scientific information on the subject. In 1990 the IPCC issued its First Assessment Report, which confirmed that the threat of climate change was real. The Second World Climate Conference, held in Geneva called for the creation of a global treaty. The General Assembly responded by passing resolution and formally launching negotiations on a Convention on Climate Change.

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.
- Pakistan has submitted to the Initial National Communication to UNFCCC in which national GHG inventory was updated and strategy for addressing climate change was defined.
- A high level National Committee on Climate Change, chaired by the Prime Minister of Pakistan has been formed to review policies and monitor progress on climate change initiatives in the country.
- An autonomous Global Change Impact Studies Centre has been established that is engaged in research on impacts and adaptation to climate change in the country.
- **Clean Development Mechanism in Pakistan:**

  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. A Clean Development Mechanism (CDM) Cell in the Ministry of Environment was established in August 2005 to promote CDM in Pakistan. A National Operation Strategy for CDM was approved by the Prime Minister in February 2006. Several awareness raising workshops were conducted with public and private sectors to enhance understanding about CDM in the country. 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.

To further promote the development of CDM projects in Pakistan, the Ministry of Environment has received a Japanese Policy and Human Resource Development (PHRD) Grant of US$ 0.57 million though The World Bank. The project will further strengthen the institutional framework for CDM in the country by creating an enabling environment and promoting public and private participation in the fast emerging carbon market in Pakistan. These efforts will bring foreign investment in sustainable development projects in the area of alternate/renewable energy production, waste management, industrial pollution/effluent management, agriculture and forestry which at the same will help in effectively participating in global efforts to reduce greenhouse gas emissions to mitigate climate change.

The **Designated National Authority (DNA)** has so far approved the following four CDM projects:

1. ***Catalytic Nitrous oxide Abatement and Tail Gas End of Pakarab Fertilizers Multan:*** The projects aim at catalytic break down of Nitrous Oxide gas equivalent to 1.3 million tones of CO_2 per year. This project will bring investment of US$ 15 million and will earn Certified Emission Reductions/ Carbon Credits worth millions of dollars. The project has been registered with CDM Executive Board and its implementation is already underway.
2. ***Management of Cattle Waste in Landhi Cattle Colony, Karachi*** was granted approval on 2nd April 2007. The project will bring foreign investment of US$ 102.15 million. Under this project cattle waste of about 4 million tonnes will be converted into valuable organic fertilizer along with generation of 25 MW of clean electricity to be connected to the KESC main grid. Additionally the project will reduce around 1.53 million tones of CO_2 emissions per year which will bring additional income of US$ 15 million from the sale of carbon credits every year.
3. ***The 84 MW New Bong Escape Hydropower Project, AJK*** was granted approval on 3rd May 2007. The project will bring foreign investment of US$ 148.55 million and aims to generate 84 MW electricity, in order to sufficiently supply the national grid using clean, renewable and sustainable hydropower. Additionally, the project will reduce 0.22 million tones of CO_2 emissions per year which will bring additional income of US$ 3.3 million from the sale of carbon credits every year.
4. ***Pakarab Fertilizer Cogeneration Power Project, Multan*** was granted approval on 28th January 2008. The project will bring foreign investment of US $35 million. The project aims to generate power through gas turbines with upstream Heat Recovery Steam Generators (HRSG) for supply to fertilizer complex using clean, renewable and sustainable cogeneration technology. Additionally the project will reduce around 0.11 million tones of CO_2 emissions per year which will bring additional income of US$ 1.61 million from the sale of carbon credits every year and will improve local environmental conditions and sustainable development in the area. A number of other projects for preserving renewable energy, waste management and improving industrial process are in the pipeline.

Apart from the above mentioned initiatives, a number of CDM projects are in the pipeline at various stages of development in sectors like waste heat recovery, co-generation, waste management, forestry and alternate energy (wind and hydro-power).

- **Technical Advisory Panel (TAP) on Climate Change:**

  The lack of an enabling policy, regulatory framework and vulnerability assessments plus inadequate capacity to reduce impact and risks of Climate Change, particularly to livelihoods of the poor, are some of the challenges that need to be urgently addressed in Pakistan. To achieve the above mentioned goals 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.

  The official launch of the TAP was held on **February 15, 2008**, Funded by the Royal Norwegian Embassy and the Department for International Development, U.K., and TAP is a joint initiative of the Ministry of Environment, Government of Pakistan, and The World Conservation Union (IUCN). The panel brings together different organizations working on climate change on a single platform to provide active support to government in addressing climate change challenges. The panel is also mandated to undertake capacity building and awareness raising activities among stakeholders and the general public. Currently, TAP comprises six organizations: Ministry of Environment, Global Change Impact Studies Centre, Pakistan Agriculture Research Council, Pakistan Meteorological Department, Asia Pacific Network and IUCN, the last also serving as the TAP secretariat.

IV.2. Economic Initiatives to Cope with Climate Change

Addressing Climate Change and the economic challenge it will likely bring presents policy makers with a dilemma. The benefits of policy action are uncertain and would accrue largely to future generations, whereas the costs of policies run the risk of being more immediate and extensive. To shed light on how mitigation policies would affect the countries' economies, the IMF recently undertook a study comparing alternative policy designs---taxes on GHG emissions, emissions permit trading, and hybrid schemes combining elements of both policies. The analysis shows that climate change can be addressed without either hurting the macroeconomic stability and growth or putting an undue burden on the countries least able to bear the costs of policies. In other words if policies are well designed their economic costs could be manageable.

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 in this regard are as follows:

- **Economic and Institutional Development:** Development helps countries diversify away from heavily exposed sectors; improves access to health, education, and water; and reduces poverty. High-quality institutions also strengthen countries' abilities to adapt to climate change.

- **Fiscal self-insurance:** Government budgets must allow for adaptation expenditures, and social safety nets must be strengthened, especially in countries whose domestic resources are far short of what are needed---- on this front, the UN has just launched an effort to provide financing, a step in the right direction. The world needs public finance economists to consider what role fiscal instruments---- notably, taxation and public spending--- have to play in dealing with climate change. **Environmentally related taxes, more commonly known as green taxes[7], are also levied in some parts of Asia.** In China a tax on wooden chop sticks is charged in order to protect forests. The

[7] **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.

possibility of whether such taxes can be implemented in Pakistan needs to be meticulously looked into. Apart from raising the cost of production the green taxes not only generate additional revenue but also protect the environment. The developed countries are increasingly adopting this trend.

- **The choice of the Exchange Rate Regime, Labor Market and Financial Sector Policies:** These choices can encourage firms to adjust to the abrupt shocks (such as extreme whether events) that are likely to accompany Climate Change. A flexible exchange rate regime and financial and labor market reforms that make capital and labor more adaptable may help reduce the macroeconomic cost of extreme weather shocks. Such shocks typically destroy capital investment and disrupt production and adjusting to them requires moving people and capital across and within sectors.

- **Financial Markets:** These 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 financial markets' capacity to diversify costs and spread the risks to those most willing and able to bear them will also help to reduce the social cost of adaptation.

V. Concluding Remarks

According to various classification systems, Pakistan is divided into 9 major ecological zones which are very divergent in nature, ranging from the depths of Arabian Sea to the towering mountains of the western Himalayas, Hindukush and Karakoram. Dramatic geological history combined with a significantly advantageous location, has blessed Pakistan with a remarkable number of the world's beneficial ecological regions.

Human interference has led to increased ecological imbalances causing significant damage to natural resources all over the world. Like most developing countries, Pakistan faces critical challenges in conservation of existing natural resources and their further enhancement to meet the demands of an ever increasing population. The rapidly shrinking wetlands, some of which are of international significance, the wondrous juniper forests inhabited by numerous forms of fauna and flora are in danger of extinction due to rapid deforestation, discharge of sewage and industrial effluents into marine and aquatic ecosystems, increase in both wind and water erosion due to reduction in vegetation cover etc. are only some of the crucial challenges facing the country.

The Government of Pakistan is fully aware that these natural resources need to be protected at all costs to ensure future survival at the global as well as the local level. For this purpose numerous international and national projects are in the process of execution and various innovative initiatives have been planned for future implementation. The key policies and programmes that have stemmed from NEAP overlook almost all areas of environmental conservation including Air, Water and Sanitation, Land, Forests and Biodiversity. In addition to this, the worldwide phenomenon of Climate Change has further compounded the overall situation and needs to be addressed at the international level. Pakistan has taken significant initiatives in collaboration with international agencies to counter all complex issues responsible for environmental degradation. It is hoped that these measures will be able to yield timely and desired results in the years to come.