

Environment

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Environment challenges and issues of Pakistan are associated primarily with an imbalanced social and economic development in recent decades. This challenge is further compounded with rapid urbanization due to a shift of population from rural to urban areas. Thus, all major cities of Pakistan face haphazard, unplanned expansion leading to increase in pollution. This unchecked growth has led to creation of slums areas around city peripheries and low lying area. Since the municipal authorities and utility service providers have limitations in extending their facilities, urban congestion is the prime reason of ever deteriorating ambient air and water quality, solid waste management and loss of biodiversity. Under the present scenario, the managers of Pakistan's major urban centres are facing rising difficulties in developing their management plans to provide adequate water and sanitation facilities and health services to ensure a healthy living environment.

Environmental degradation is fundamentally linked to poverty in Pakistan. Poverty is the main impediment in dealing with the environment related problems. There is an increasing demand on the already depleting natural resource base of the country. Since poor are 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. Therefore, there has been a dire need to work on poverty alleviation. In this regard, *Benazir Income Support Programme (BISP)* launched by the present government is expected to have a positive impact on poverty alleviation and in releasing stress on natural resources and environment.

The Mid-Term Development Framework: 2005-2010 (MTDF 2005-10) of the Planning Commission has been developed in line with the National Environment Action Plan (NEAP) objectives, and focuses on four core areas i.e., clean air, clean water; solid waste management, and Ecosystem management. The Plan has been prepared keeping in mind Pakistan's experience with such initiatives in the last decade; the current capacity to undertake planning, implementation and oversight and the identified needs for improvement in such capacity. The MTDF clearly specifies issues in environment which need to be addressed.

15.1 Air Pollution

Main factors causing degradation to air quality are, a) rapidly growing energy demand and b) a fast growing transport sector. In the cities, widespread use of low-quality fuel, combined with a dramatic expansion in the number of vehicles on roads, has led to significant air pollution problems. Air pollution levels in Pakistan's most populated cities are high and climbing causing serious health issues. Although Pakistan's energy consumption is still low by world standards, but lead and carbon emissions are major air pollutants in urban centres.

Table 15.1: The MTFD 2005-10 and MDG's Targets and Achievements

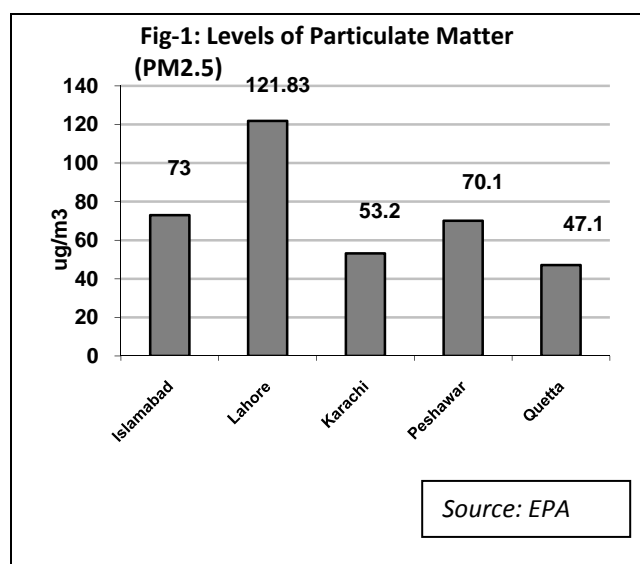
| Name of Sector/Sub-Sector | Physical Targets of MTFD period | | | Achievement of Target |
|--|---------------------------------|-----------------|------------------|-----------------------|
| | Year 2004-05 | 2009-10 Targets | MDG Targets 2015 | |
| Forests cover including State and private forests/farmlands (% age of total land area) | 4.9% | 5.2% | 6.0% | 5.17% |
| Area protected for conservation of wildlife (% age of total area) | 11.3% | 11.6% | 12.0% | 11.3% |
| No. of petrol & diesel vehicles using CNG fuel | 380,000 | 800,000 | 920,000 | 2,400,000 |
| Access to sanitation (national % age) | 42 | 50 | 90 | 44 |
| Access to clean water (national % age) | 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

Several studies carried out by Environment Protection Agency (EPA) and the air quality data recorded by continuous monitoring stations in 5 capital cities confirmed presence of high concentration of suspended particulate matter. The level of PM (particulate matter size below 2.5 micron), which is mainly due to combustion sources, has reached to an alarming point (2 - 3.6 times higher than the safe limit). Table 15.2 and Fig-1 shows average pollutants in 5 capital cities

| | City | Level ug/m ³ |
|----|-------------------|-------------------------|
| 1. | Islamabad | 73.0 |
| 2. | Lahore | 121.8 |
| 3. | Karachi | 53.2 |
| 4. | Peshawar | 70.2 |
| 5. | Quetta | 47.1 |
| | Safe Limit | 35.0 |

Source: Environment Protection Agency (EPA)



The level of gases like Carbon Monoxide (CO), Sulphur Dioxide (SO₂), Ozone (O₃) and Hydrocarbon (HC) are still within safe limits though some pockets of high concentration are found in congested places, which give short term exposure to public. Formation of secondary pollutants like sulphates and photo-chemical smog is a very common phenomenon.

The main causes of air pollution are abrupt increase in number of vehicles and inefficient automotive technology, use of unclean fuels, uncontrolled emission of industrial units, emission of brick kilns, burning of garbage and presence of loose dust. Motorcycles and rickshaws, due to their two stroke

engines, are the most inefficient in burning fuel and contribute most to emissions. The two wheeler industry is performing very fast in Pakistan and it has increased by 143.0 percent in 2009-10 when compared with the year 2000-01. Rickshaws have grown by more than 34.4 percent while motorcycles and scooters have more than doubled over the ten years. (see Table 15.3)

| Year | Total | Motorcycles/Scooter | Rickshaws |
|-----------------------------------|--------|---------------------|-----------|
| 2000-01 | 2291.3 | 2218.9 | 72.4 |
| 2001-02 | 2561.9 | 2481.1 | 80.8 |
| 2002-03 | 2737.1 | 2656.2 | 80.9 |
| 2003-04 | 2963.5 | 2882.5 | 81.0 |
| 2004-05 | 3144.5 | 3063.0 | 81.5 |
| 2005-06 | 3868.8 | 3791.0 | 77.2 |
| 2006-07 | 4542.8 | 4463.8 | 79.0 |
| 2007-08 | 5126.3 | 5037.0 | 89.3 |
| 2008-09 | 5456.4 | 5368.0 | 88.4 |
| 2009-10 (July-March) | 5567.2 | 5469.6 | 97.3 |
| Percentage inc./dec. over 2000-01 | 143.0 | 146.5 | 34.4 |

E: Estimated *Source: National Transport Research Centre*

For the last ten years, the use of coal in the power sector has been decreasing. It may be due to the fact that a number of plants have now been converted to natural gas. Likewise, there has been reduction in coal usage for domestic purposes (Table 15.4).

| Year | Power | Brick Kilns | Household |
|---------------------|-------|-------------|-----------|
| 2000-01 | 205.8 | 2837.9 | 1.0 |
| 2001-02 | 249.4 | 2577.5 | 1.1 |
| 2002-03 | 203.6 | 2607.0 | 1.1 |
| 2003-04 | 184.9 | 2589.4 | 1.0 |
| 2004-05 | 179.9 | 3906.2 | - |
| 2005-06 | 149.3 | 4221.8 | - |
| 2006-07 | 164.4 | 3277.4 | 1.0 |
| 2007-08 | 162.2 | 3760.7 | 1.0 |
| 2008-09 | 112.5 | 3205.4 | 0.8 |
| 2009-10 (July-Dec.) | 55.1 | 2379.1 | 0.8 |

E : Estimated, - : Not Available *Source: Hydrocarbon Development Institute of Pakistan*

Pakistan has become the largest user of Compressed Natural Gas (CNG) in the world, as per the statistics issued by International Association of National Gas Vehicles on CNG. Presently, 3105 CNG stations are operating in the country and 2.4 million vehicles are using CNG as fuel (see Table 15.5). Use of CNG as fuel in transport sector has observed a quantum leap, replacing traditional fuels and has helped a lot in lowering the pollution load in many urban centers. After the successful CNG programme for petrol replacement, the government is now looking to replace the more polluting “diesel fuel” in the road transport sector. The government has planned to offer incentives to investors to introduce CNG buses in the major cities of the country.

Table 15.5: Growth in CNG Sector

| As on | CNG Stations (No.) | Converted Vehicles (No.) |
|----------------------------|--------------------|--------------------------|
| 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 |
| 16 th May, 2007 | 1,450 | 1,400,000 |
| February, 2008 | 2,063 | 1,700,000 |
| April, 2009 | 2,760 | 2,000,000 |
| December, 2009 | 3,105 | 2,400,000 |

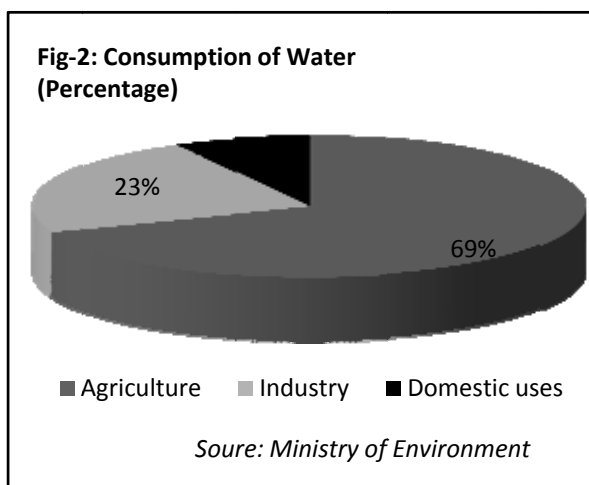
Source: HDPI <http://www.hdip.com.pk>, OGRA, IANGV <http://www.iangv.org>

The Motor Vehicle Examiners (MVE) have no facilities to scientifically check fitness or emissions of vehicles. At present, only commercial vehicles are checked by MVE. Even passed vehicle cannot give assurance of compliance of standards. No private vehicle undergoes any mandatory inspection/emission check.

15.2 Water Pollution

Water pollution has been steadily increasing over the years. The sources of this pollution include uncontrolled discharges of municipal as well as industrial wastes in water bodies, runoff from agriculture fields where agrochemical usage has been increasing and other natural as well as anthropogenic activities taking place in the catchment areas.

The existing water resources in the country are under threat due to untreated discharge of municipal and industrial wastes to rivers and other surface water bodies. The majority of the population of Pakistan is exposed to the hazard of unsafe and polluted drinking water. Untreated sewage, industrial effluents, and agricultural run-off are usually released in streams or drains into the rivers and sea. Polluted water poses potential risk to public health. High incidence of water borne diseases can directly be attributed to polluted waters in lakes. Other impacts of high contamination in the waters include loss of biodiversity and ecosystems, reduction in fish population and damage to soils and crops in the irrigated areas.



The consumption of water in Agriculture, Industrial and Domestic sector is shown below as percentage total use. (see Table 15.6) and Fig-2.

After use, the remaining water becomes “wastewater” containing all kinds of toxic chemicals and biological contaminants. Municipal sewerage is a major source of pollution. About 2 million wet tons of human excreta are annually produced in the urban sector of which around 50% goes into water bodies to pollute them. About 70% of biological load is generated by textile and beverage industry.

Table - 15.6: Consumption of Water

| Sectors | Percentage |
|-------------|------------|
| Agriculture | 69% |
| Industry | 23% |
| Domestic | 08% |

Source: Ministry of Environment

National Conservation Strategy (NCS) indicated that almost 40% of deaths were related to water borne diseases. Untreated wastewater from industries further aggravates the situation. About 8% of the total wastewater is treated and rest of the quantity is discharged untreated into different surface water resources like canals, rivers, lakes and sea. Only three cities Karachi (2), Faisalabad (1) and Peshawar (1) have treatment plants but they are under capacity and do not meet NEQS. Recently, Capital Development Authority (CDA) has installed a modern wastewater treatment plant in Islamabad which comply with the National Environment Quality Standards (NEQS).

Industry that has the largest potential of wastewater discharges mostly comprises of textile, tannery, paper and pulp. About 9000 million gallons of wastewater are daily discharged into water bodies in Punjab and Karachi. Some treatment plants have been installed by the industries (about 133 in Punjab, 207 in Sindh and 2 in NWFP). Environment Protection Agencies (EPAs) are randomly checking pollution levels of industry and municipal waste and filling cases in the Environmental Protection Tribunals.

Water is not considered as a “precious commodity” in Pakistan as minimal water charges are levied on the treated domestic water or on agricultural water. There is no restriction on extraction of ground water for any purposes. Under this scenario, conservation of water resources does not get importance. Same is the case with treatment of sewerage and industrial toxic waste. Weak enforcement of NEQS, lack of cost effective indigenous technology and resource constraint are the predominating factors of not treating wastewater. The most important element is the disinterests of municipal authorities to address this issue. Some Water and Sanitation Agencies (WASAs) have planned treatment plants for Rawalpindi, Lahore, Faisalabad and Multan with the assistance of Asian Development Bank but the projects financing has not yet been made available. Treatment of sewage and utilizing treated water for agriculture purposes could be a good option for agriculture country like Pakistan. Another constraint is non-availability of locally manufactured cost effective pollution control technologies.

Since the untreated wastewater is discharged into the rivers and other water bodies, the quality of water resources has been degraded. People living downstream of rivers, particularly in lower Punjab and Sindh, who have no other means, use this water for drinking. According to the WHO report about 25-30% of all Hospital admissions are connected to water borne bacterial and parasitic conditions, with 60% of infant deaths caused by water infections. The long-term effects on human health of pesticides and other pollutants includes colon and bladder cancer, miscarriage, birth defects, deformation of bones and sterility. Due to low oxygen in river waters, fish catch has also decreased adversely affecting livelihood of people.

The **National Drinking Water Policy** has been approved by the Cabinet in order to provide adequate quality of drinking water to the population in an efficient and sustainable manner. This policy aims to provide a guiding framework to address the key issues and challenges facing Pakistan in the provision of sustainable access to safe drinking water. Currently over 65 percent of Pakistan’s population is

considered to have access to safe drinking water. Huge disparities, however, exist with regard to drinking water coverage between urban and rural areas and provinces/regions. The quality of the drinking water supply is also poor, with bacterial contamination arsenic, fluoride and nitrate being the parameters on major concern. Sustainability of the existing water supply systems is also a major issue in the sector.

Inadequate water supply sanitation and hygiene result in high incidence of water and sanitation related diseases in Pakistan, which in-turn increase mortality rates and pose a major threat to the survival and development of Pakistan children. It has been estimated that water, sanitation and hygiene related diseases cost Pakistan economy about Rs 112 billion per year over Rs 300 million a day, in terms of health costs and lost earning.¹ Out of this, the cost associated with diarrhoeal diseases alone is estimated to range from Rs 55 to 80 billion per year.

The key principles to be pursued for implementation of the policy are as follows:

- i) Access to safe drinking water is the basic human right of every citizen and that it is the responsibility of the Government to ensure its provision to all citizens.
- ii) Water allocation for drinking purposes will be given priority over other uses.
- iii) In order to ensure equitable access, special attention will be given to removing the existing disparities in coverage of safe drinking and for addressing the needs of the poor and the vulnerable.
- iv) Recognizing the fact that women are the main providers of domestic water supply and maintainers of hygienic household environment, their participation in planning, implementation, monitoring and operation & maintenance of water supply systems will be ensured.
- v) Responsibilities and resources will be delegated to local authorities to enable them discharge their assigned functions with regard to provision of safe water supply in accordance with Local Bodies Legislation.

15.3 Land

Pakistan is predominantly a dry-land country where 80 percent of its land area is arid or semi-arid, about 12 percent is dry sub-humid and remaining 8 percent is humid. Two third of Pakistan's rapidly increasing population depends on dry-lands to support their livelihood mainly through agro-pastoral activities. However, like many other developing countries dry lands in Pakistan is severely affected by land degradation and desertification due to unsustainable land management practices and increasing demand of natural resources causing enormous environmental problems, including degradation of dry-land ecosystems, loss of soil fertility, flash floods, loss of biodiversity, reduction in land productivity, soil erosion, water logging salinity, and many other associated problems to rapid growth in population is putting pressure on natural resources. The situation is further aggravated by scarcity of water, frequent droughts and miss-management of land resources, contributing to expansion of deserts, reduced productivity and consequent increases in rural poverty. Moreover there is limited knowledge of consequences and economic implications of land degradation, information gaps, and limited institutional capacity to address and degradation and desertification problems through an integrated land management approach.

¹ Pakistan Strategic Country Environment Assessment (2006), the World Bank.

Table 15.7: Causes and Effects of Land Degradation in Barani (Rain-Fed) Lands

| Causes of land degradation | Effects and implications |
|---|---|
| Soil erosion | Soil erosion results in siltation of rivers, irrigation systems and small dams, debris flow and land slides on hill slopes impairing of texture and structure of soil and loss of soil nutrients, excessive water runoff, rise in frequency of floods decrease in water retaining capacity of soils. |
| Sloping cultivation | Clearing of forest land for crop cultivation, illicit cutting of trees for firewood and agricultural implements. |
| Over-grazing | Overgrazing cutting and lopping of forage trees, damage to young forest crop and nurseries, disturbance or compaction of soil, increase in soil erosion. Reduction in wildlife habitat quality and quantity, competition with livestock for forages and space, less regeneration of natural vegetation due to compaction of soil. |
| Deforestation | Deforestation results in excessive soil and water erosion, drying of aquifers, reduced carbon sequestration, aridity in climate, reduction in water retaining capacity of soil, excessive water runoff, destruction and deterioration of wildlife resulting in lower number of wild animals and birds. |
| Land tenure issues | Fragmentation of land holdings, cutting of forest for fuel, timber and lopping for forage, clearing of forest areas for crop cultivation. |
| Poor management of natural resources/forests. | Illegal cutting of trees in forests and watersheds, reduction in scrub forest cover, inadequate reforestation due to insufficient resources has increased soil erosion and siltation of rivers. Weak law enforcement to check theft and illegal removal of vegetation quite evident. |

Source: National Action Plan to Combat Desertification, M/o Environment

The menace of land degradation and desertification is not only affecting rain-fed agriculture and pastoral systems, but also reducing productive potential of irrigated agro-ecosystems due to water logging and salinity. Sustainable Land Management (SLM) is now considered as a viable option to combat land degradation and desertification. Federal and Provincial Governments have to integrate SLM principles into sectoral policies, strategies and plans, as land degradation adversely affects natural resource based livelihood of the rural poor. Federal Government shall support provincial governments to combat desertification as recommended under Poverty Reduction Strategy Paper (PRSP), National Action Programme (NAP) and aligning Pakistan's NAP with 10-Year Strategic Plan of the United Nations Convention to Combat Desertification (UNCCD) (see Table 15.7). According to National Forest Policy, National Desertification Control Fund as envisaged under NAP and UNCCD shall be established to ensure continued financial sustainability for SLM interventions at grassroots level. Appropriate incentives shall be designed to enlist the participation of local communities in sustainable management of land resources.

15.4 Forestry

Forests are crucial for the well being of humanity. They provide foundations for life on earth through ecological functions, by regulating the climate and water resources and by serving as habitats for plants and animals. Forests also furnish a wide range of essential goods such as wood, food, fodder and medicines in addition to opportunities for recreation, and other services. Forests are under pressure due to expanding human and livestock populations which frequently leads to conversion or degradations of forests into unsustainable forms of land use. When forests are lost or severely degraded, their capacity to function as regulators of the environment is also lost, increasing floods and erosion hazards, reducing soil fertility and contributing to the loss of plant and animal life. As a result, the sustainable

provision of goods and services from forests are jeopardized.

The existing forest resources are under severe pressure to meet the fuel wood and timber needs of the country and wood based industries including housing, sports goods, matches, boat making and furniture industry in the country. There is need to increase the area under tree cover not only to meet the material needs of the growing population but also to enhance the environmental and ecological services provided by the forest.

Under Millennium Development Goals of Forestry Sector, Pakistan is committed to increase forest cover from existing 5.2% to 5.7% by the year 2011 and 6% by the year 2015. An increase of one percent implies that an additional 1.051 million hectares area has to be brought under forest cover by 2015. This will include all state lands, communal lands, farmlands, private lands and municipal lands.

15.4 Measures to Enhance Forest Cover

■ Mass afforestation and Tree Planting Campaigns

Two inter-provincial meetings to finalize the targets and strategies for the monsoon and spring tree planting campaigns were held under the chairmanship of the Minister for Environment. During the tree planting campaign 55.77 million and 35.96 million trees were planted in spring and monsoon seasons respectively. The **Federal Forestry Board** develops policies and strategies related to the Forestry Sector and also monitor the activities of the Provincial Forest Departments including the forest cover. This Board comprises the representatives from the Provincial Forest Departments, AJK, Gilgit-Baltistan, NGO's progressive gamers and other stakeholders.

■ National Vision 2030

By 2030 the country will be managing all types of forests on ecosystem approach, enabling them to perform potential functions of conserving biodiversity, providing sustainable livelihood to dependent communities, meeting national demands for wood and contributing positively to mitigate global environmental problems. Achievement of the Vision 2030 on forest biodiversity conservation is a combined responsibility of all forest stakeholders.

■ National Forest Policy

Ministry of Environment is in process of formulating the National Forest Policy 2010 to provide a broad framework for addressing issues of forests and renewable natural resources of Pakistan and their sustainable development for the maintenance and rehabilitation of environment and enhancement of sustainable livelihoods. The Policy provides broad guidelines to the Federal Government, Provincial Governments, Federally Administered Tribal Areas and Local Governments for ensuring the sustainable management of their forests and renewable natural resources.

■ Guinness World Record

Pakistan has set a new Guinness World Record in maximum tree planting during 24 hours on July 15, 2009; three hundred planters from the local communities planted 541,176 propagules of mangrove trees on 796 acres on an island at Keti Bundar in the Indus Delta.

■ National Tree Planting Day

Prime Minister of Pakistan declared 18th August as National Tree Planting Day (NTPD). The objective

is to address deforestation and associated environmental problems being faced by the national through motivation and involvement of all segments of the society in tree plantation campaign. On 18th August 2009 massive plantation was carried out throughout Pakistan with the help of Provincial Forest Departments and Federal line Ministries/agencies.

■ **President Mass Afforestation Programme**

President of Pakistan has launched a mass afforestation programme on December 22, 2008. This programme is spread over a period of five years and shall largely be sponsored by private entrepreneurs for planting trees on state and other suitable lands. Private entrepreneurs are an integral part of this programme. Many private companies have expressed great interest in investing in environmental forestry as part of their Corporate Social Responsibility.

■ **Mangroves for the Future (MFF)**

Mangroves for the Future (MFF) initiatives focus on the countries worst-affected by the tsunami. However, MFF will also include other counties of the Region that face similar issues with an overall aim to promote an integrated ocean wide approach to coastal zone management. Pakistan joined MFF as dialogue country in 2008 and prepared its draft National Strategy & Action Plan (NSAP) as per requirements of Regional Steering Committee of MFF to become regular member of this regional programme.

The 6th Regional Steering Committee (RSC) meeting of the MFF held in Thailand during January 2010 considered the Pakistan's National Strategy and Action Plan and made it model for other countries to follow. Pakistan also becomes the regular member of MFF. As a member, Pakistan is now entitled to received assistance for institutional strengthening, capacity building and for implementation of small and large projects in coastal areas of Pakistan from April 2010.

15.5 Climate Change

Climate change resulting from an increasing concentration of Greenhouse Gases (GHGs) in the atmosphere due to the use of fossil fuels and other human activities has become a major worldwide concern. It is particularly so for Pakistan because climate change is posing a direct threat to its water security, food security and energy security. The country's vulnerability to such adverse impacts is likely to increase considerably in the coming decades as the average global temperature, which increased by 0.6 °C over the past century, is projected to increase further by 1.1 to 6.4 °C by the end of the current century. Already Pakistan is rated as a "high risk" country in the global rankings for Climate Change Vulnerability Index (CCVI) 2009/10. (see 15.8)

Table 15.8: Climate Change Vulnerability Index (CCVI) 2009/10

| Rank | Country | Rating |
|------|-------------|-------------|
| 1 | Somalia | Extreme |
| 2 | Haiti | Extreme |
| 3 | Afghanistan | Extreme |
| 29 | Pakistan | High Risk |
| 44 | Philippines | High Risk |
| 56 | India | High Risk |
| 61 | Indonesia | High Risk |
| 110 | China | Medium Risk |
| 152 | USA | Low Risk |
| 155 | UK | Low Risk |
| 166 | Norway | Low Risk |

Source: Maplecroft

■ Past and Expected Future Climatic Changes over Pakistan

During the last century, average annual temperature over Pakistan increased by 0.6 °C, in agreement with the global trend, with the temperature increase over northern Pakistan being higher than over southern Pakistan (0.8 °C versus 0.5 °C). Precipitation over Pakistan also increased on the average by about 25%. Studies based on the ensemble outputs of several Global Circulation Models (GCMs) project that the average temperature over Pakistan will increase in the range 1.3 - 1.5 °C by 2020s, 2.5-2.8 °C by 2050s, and 3.9-4.4 °C by 2080s, corresponding to an increase in average global surface temperature by 2.8-3.4 °C by the turn of the 21st century. Precipitation is projected to increase slightly in summer and decrease in winter with no significant change in annual precipitation. Furthermore, it is projected that climate change will increase the variability of monsoon rains and enhance the frequency and severity of extreme events such as floods and droughts.

■ Pakistan's Status as a GHG Emitter

Pakistan's total GHG emissions in 2008 amounted to 309 million tonnes (mt) of Carbon dioxide (CO₂) equivalent, comprising about 54% CO₂, 36% Methane, 9% Nitrous Oxide and 1% other gases. The biggest contributor is the energy sector with 50% shares, followed by the agriculture sector (39% share), industrial processes (6% share) and other activities (5% share). Pakistan is a small GHG emitter. It contributes only about 0.8% of the total global GHG emissions, on per capita basis, Pakistan with 1.9 tonnes per capita GHG emissions stands at a level which corresponds to about one-third of the world average, one-fifth of the average for Western Europe and one tenth of the per capita emissions in the US, putting it at 135th place in the world ranking of countries on the basis of their per capita GHG emissions. (see Table 15.9)

Table 15.9: GHG Emissions (2008)

| Countries | Absolute (Million Metric tons) | Per Capita (Metric tons) |
|---------------|-----------------------------------|-----------------------------|
| Australia | 437.4 | 20.8 |
| United States | 5,832.8 | 19.2 |
| Iran | 511.1 | 7.8 |
| France | 415.3 | 6.5 |
| Malaysia | 162.4 | 6.4 |
| China | 6,533.6 | 4.9 |
| Indonesia | 434.1 | 1.8 |
| India | 1,494.9 | 1.3 |
| Pakistan | 147.8 | 0.9 |
| Philippines | 79.8 | 0.8 |
| Sri Lanka | 13.3 | 0.6 |

Source: Energy Information Administration (EIA)

■ Major Climate Change Related Concerns

The most important climate change potential threats to Pakistan are identified as:

- Increase variability of monsoon;
- Rapid recession of Hindu Kush-Karakoram-Himalayan (HKH) glaciers threatening water inflows into the Indus River System (IRS); reduction in capacity of natural reservoirs due to glacier melt and rise in snow line;
- Increased risks of floods and droughts;
- Increased siltation of major dams resulting in greater loss of reservoir capacity;
- Severe water-stressed and heat-stressed conditions in arid and semi arid regions; leading to reduced agriculture productivity and power generation;

- Increased upstream intrusion of saline water in the Indus delta, adversely affecting coastal agriculture, mangroves and breeding grounds of fish ; and
- Threat to coastal areas due to sea level rise and increased cyclonic activity due to higher sea surface temperatures.

The above threats lead to major concerns for Pakistan in terms of its Water Security, Food Security and Energy Security. Some other climate change related concerns of Pakistan are identified as: Increase in deforestation; loss biodiversity; increased health risks (heat strokes, pneumonia, malaria and other vector-borne diseases) and risks to other vulnerable ecosystems (e.g. rangelands, degraded lands, mountainous areas etc).

A Task Force on Climate Change (TFCC) was set up by the Planning Commission of Pakistan in October 2008. The Task Force report recommends a number of measures to address both Mitigation and Adaptation aspects of climate change. It also identifies various ongoing activities and planned actions envisaged under the planning Commission's Medium Term Development Framework 2005-10 and Vision 2030 which implicitly represent Pakistan's plans and actions towards mitigation and adaptation efforts. Main recommendations of the Task Force on climate change are summarized below:

■ **Mitigation Measure**

- Energy efficiency improvement at all levels in the energy system chain.
- Expansion of nuclear power programme.
- Development of mass transit systems in large cities.
- Greater use of CNG as fuel for urban transportation.
- New methods of rice cultivation that have lower methane emissions.
- Development and adoption of new methods for reducing Nitrous Oxide releases from agricultural soils
- New breeds of cattle which are more productive in terms of milk and meat but have lower methane production from enteric fermentation
- Intensive effort on forestation and reforestation.

■ **Adaptation Measures**

- Addition of sufficient reservoir capacity on IRS Rivers so that even during high flood years no water flows down Kotri in excess of what is necessary for environmental reasons.
- Development of new breeds of crops of high yield, resistant to heat stress, drought tolerant, less vulnerable to heavy spells of rain, and less prone to insects and pests.
- Aggressive afforestation and reforestation programmes with plantation suited to the looming climate change.
- Preservation of rangelands through proper rangeland management.
- The effort on communicating climate change related information to the intelligentsia as well as the general public and raising their awareness of the critical issues should be substantially expanded.

- Capacity enhancement of all the organizations in the country which could make useful contribution towards addressing climate change.
- Introduction of climate change related scientific disciplines in Pakistan's leading universities so as to ensure a regular supply of trained manpower, and
- Establishment of a National Data Bank for climatological, hydrological, agro-meteorological and other climate change related data to cater for the needs of all relevant institutions.

■ **International Negotiations for Future Climate Change Regime**

Salient recommendations of the Task Force regarding Pakistan's position in international negotiations for a post-2012 climate change regime are:

- Global temperature should not be allowed to exceed 2 °C.
- Strive for the continuation of the Kyoto Protocol.
- Call for deep cuts in GHG emissions by developed countries.
- Avoid any onerous binding GHG emission reduction obligations on Pakistan.
- Insist that, based on the principle of equity, any cap on GHG emissions should be on a universal per capita level basis and apply equally to all countries.
- Project Pakistan as a responsible and constructive member of international community and seek access to advanced Carbon-free and low-Carbon and Clean Goal technologies.
- Emphasize adaptation as a key priority for Pakistan.
- Call to define and establish vulnerability on scientific basis.
- Reject linkage between climate change and international trade.
- Seek substantial increase in international funding for adaptation and call for new financial and technological mechanism.
- Seek approval for nuclear power as an admissible Clean Development Mechanism (CDM) technology.
- Continue to support the position of the G77 and China.

15.6 Public Sector Development Programme, 2009-10

The Government of Pakistan has increased its funds allocation to the Environment and Sustainable Development in its current public sector development programme. Overall, an allocation of around Rs 5,500 million has been made for the environment sector projects in the federal PSDP 2009-10. 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; projected 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. However, release of funds remained a serious issue during the year due to financial crunch being faced by the country.

Many projects including forestry, watershed management and biodiversity projects in Mangla and Tarbela Watersheds are underway 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, terracing, etc. Various tree planting projects are under implementation. The tree cover in the country (state and privately owned) has increased by 5.17%. To achieve the MDGs targets of vegetation cover of 6% by 2015, 6 projects of forestry resource development costing Rs. 12.00 billion are under implementation.

Installation of water filtration plants in different pockets is underway. Sustainability of these water filtration plants needs to be ensured through compliance of already deliberated operation and maintenance aspects as well as ownership by the provincial/state and local governments. After completion of targets for each union council, next phase of the programme, i.e. to install one plant in each village may be taken up.
