

Chapter 23

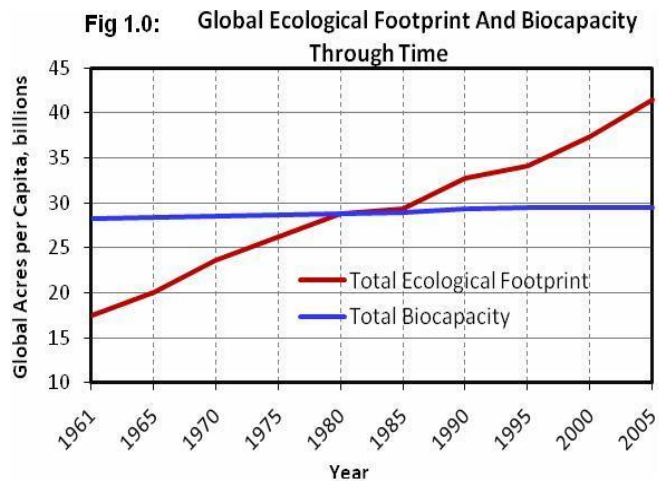
ENVIRONMENT AND CLIMATE CHANGE

Pakistan is faced with serious challenges of degradation and pollution of land, water and air, while freshwater faces perhaps the most critical threat. The industrial pollution, though not too high at the moment, is unchecked and can get worse unless economic activity is underpinned with sustainable development. Air pollution is endemic because of a surge in automobiles, insufficient emission standards, and absence of effective enforcement. This is further exacerbated in the winters by heavy smog rolling in from India’s coal-fired power plants. Also, the land degradation is a serious problem, both in irrigated and barani areas. Elsewhere, mining, erosion and deforestation are major causes of this too. This is compounded by relentless urbanisation, continuous industrialisation, changing consumption patterns, and climate change.

The overall achievements in the environment sector have not been very encouraging with little or no visible improvement due to low level releases of funds and lower utilisation capacity. It also did not address important factors, such as institutional and implementation weaknesses, weak legislation, inadequacy of knowledge management, environmental auditing and monitoring to name a few. The environmental regulatory institutions, like the Federal and Provincial EPAs, remained inadequately manned and staffed, and had insufficient budgets. This has been partially compensated through development projects.

Despite its overarching role, the environment sector has not been recognised fully in the calculus of the economic and social sectors, even though the direct and indirect losses to the economy are estimated to be over Rs365 billion annually or six per cent of the GDP. The inability to address the situation will result in extremely high costs in the future. It is, therefore, necessary to help improve country’s capacity to achieve environmentally sustainable economic development to meet needs of the present and future generations.

To achieve sustainable economic development, it will be necessary to keep in mind the balance between the ecological footprint (resource demand) and the bio-capacity (resource supply). The ecological footprint across the planet has been increasing inexorably, as its capacity has diminished, leading to a state of deficit as far back as the eighties (Figure 1) [Source: WWF1]. This allows a better understanding of the underlying causes behind phenomenon such as climate change. The model suggests that Pakistan has



¹See www.wwf.ca/downloads/lpr2008_ecologicalfootprint.pdf

an ecological footprint of 1.84 Global Acres², while its bio-capacity is only 0.9 Global Acres³, which has serious implications for long-term sustainability.

Objectives

The aims are to

- improve Pakistan's capacity for achieving environmentally sustainable economic development
- gradually improve the country's air and water quality
- ensure sustainable development in different sectors of economy through adequately mitigating and adapting climate change impacts, capacity building, and effective linkages
- gradually integrate environment in development planning, projects, programmes and policies
- ensure sustainable forest management and development
- ensure biodiversity conservation
- achieve the Millennium Development Goals (MDGs) efficiently regarding provision of safe drinking water and adequate sanitation
- ensure sustainable management of land, and
- build the capacity of environment-related institutions and knowledge management.

Situational analysis

Land and water

The large-scale expansion of private-sector tube-well irrigation greatly helped the agricultural sector, but has had serious environmental consequences resulting in over-mining of the aquifer, and salinity. Furthermore, 11 per cent of the 22 million hectares of arable land has been declared as 'disaster area' because of severe water-logging and salinity. Water is not only in short supply, it is also contaminated by various toxic chemicals and biological materials flowing in from agriculture, municipal waste, and industries. Cotton alone accounts for 70 per cent of pesticide pollution in Pakistan. Only about eight per cent of the two million tonnes of human waste produced annually is treated, the rest is discharged untreated into the water-courses and sea. The aquifers too, are becoming chemically stressed. As a consequence, only river Indus and Jhelum have acceptable water quality, while all the other rivers carry a biological load higher than the acceptable standards. Few treatment plants have been installed by industries (133 in Punjab, 207 in Sindh and two in Khyber Pakhtunkhwa). Only three cities Karachi (3), Faisalabad (1) and Islamabad (1) have municipal sewage treatment plants, but these are highly inadequate and do not meet the National Environment Quality Standards (NEQS). The government established the NEQS in 1993, the industries did so after 1994 have effluent treatment plants installed yet they are reluctant to operate them. Furthermore, industrial units established prior to 1994 have invested in wastewater and chemical treatment plants, however, still a lot of

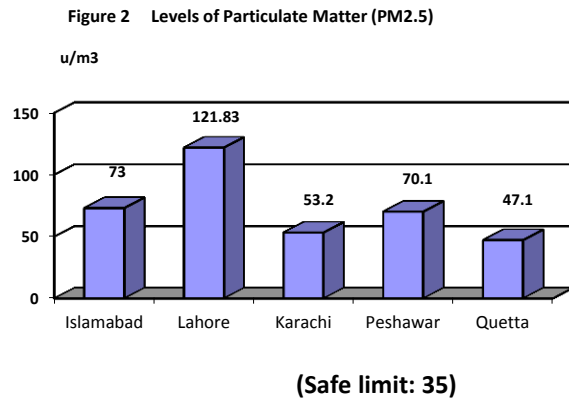
² A Global Acre takes account of the different land productivities based on use (crops, grazing, etc) and geographical location (favourable climate, water)

³ See www.footprintnetwork.org/atlas

improvement is required to ensure compliance of the NEQS. Majority of the industrial units have no arrangements for treatment of their effluents. Out of 20 industrial estates, only Korangi and Kasur have wastewater treatment plants. The third one is under construction in the Sunder Industrial Estate Lahore. The Environment Protection Agencies (EPAs) are ineffective in monitoring pollution or prosecuting the polluters.

Air

All five capital cities show high concentration of suspended particulate matter (SPM 2.5 microns), which have reached levels that are 2-3.5 times higher than the safe limit (Figure 2) [Source: Pak-EPA]. The main causes of air pollution include a sharp increase in the number of vehicles and the old models having inefficient automotive technology, uncontrolled emission from the industrial units, burning of garbage, and presence of loose dust because of dry climate. Environmental standards are not enforced in important sectors, such as transport and industry. At present, only commercial vehicles are supposed to be 'visually' checked by the Motor Vehicle Examiners (MVEs) after every six months. However, all the MVEs are ill-equipped to enforce compliance with emission standards. Private vehicles do not undergo any mandatory inspection at all.



Solid waste

The scale of urban waste management can be gauged from the fact that usually no proper land fill or other disposal infrastructure is available to manage 60,000 tonnes of waste generated every day. Existing infrastructure permits collection of only 50 per cent of this waste, which is further dumped in open spaces and water bodies or burnt inefficiently, leading to pollution of freshwater and the aquifers. Littering too is an endemic issue. The issue of hospital waste (over 250,000 tonnes per annum with much infectious waste) is particularly severe. Most hospitals lack incineration or treatment facilities. The government has notified the Hospital Waste Rules 2005, but those are not being adequately implemented.

Impact and cost of environmental degradation

Environmental pollution is seriously impacting the ability of the country to sustain the desired long-term development. The most serious consequence of industrial and agricultural pollution is ever increasing groundwater contamination, with particular impact on the health of people and the ecosystem downstream. Due to low oxygen in river waters, fish catch has also decreased, adversely affecting the livelihood in some areas. Environmental degradation along with poor home hygiene, lack of basic sanitation and unsafe drinking water has a huge impact on the health of the population, particularly children under five. Diarrhoea and typhoid, the two common illnesses related to poor water and sanitation, account for about 30 per cent of the environmental costs or 1.8 per cent of the GDP. According to the WHO, about 25-30 per cent of all hospital admissions are connected to water-borne bacterial and parasitic conditions, with

half of infant deaths caused by water infections. Polluted air is estimated to cause about 22,000 pre-mature deaths every year and ever-increasing incidents of respiratory diseases. Smog, haze, brown clouds and dense fog, adversely impact the economy and individual health.

Forests and natural resources

The total land area covered with forests and trees is about 5.2 per cent. Despite investments spread over several decades, including the promulgation of the Forestry Sector Master Plan (FSMP 1992), natural forests in Gilgit-Baltistan and Khyber Pakhtunkhwa have reduced significantly⁴, as also the riverine forests and mangroves. The gap between the demand and supply of wood is widening every year. Against a total demand of 43 mm³, annual wood growth rate is 14.4 mm³, and this gap is filled with unauthorised felling of trees. The global warming is also having an impact on the survival, growth rate, and health of forests. Over 150,000 hectares of former forestlands, since converted for non-forestry purposes, have also reduced the forest cover. Environmental deterioration is also increasing as:

- Watershed management is deficient in its scope and scale, which accelerates erosion. Beyond the tree-line, no agency takes responsibility for watershed areas, which are deteriorating due to deforestation, and land and water mismanagement.
- Rangelands occupy more than 66 per cent of the land area and provide livelihood directly to 15 million people as well as being the major source of meat and milk. They are mostly over-exploited and suffer from cycles of drought.
- The status of biodiversity has slightly improved, yet some of our obligations require immediate implementation, such as the national law on biodiversity.
- Desertification is on the rise in the wake of climate change driven extended droughts, floods and over- extraction of sub-soil water.

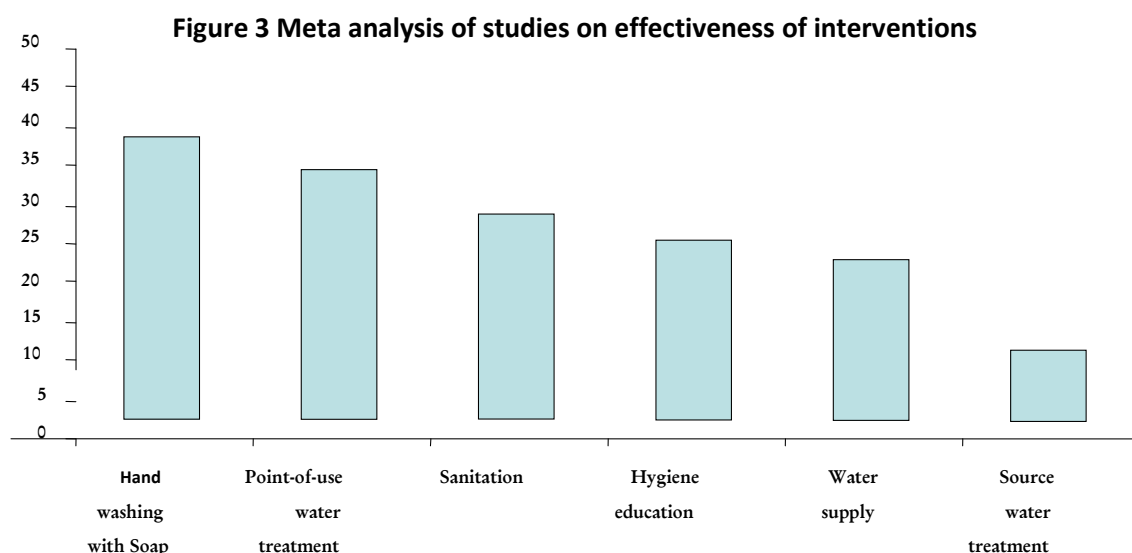
Opportunities under the UN Conventions are not adequately harnessed. Pakistan is a party to several UN Conventions on Biological Diversity (UNCBD), Combat Desertification (UNCCD), Migratory Species, Ramsar on Wetlands, and the Convention on International Trade of Engendered Species of Wild Fauna and Flora (CITES, UN Forum on Forests (UNFF). At the federal level, awareness and understanding about the obligations and opportunities under these agreements are improving, but at the provincial and local levels, real stakeholders are not fully conversant with these agreements. Resultantly, the financial and technical opportunities are not potentially exploited to meet the objectives of these agreements. After the 18th Amendment, there is a need to involve provincial government departments in the implementation of the MEAs.

Drinking water supply and sanitation

Traditional hazards arising from poor water supply, sanitation, and hygiene continue to be the predominant environmental risks to quality of life and health faced by citizens. The close and multiple connections underscore the need for sustainable water supply and sanitation (SWSS) investments and people-centred management. A meta-analysis of studies on the effectiveness of water supply, water quality, sanitation, hygiene and multi-factorial interventions has shown that hand washing with soap and the purification of water at point-of-use are the most effective interventions (Figure 3) [Source: Fewtrell & Colford, 2004]. The meta-analysis is rich in policy

⁴The average rate of deforestation is 27,000 ha per year. 84 per cent of illegally cut wood is consumed as fuel wood, while the rest is smuggled as constructional timber.

implications, which indicates that the emphasis on water supply networks, without considering the downstream risks of contamination needs to be reviewed.



Pakistan, however, faces a growing shortage of water owing to population growth, increasing per capita consumption, uncertain supply, and ineffective traditional institutions for water management. New mechanisms are required for the efficient and equitable sharing of water resources. The problem is likely to aggravate further due to an increased variability of monsoon and shrinking of the Hindu Kush-Karakoram-Himalayan glaciers (our natural reservoirs). While provincial allocations of surface waters have been made under the Water Accord 1991, there is a need for a policy direction on allocations of surface and groundwater for agriculture, ecosystem, and people.

Access to water supply is another important basic need. Fortunately, the country is on-track on access to 'improved' water resources. This achievement owes partly to higher public sector investment in water supply schemes, and self-provision of water from hand and motor-pumps in the rural areas. Around 95 per cent of the urban and 87 per cent of the rural population have now access to various means of improved drinking water supplies, with household connections of 48 per cent and 19 per cent respectively⁵ Further, less than one per cent of the population has to travel more than 0.5 kilometre to the source of their drinking water⁶ compared to two per cent at the start of the decade.⁷In addition to the hilly areas, access to water remains difficult in the Southern Khyber Pakhtunkhwa, parts of Balochistan, Tharparkar and Cholistan. One-third of Pakistan's rural population is deprived of sanitation facilities. Overall, 40 million people defecate in the open, which makes Pakistan the third largest after India and Indonesia. The Water and Sanitation Programme of the World Bank assessed an annual loss of 3.9 per cent of the GDP due to inaction in sanitation. Half of the black water is disposed off through open drains. The rest is drained through sewers or covered untreated drains before being discharged into low-lying land or water body. The only exception to this are those few cities where treatment plants operate rather intermittently.

⁵ (Joint Monitoring Programme of WHO and UNICEF, Progress Report 2008)

⁶ (PSLM, 2010-11)

⁷ (PIHS, 2001-02)

Regulatory weakness

It is imperative to build partnerships and coordination among the federal and provincial governments, municipal authorities, industrial associations and other stakeholders. Clear targets should be set and responsibilities defined for improving the environment. For this purpose, the federal and provincial government institutions concerned must show necessary resolve to strengthen regulatory institutions (EPAs) and enable them to play their statutory role effectively. After the 18th Amendment, the provinces have been allowed to enact their own provincial environmental acts.

Strategies

- **Pollution control:** Existing environmental policies will be translated into implementable programmes and actions plans. A programme-based approach will be preferred to identify issues, gaps, strategies, action and activities and projects (Annexure-1).
- Monitoring and evaluation will be enhanced through up-gradation of capacity of the existing institutions, by focusing on knowledge management, human resource development and improvement of technical facilities. This will include outsourcing of monitoring to the private sector, NGOs and educational institutions.
- **Natural resources:** A holistic ecosystem approach of forest management will be pursued to include other functions such as water and soil conservation, biodiversity protection, carbon sequestration, NTFP, etc.
- **Water and Sanitation (WS):** The implementation of the WS policies will be based on a set of challenging but practical goals and a roadmap set out to achieve the intermediate targets with objectively and verifiable indicators for staying on course.

A summary of environmental issues, gaps, strategies and action plans is presented in Annexure-1.

Policies and plans

The Plan has an integrated approach designed to mainstream environmental aspect in the nation's development and quality of life of its citizens through an integrated approach towards better environmental management. While it covers the traditional areas of water pollution, sanitation, air pollution, waste management, deforestation, energy conservation, it also brings the issues of environmental economics into the discourse of development and poverty. The Plan focuses on gradually improving air and water quality, providing healthy and productive natural resources, strengthening institutions, and taking up sustainable development across different sub-sectors of the economy.

Pollution control

Improvement in air quality: Based on the existing state of the environment, prudent measures are planned to combat pollution and make the institutions more effective. For example, cleaner public transport is recommended to be operated in all cities with a population above 0.5 million and mass transit facilities for those above two million (Karachi, Lahore, Peshawar, Faisalabad, Sukkur, Hyderabad and Rawalpindi/Islamabad). Besides, the Ministry of Climate Change, along with the provincial EPAs, will ensure compliance of the Pak-II Emission Standards for new vehicles. Reduction in sulphur content requires heavy investment to install desulphurisation plants in refineries. Therefore, the Ministry of Petroleum will pursue this intervention to

facilitate the availability of the Euro-II compliant sulphur diesel (0.05 per cent). Keeping in view shortage of the CNG, the Ministry of Petroleum will encourage use of the LNG in vehicles and dual fuel (Diesel + LPG and Diesel + CNG) in diesel vehicles. Mandatory annual and biannual inspection of emissions from public and private vehicles requires regular vehicle inspection and emission testing. This is being done through the Motor Vehicle Examination and Emission Testing Centres (MVE & ETC) established throughout the country, in collaboration with the MVE, Motor Vehicle Registration and Environmental Protection Agencies. During the Plan period, these areas will be strengthened. Additionally, the green cover in cities will be increased through urban plantation. The city administrations will be made responsible to plant trees in open spaces and along internal roads and make tougher laws regulating and increasing the green cover.

Wastewater treatment

Water scarcity calls for treatment of the wastewater and its use for agriculture. The industry has the capacity for designing and fabricating sewage and wastewater treatment plants locally. The existing treatment plants can treat only a fraction of the total wastewater of the industrial sector. Therefore, a Wastewater Treatment Programme will be initiated in collaboration with the provincial governments to treat and recycle industrial effluents, with a target to cover 50 per cent of industries by 2018, and all of them by 2022 along with municipal waste water treatment to comply with the recently approved environmental quality standards. Besides, the environmental assessment mechanism of development projects, particularly in the urban areas, will be strengthened at the federal and provincial levels.

Forests and natural resources

All the programmes and development projects will include, as an essential component, the involvement of local communities, particularly for the management and development of forests and natural resources. At the same time, the Plan specifically emphasises the provision of alternate, renewable and clean fuels including Liquid Petroleum Gas (LPG), microhydel power, wind turbines, biogas and solar oven for forest dependent communities along with alternate livelihood sources. It seeks to give ownership of local tourism to custodian communities through development of community-based tourist infrastructure, promotion and marketing, and training. Moreover, the relevant institutions will be strengthened to deliver with improved surveillance through training and by equipping field forest establishments for watch and ward.

This Plan proposes to provide sufficient capacity and resources to intensify the effort and steer it efficiently in addition to development of other forestry resources. The government will also take measures to import wood from forest rich countries to reduce the gap between demand and supply and to relieve natural forests from stress. The FBR is deliberating on arrangements to waive off sales taxes on imported timber. The Plan simultaneously will undertake measures to expand energy plantations throughout the country to meet the fuel wood demand.

The Plan foresees a new international mechanism to pay compensation in lieu of cutting of trees, called Reduced Emission from Deforestation & Forest Degradation (REDD), which is already in place since 2012. In collaboration with the provinces, full-scale REDD projects will be undertaken with international assistance to generate and sell carbon credits.

Participatory management of rangelands is a neglected area. For regulated grazing, range replenishment through grass seeding, planting of fodder trees, soil conservation and water

harvesting will be carried out more intensively. To conserve biodiversity, a biodiversity clearinghouse mechanism under the Convention of Biological Diversity will be created in the focal Ministry with the GEF and bilateral assistance. More projects for donor and multi-bilateral assistance will be prepared and implemented. To combat desertification, measures will be undertaken to activate the national committee, establishment of the Desertification Control Cell in the focal Ministry, creation of desertification control fund, and promulgation of sustainable land management policy. Furthermore, support to academia for providing tertiary level education on forestry and allied disciplines will be continued. Collaborative R&D programmes will be also undertaken. The capacity of national and provincial institutions for implementation of programmes, donor negotiations, management planning, monitoring and assessment, protection, and research and development, will be enhanced.

Drinking Water Supply and Sanitation

Improvement of the WSS needs special attention. The WHO has made an assessment of the economic returns on various levels of investment in water supply and sanitation. Results depict that the millennium development targets for access to improved water supply and sanitation are financially affordable and yield a high rate of economic return as it accrues greater benefits per unit investment, specifically through the point-of-use water disinfection.

Institutional challenges: For an effective implementation of the proposed Plan, institutional strengthening is required. The institutional challenges may be consolidated into five main themes: (i) re-orienting WSS sector towards appropriate public health practices through a holistic appreciation of the sector, based on scientific and strategic reviews, (ii) achieving transparency and accountability through uniform policies, consistent standards, and clarity in institutional roles and responsibilities, (iii) strengthening service delivery by restructuring water supply and sanitation agencies and departments as professional utilities, (iv) enhancing the political commitment and funding for sanitation, (v) focussing on behaviour-change communications as a strategic intervention for improving water quality, sanitation and hygiene. The subsidiary measures propose feasible steps for reaching out to citizens, by promoting basic civic sense and hygiene, focusing on water safety and quality, and on culturally appropriate interventions in sanitation.

Focus on public health: The federal and provincial governments will review their health and WSS policies to explicitly incorporate elements such as (i) home hygiene as a distinct discipline in preventive and curative medicine, (ii) dedicated responsibilities for home hygiene promotion, for example through the Lady Health Workers Programme, (iii) sanitation and water quality and water supply as the priorities for public-health interventions in the WSS sector with priority to water purification interventions closer to the point of use as these are likely to be more effective, (iv) shift from periodic water quality testing through samples drawn at fixed points towards pro-active water safety planning (or system-wide risk management), (v) improved sanitation through eradicating open defecation through behaviour change campaign, especially the in rural Pakistan, and (vi) a target-based approach to public health, for example establishing a basic national target for zero epidemics of water-borne diseases as well as higher targets, such as zero detection of contaminated water samples, to be achieved progressively at the Union Council levels across the country.

Institutional efficiency: The provincial governments exercise authority over water supply and sanitation. There is a need to demarcate inter-government roles in the WSS to avoid jurisdiction and overlap issues and clarify roles of different levels and branches of government. In most

cases, the responsibilities for operation and maintenance and the systems for evaluating water quality performance are not well-defined. The following are the logical arrangements proposed to be implemented during the Plan period:

Federal and provincial governments: Water supply and sanitation strategies, policies, and guidelines; financing and human resource development; monitoring, and scientific research

Local governments: Health-based water supply and sanitation projects for Tehsil and Union Councils, including O&M, and monitoring

Union Councils: Social mobilisation for water safety and total sanitation

To achieve this synergy, it will be necessary to professionalise WSS service providers through a system of service quality contracts in addition to appointing provincial WSS regulators and assessors.

Energy efficiency and conservation

Implementation of the National Energy Conservation Policy: For energy efficiency and conservation, a major initiative will be launched to coordinate the implementation of the National Policy on Energy Conservation. The implementation will see the launch of an umbrella project encompassing a host of activities in various energy consuming sectors of economy, notably industry, building, agriculture, water pumping, power and transport. Efforts will be made to achieve an integration of energy-related functions by creating a unified institutional arrangement with all relevant entities reporting to it. Necessary support and resources will be provided to enable the related agencies to bring about a change in the energy use patterns at the national and provincial levels. Energy conservation will also be incorporated as part of the education curriculum from school to college level with the help of various authorities. Universities will provide degree and certificate courses for a specialised cadre of Energy Managers and Auditors to help apprehend energy losses occurring in different sectors of the economy. The Energy Service Companies (ESCOs) will be enabled to take the lead in implementation using market mechanisms and innovative practices. The Building Energy Code (BEC) will be formally adopted and incorporated. The BEC-compliance will be made mandatory for all new buildings, both in the public as well as the private sector. All public sector buildings will be required to ensure necessary retrofitting as required under the BEC. The development agencies concerned, like Development Authorities and Municipal bodies, will be required to ensure revision of by-laws to be completed by 2016.

Industrial and manufacturing value added per unit of energy will be enhanced for improvement of energy audit and management systems. It is also planned to promote energy efficiency (EE) in industrial sector through the ESCOs by the Ministry of Climate Change. The Plan envisages energy efficiency enhancement in pumping municipal water and running agricultural tube wells, through audit and retrofits, infrastructure development, capacity-building, use of alternates energy technologies and standardisation. The use of bio-gas plants and solar heaters for home water will be promoted through various fiscal and financial incentives through the Gas Utility Companies. In addition, there will be limited demonstration of renewable technologies in selected areas. The government will also focus on the establishment and operation of legitimate energy standards and labelling regime. The development of appropriate testing capacity along with regularisation of domestic production and import of appliances, such as air conditioner, refrigerator, CFLs, fans, pumps, geysers, space heaters, etc., will be emphasised.

The ministries of Climate Change, and Science and Technology will coordinate with relevant agencies to put the standards and labelling regime in place.

Knowledge management

The knowledge management will be mainstreamed in the environment-related institutions. The initial goal of the environment sector will be to raise the level of discourse within the Ministry of Climate Change (MoCC), making it a repository of knowledge and a catalyst for environment-related activities. Reversing environmental degradation will be a key responsibility of the MoCC, which will also initiate the preparation of systematic and regular National Environmental Accounts for Pakistan. It will also focus on the environmental sustainability aspects of energy, water, and transport infrastructures in the disaster-prone areas, which are predicted to succumb to additional physical stress due to the impact of climate change. This requires a whole new set of building and safety standards as well as design for retrofits to improve safety.

Programmes and projects

To achieve objectives of the environment sector, the following programmes and projects have been identified for implementation, which will be done partnership with the provincial governments, donors, and bi-multilateral assistance:

Pollution control

- Pakistan Clean Air Programme
- Wastewater Treatment Programme
- Fresh Water Protection and Surveillance Programme
- Solid Waste Management Programme
- Hazardous Waste Management Programme
- SEA Introduction and EIA Promotion Programme
- Institutional Strengthening Programme
- Awareness Raising Programme
- Sustainable Transport Project

Forestry and natural resources

- Provision of alternate energy and livelihood
- Sustainable forest management
- Improve surveillance and law enforcement
- Development of forest resources
- Involvement of all citizens in tree planting
- Energy plantations and wood efficient technologies
- Reduced emissions from deforestation and forest degradation
- Rehabilitation of rangelands with participatory models

- Biodiversity conservation and national parks
- Sustainable biomass utilisation and forest management in rural areas
- Sustainable land management programme

Water Supply and Sanitation

- Triggering behaviour change communication for water, sanitation, and hygiene (BCC-WASH)
- Total Sanitation Support Programme (TSSP)
- Water Safety Planning Support Programme (WSPSP)
- Policy Reform and Institutional Development of Water Utilities (PRIDE WATER)
- Research and Institutional Innovation projects (RIIP)

Energy conservation and efficiency

- National Energy Conservation Policy Implementation
- Building Energy Code Compliance
- Energy Conservation and Efficiency in Building Sector
- Energy Conservation in Transport Industry Sector
- Renewable Energy Based Technologies
- Household Appliances

Knowledge management and institutional strengthening

- Institutional strengthening and knowledge management programme
- SEA and EIA promotion

Financial resources mobilisation

The proposed resource mobilisation for the environment sector under an optimal scenario depicts funding for about 60 programmes and projects in different sub-sectors. The environmental indicators and targets for the Plan are given in tables at the end.

Climate change

The climate change is one of the most complex challenges of this century. Pakistan, being amongst the highly vulnerable countries to its impacts, has to bear the brunt of the climate change effects, which is already facing a number of challenges of environmental degradation, poverty and institutional weaknesses. The climate change makes these challenges more complicated, which deepens its vulnerability; thereby undermining its prospects for development. Poverty reduction and sustainable development remain core priorities of Pakistan and in this context, the climate change must urgently be addressed. The economic growth alone is unlikely to be fast or equitable enough to counter threats from this change. An ever-increasing concentration of the Greenhouse Gases (GHGs) in the atmosphere due to the use of fossil fuels and other human activities has been causing the climate change; thus

becoming a major international concern. It is a phenomenon, which is likely to impact almost every sector of Pakistan's economy. Today it stands not only as a major environmental problem, but also as a multi-dimensional developmental issue. It is posing a direct threat to the water security, food security and energy security of Pakistan. 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 last century, and has increased further by 0.1°C in the first decade of the current century. It is a challenging reality for thinkers, planners, policymakers and professionals alike.

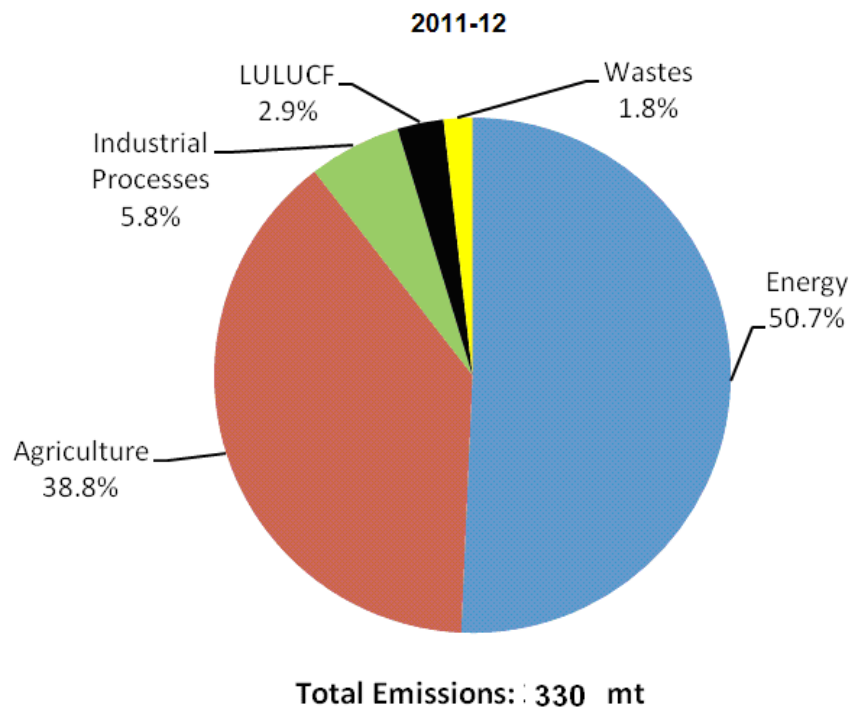
Objectives

The primary aims are to

- ensure sustainable economic development in different sectors of economy through appropriately addressing mitigation and adaptation challenges posed by the climate change, in particular, the threats to Pakistan's water, energy and food security
- make full use of new developments in science and technology for effectively addressing climate change issues
- contribute to the international efforts to check climate change by controlling Pakistan's own GHG emissions to the maximum extent feasible, and
- build the capacity of relevant institutions, and establish effective national and international linkages for adequately addressing the issues

Situational analysis

Pakistan's total GHG emissions in 2012 amounted to 330 million tonnes of Carbon dioxide (CO₂) equivalent, comprising about 54 per cent CO₂, 36 per cent Methane, nine per cent Nitrous Oxide and one per cent other gases. The biggest contributor is the energy sector with 50 per cent share, followed by the agriculture sector 39 per cent, industrial processes six per cent and other activities five per cent (Figure 1.1). Pakistan is a small GHG emitter globally as it contributes only about 0.8 per cent 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 of the United States, putting it at the 135th place in the world ranking of countries on the basis of their per capita GHG emissions. Though Pakistan's per capita energy consumption and CO₂ emissions are low, its CO₂ emissions per unit of the GDP production are relatively high, and the living standards are on the rise. This, coupled with the high rate of growth in population (the current population of 180 million may be doubled in the next few decades), will increase energy demand manifold. To meet this growing energy demand, Pakistan will have to make use of its thermal and coal potentials; thereby increasing the GHG emission levels. Hence, it will become essential to adopt more stringent energy conservation and efficiency improvement measures as well as massive afforestation. The carbon sinks are degrading fast as the country has low forest cover (5.2 per cent) with a high rate of deforestation of about 0.2–0.4 per cent per annum. The global warming is having a visible impact on the survival, growth rate, and health of forests.



Sectoral shares in the GHG emissions in 2011

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 per cent. Studies based on the ensemble outputs of the 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 the summer and decrease in winter with no significant change in annual precipitation. Furthermore, it is projected that the climate change will increase the variability of monsoon rains, and enhance the frequency and severity of extreme events, such as floods and droughts.

The climate change affects almost all the sectors of our society, particularly water resources, energy, health, biodiversity, with a major impact on agricultural productivity. This is due to changes in temperature, adverse effects on land and water resources and enhanced frequency and intensity of natural hazards, such as droughts and floods. Dry land areas, such as arid and semi-arid regions, are most vulnerable to these changes. These regions are already facing significant water shortages, and temperatures are already close to their tolerance limits. The increasing temperatures alter bio-physical relationships by changing growing periods of the crops, altering scheduling of cropping seasons, increasing crop stresses (thermal and moisture stresses), changing irrigation water requirements, altering soil characteristics, and increasing the risk of pests and diseases; thus badly affecting the agricultural productivity. Water demands are met by the Indus River System that is fed by glaciers in the Hindu Kush-Karakoram Himalaya ranges, which are generally believed to be receding under influence of climate change and global warming. The melting of these glaciers due to global warming will result in increased water flows for a few decades (which need to be harnessed through building more dams in the

catchment areas), followed by reduced river flows as the glaciers get depleted (needing again higher reservoir capacity to reduce flow of water into the sea during flood periods).

The adverse impacts of global warming in Pakistan are also showing up in the form of extreme climate events. The country faced severe drought from 1998-2001 and intense floods in 2010, 2011 and 2012, which had serious consequences for life and property of the people. It is estimated that greater precipitation and melting of glaciers will increase waters in our rivers by as much as 20 per cent initially, suggesting the benefit of increasing capacity for water storage. However, the spatial variation can result in greater risk of drought for areas far from the sea. The climate change will also have an important impact on wildlife and their habitat. Rangelands, forests and their types, and biodiversity will be under even greater threat. This requires major programmes for increasing the forested areas with plantation suited against the looming climate change. It will be essential to build the capacity for multidisciplinary studies and modelling for reliable climate forecasting and analysis of the corresponding socio-economic impact. This will require sustained regional cooperation as well as monitoring of our entire environment from the North to the South.

Major issues

The most serious challenges for Pakistan are threats to its water, food and energy securities, owing to

- possible drastic shifts in weather patterns, both on temporal and spatial scales, in particular increased variability of monsoon
- likelihood of increased frequency and severity of extreme events such as floods, droughts and cyclones
- increase in sediment flow due to increased incidences of high intensity rains resulting in more rapid loss of reservoir capacity due to siltation
- rapid recession of the Hindu Kush-Karakoram-Himalayan (HKH) glaciers, causing reduction in the capacity of natural reservoirs and affecting the magnitude and pattern of water inflows into the Indus River System (IRS)
- increased incidences of high altitude snow avalanches and GLOFs (glacial lakes outburst floods) generated by surging tributary glaciers blocking main un-glaciated valleys
- increased degradation of surface water quality due to increase in extreme climate events
- severe water-stressed and heat-stressed conditions in arid and semi-arid regions, leading to reduced agriculture productivity due to increased heat-and water-stress as well as more frequent and intense floods and droughts and power generation
- abundance of insects, pests and pathogens in warmer and more humid environment, particularly after heavy rains and floods
- reduced productivity and fertility of livestock due to heat-stress
- degradation of the rangeland and further deterioration of the already degraded cultivated land areas such as those suffering from water erosion, wind erosion, water-logging, salinity, etc.

- adverse impact on power generation capacity due to irregular river flows and more frequent and intense floods and droughts
- increased health risks (heat strokes, pneumonia, malaria and other vector-borne diseases)
- increase in deforestation, land erosion and soil degradation
- risks to fragile marine, mountainous, and coastal area ecosystems
- loss of biodiversity
- increased upstream intrusion of saline water in the Indus delta, adversely affecting coastal agriculture, mangroves and breeding grounds of fish
- threat to coastal areas, including the city of Karachi due to sea level rise and increased cyclonic activity due to higher sea surface temperatures
- limited technical expertise in the country for the climate change research, and
- low adaptive capacity to adverse climate change impacts due to lack of technical know-how and low financial resources

Policies and plans

Mitigation and adaptation

Pakistan, already being a low GHG emitting country, requires relatively fewer efforts to carry out mitigation measures. On the other hand, being underdeveloped and poor, it requires concerted efforts to adapt to the adverse impacts of climate change. The Plan envisages supporting all possible mechanisms devised to combat climate change through mitigation and adaptation efforts including market-based mechanisms. A number of measures are planned to address both mitigation and adaptation aspects of climate change through enhancing various ongoing efforts and initiating new activities.

Mitigation policies and Plan

The Plan will support ongoing efforts for climate change mitigation by undertaking the required measures on sustainable basis. Pakistan's emissions are bound to increase considerably as the country climbs over the development ladder and strives to provide adequate amount of energy to support its growing socio-economic developmental needs. Still, as a responsible member of the international community, Pakistan will like to contribute to the global GHG mitigation efforts without compromising on its basic minimum energy and food needs consistent with its socio-economic developmental requirements, energy security considerations, and financial and technological constraints.

Energy efficiency and GHG emissions reduction sector

The major mitigation measures envisaged in this sector are: Energy efficiency will be improved at all levels in the energy system chain through energy conservation measures and use of energy-efficient devices, large scale use of various renewable energy technologies as well as expansion of nuclear power programme. At the same time, efforts will be made for rapid development of hydropower resources, acquisition and adoption of clean coal technologies such as Coal Bed Methane Capture (CBMC), Integrated Coal Gasification Combined Cycle power generation (IGCC), and CO₂ Capture and Storage (CCS). Moreover, development of mass transit

systems in large cities and greater use of CNG and LNG as fuel for urban transportation will be pursued.

Agriculture sector

Not much attention has been paid to address the GHG emissions from the agriculture and livestock sector. Now, it is planned to develop and adopt: (i) new methods of rice cultivation with lower methane emissions, (ii) new methods for reducing Nitrous oxide releases from agricultural soils, (iii) new breeds of cattle more productive in terms of milk and meat, but have lower methane production from enteric fermentation, and (iv) new economical feeds that reduce methane production activity of cattle besides providing them with better nutrition.

Afforestation and reforestation

Forest sector: It is envisaged to increase forest cover from 5.2 per cent in 2013 to six per cent by 2018. In addition to the ongoing development of forestry resources projects and mass awareness activities, afforestation and reforestation efforts will be promoted to the maximum possible extent for rehabilitation of damaged and waste areas; thus reducing emission from deforestation.

CDM activities

Intensive effort will be made to promote the Clean Development Mechanism (CDM) projects with a view to reduce carbon footprint of various industrial, agricultural products and energy services. It will include: appropriate strengthening of the CDM Cell in the Ministry of Climate Change and its capacity-building through international support, enhancement of national capacity for designing and implementing CDM projects so as to take full advantage of international CDM financing and acquire Advanced Clean Fuel Technologies; expeditious approval and implementation of projects designed for earning carbon credits.

Adaptation policies and Plan

Adaptation is particularly important in the vulnerable countries, like Pakistan and it will provide quicker solution to vulnerable communities. Besides, gradual improvement in our understanding of the impacts of climate change and associated risks warrants flexibility in the adaptive approach for new investments within the management framework. Some of the planned measures include:

Water resource

There is a need to construct a series of large hydropower projects to add 18 MAF of new storage capacity by 2030 to the existing 12.5 MAF capacity, which is decreasing by 0.2 MAF annually (due to silting). The approval has already been accorded for the construction work of 4,500 MW hydropower plant at Bhasha with 6.4 MAF water storage capacity. Complementing the large storages by a comprehensive programme of small and medium dams as well as measures for recharging underground reservoirs, investigations for using groundwater aquifers as water storage facilities, lining the water channels for which a major programme is already underway, continuous monitoring of the glaciers and glacier lakes in northern Pakistan; keeping a strict watch on temporal changes in the HKH glaciers through RS-GIS techniques and physical measurements and monitoring the corresponding impact on IRS flows, addition of sufficient reservoir capacity on the IRS rivers so that even during high flood years, no water flows down Kotri in excess of what is necessary for environmental reasons, provision of regulated flows

down Kotri to conform to minimum necessary environmental flows. Besides, local rain water harvesting and building of surface and sub-surface storages for agriculture and other local needs will be carried out. It will be ensured that stringent demand management and efficiency improvement measures are adapted in all water-use sectors, particularly in the supply, distribution and use of irrigation water along with reuse of marginal quality irrigation effluent.

Agriculture and livestock

It is planned to: (i) develop through biotechnology, heat-stress resistant, drought-and flood-tolerant, and water-use efficient high yielding crop varieties, (ii) increase irrigation water availability by reducing losses in the irrigation water supply network, (iii) increase milk and meat production (a) by developing animals breeds, which are more productive but less vulnerable to climatic changes, and (b) by improving the quality of animal feedstock. The 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 will be developed, (iv) Also, efforts will be made to improve crop productivity per unit of land and per unit of water by increasing the efficiency of various agricultural inputs, in particular the input of irrigation water. (v) Moreover, improvement of farm practices by adopting modern techniques, such as laser land levelling, crop diversification, proper cropping patterns, optimised planting dates will be carried out. Additionally, development and introduction of better varieties, etc.; and (vi) implement the 'More Crop per Drop' strategy through improved irrigation methods and practices, water-saving techniques in combination with the use of high yielding and water-efficient crop varieties.

Coastal areas and Indus Deltaic region

The regulated flows down Kotri, to conform to minimum necessary environmental flows, will be provided for restoration and protection of mangroves. Besides, proper engineering structures (like dikes and seawalls) to protect beaches and other facilities along the coast will be constructed. Additionally, capacity of relevant institutions to deal with natural disasters such as cyclones, floods will be developed.

Forests and other vulnerable ecosystems

It is planned to undertake aggressive afforestation and reforestation programmes with plantation suited against the looming climate change will be carried out. Also, biological control of forest pests by maintaining viable populations of predatory birds and insects through restricted use of chemical insecticide will be ensured. More importantly, preservation of rangelands through proper rangeland management, increase of grasslands using appropriate varieties of grass in saline and waterlogged zones to prevent their degradation will be stressed along with planting of genetically impoverished species or those that have important ecosystem functions by providing natural migration corridors. For preserving genetic diversity and conserving species, use of gene banks, seed banks, zoos and botanical gardens will be practiced.

CDM and Adaptation Fund

The CDM Cell in the Ministry of Climate Change will be further strengthened as its Institutional Capacity for Addressing Climate Change. There are several organisations in the country, which can make useful contribution towards addressing climate change. It is planned to: (i) an enhanced capacity will be build through national and international support for effectively contributing towards approval and implementation of projects earning financial resources through carbon credits. National capacity for designing and implementing CDM projects will be

enhanced so as to take full advantage of international CDM financing and acquire Advanced Clean Fuel Technologies. Besides, there is another opportunity available through the Adaptation Fund. All efforts will be made to access due share from this fund, which is being exclusively dedicated to the funding of concrete adaptation activities in developing countries. The MoCC will develop its capacity to facilitate preparation and approval of environment related projects for funding through the adaptation fund.

Institutional capacity

There are several organisations, which can make useful contribution towards addressing climate change. It is planned to: (i) enhance capacity of all such organisations, (ii) introduce climate change related scientific disciplines in Pakistan's leading universities so as to ensure a regular supply of trained manpower, and (iii) establish a National Data Bank for climatological, hydrological, agro-meteorological and other climate change related data to cater to the needs of all relevant institutions. Also, core groups will be developed for climate change adaptation at the national, provincial and local levels.

Adequate national resources will be allocated for combating serious consequences of climate change and for conducting R&D on issues such as changes in precipitation patterns, cyclones, droughts, floods (including flash floods), glacial melt and GLOFs. The development of partnerships will be encouraged by bringing together multiple sources of funding. This includes availing opportunities and processes for accessing donors support and other resources for climate change projects and interventions that increase resilience to face the adverse impacts of climate change in the country.

Climate change is likely to have adverse impacts on mountain ecosystems, which are not only important watersheds, but also support livelihoods of millions of families. According to the Millennium Ecosystem Assessment, the climate change is likely to become one of the most significant drivers of biodiversity loss by the end of the century. Biodiversity can support efforts to reduce the negative effects of climate change. Ecosystem-based adaptation, which integrates the use of biodiversity and ecosystem services into an overall adaptation strategy, can be cost-effective and generate social, economic and cultural co-benefits and contribute to the conservation of biodiversity.

Programmes and projects

Implementation of the climate change programme will be carried out through coordinated efforts of the relevant ministries to secure ample resources and their effective utilisation, that is, Economic Affairs Division (EAD), Ministry of Climate Change and Planning Commission at the federal level. The MoCC will perform an overarching role of policy formulation, research and development, and national and international coordination and facilitation. The EAD will facilitate negotiations with donors, bi/multilateral funding agencies, UN agencies, banks, etc., and the Planning Commission will determine impacts of climate change on the national economy and, accordingly, the Plan will help implement programmes and projects in different sectors, mostly through international support and assistance to mitigate and adapt these effects and impacts to minimise economic impact.

The following areas will be targeted through mitigation and adaptation measures as well as studies to enhance our understanding for Pakistan-specific needs:

- Data and information on Climatology

- Reducing climate change induced risks and vulnerabilities from the Glacier Lake Outburst Floods (GLOF) in the Northern mountainous region of Pakistan
- Enhancement of capacities to harness opportunities under the CDM and Adaptation Fund
- Studies to enhance our understanding for the Pakistan-specific mitigation and adaptation needs and measures will be carried out in the following areas:
 - Climatology
 - Water Resources
 - Agriculture and forestry
 - Health impacts
 - Impacts on the coastal areas
 - Disaster risks resulting from extreme events, in particular floods, droughts, cyclones and the GLOF
 - Biodiversity conservation for preserving fragile ecosystems, watersheds and livelihoods
 - Fragile ecosystems: mountainous areas, rangelands, degraded lands (affected by water-logging, salinity, soil erosion, etc.)
 - Clean Development Mechanism
 - Economic Impact Assessment of climate change-related vulnerabilities

The financial framework to actualise these programmes and projects is given in the following tables with the understanding that a considerable international support and assistance will be tapped for the purpose.

Table 1: Environmental indicators and targets

| S.# | Environmental indicators | 2012-13 benchmark | | Plan targets | |
|-----|--|--|----------|--|-----|
| 1 | Forest cover including state-owned and private forest and farmlands (as percentage of the total land area) | 5.2% | | 6% | |
| 2 | Area protected for conservation of wildlife (as %age of total area) | 11.6% | | 12% | |
| 3 | Access to sanitation (national) | 72% | | 90% | |
| 4 | Access to clean water (national) | 87% | | 93% | |
| 5 | Number of continuous air pollution monitoring stations | 7 | | 14 | |
| 6 | Percentage of Sulphur (by weight) in high-speed diesel | 0.6 | | 0.50 to 0.05 | |
| 7 | Sanitary landfill in major cities | 0 | | 6 | |
| 8 | Air Quality Improvement Reduction in suspended Particulate Matter PM2.5 | Islamabad | 72 ug/m3 | Islamabad | 60 |
| | | Lahore | 122 | Lahore | 80 |
| | | Karachi | 53 | Karachi | 40 |
| | | Peshawar | 79 | Peshawar | 60 |
| | | Quetta | 47 | Quetta | 40 |
| 9 | Noise Control Reduction in overall Noise levels in major cities | Noise level: (Leq*) | | Noise level will be reduced by 25% | |
| | | Islamabad | 59-85dB | | |
| | | Lahore | 53-95 | | |
| | | Karachi | 61-99 | | |
| | | Peshawar | 56-92 | | |
| | | Quetta | 50-86 | | |
| | | *Leq: Equivalent noise level | | | |
| 10 | Protection of water resources | Punjab | 01 | Punjab | 04 |
| | Increase cluster and combined wastewater treatment plants in the industrial estates | Sindh | 01 | Sindh | 04 |
| | | KPK | 0 | KPK | 01 |
| | River waters quality improve | BOD mg/1 | | BOD mg/1 | |
| | Harbour and coastal water quality improvement | River Ravi | 9.0 | River Ravi | 4.0 |
| | | River Swat | 12.0 | River Swat | 4.0 |
| | | D.O: | 5.0 | D.O: | 9.0 |
| | | BOD: | 82-200 | BOD: | >20 |
| | | NH3: | 100-1000 | NH3: | 60 |
| 11 | Vehicular emission control establishment of vehicle inspection/Emission Testing Centres in major cities | | | Islamabad | 10 |
| | | | | Lahore | 20 |
| | | | | Karachi | 05 |
| | | | | Peshawar | 03 |
| | | | | Quetta | 01 |
| 12 | Institutional Strengthening Programme (ISP) | The Punjab has established district-level offices. | | The EPAs will establish offices at the district level. | |

The PSDP share in the environment and climate change sectors of the federal fiscal outlay

Climate Change Division

(Rs million)

| S# | Sub-sectors | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 | Total |
|----|--|------------|------------|------------|--------------|--------------|--------------|
| 1 | Pollution control | 208 | 275 | 380 | 338 | 515 | 1,716 |
| 2 | Forestry and natural resources | 52 | 33 | 32 | 36 | 36 | 189 |
| 3 | Drinking water | 260 | 128 | 116 | 267 | 127 | 899 |
| 4 | Sanitation | 26 | 47 | 43 | - | - | 115 |
| 5 | Energy conservation and efficiency | 78 | 58 | 158 | 200 | 382 | 876 |
| 6 | Knowledge management and institutional strengthening | 52 | 41 | 13 | 7 | 9 | 122 |
| 7 | Disaster management | 52 | 61 | 53 | 134 | 127 | 427 |
| 8 | Climate Change: Adaptation and mitigation measures, R&D, capacity-building | 104 | 118 | 72 | 132 | 204 | 630 |
| | Total | 833 | 761 | 866 | 1,115 | 1,400 | 4,975 |

Summary of environmental issues, gaps, strategies and actions

| Major issues and gaps | Strategies | Action plan |
|--|--|---|
| Air, water, and environmental pollution. Rivers, water bodies and marine environment are polluted by increasing untreated discharge of industries and municipalities. About 50 per cent of population has inadequate sanitation cover; most of the piped and surface water being used for drinking is contaminated. | A holistic and integrated approach to combat water and air pollution with knowledge-based capacity-building Undertake integrated coastal zone, marine and inland water resources management planning A sanitation policy catered to enhance the coverage and control water contamination will be implemented by provinces. | Implementation and monitoring of clean air and water pollution programmes The national programmes on pollution control, clean-up of rivers and other water bodies will be implemented. The catchments areas will be protected through better watersheds management. On-going clean drinking water programme will be scaled up. |
| Access to quality drinking water Inadequate and poor sanitation effects on health | Availability and access to clean water for citizens will be facilitated, especially for the poor, through effective implementation of national drinking water and sanitation policies and national programmes through devolved provincial governments. | Effective implementation of national drinking water and other related policies developed in consultation with stakeholders The media, communities, and schools will be targeted for mass awareness regarding environmental challenges, as well as the roles and responsibilities of different stakeholders |
| Water scarcity accompanied by land degradation, soil erosion, deforestation; and high vulnerability due to flash floods, landslides and desertification | Adopt sustainable management of water resources, desertification control and rehabilitation of degraded lands through promotion of sustainable land management policies, plans and programmes | Implementation of integrated NRM, watershed and land management programmes A national-level advisory, advocacy, awareness and good practices campaign will be launched for sustainable land management, water conservation, recycling and reuse of water. |
| Ineffective management and disposal of around 60,000 tonnes of solid waste generated every day due to absence of scientifically established landfill sites and waste-to-energy generation arrangements Contamination of industrial wastewater with all kinds of toxic chemicals and biological contaminants | Introduction and strengthening of integrated waste management programmes under the public-private partnership Conversion of combustible waste to energy through use of the latest technologies Treatment of wastewater before its disposal to human friendly level of contamination | Installation of composting plants and scientific landfill sites Projects for promotion of generation of energy from waste Urban waste water treatment plants for its reuse will be encouraged through the public-private partnership. Bio-remedial measures will be adopted for the wastewater treatment. |
| Lack of incineration and other treatment facilities for 250,000 tonnes of hazardous hospital | Improvement of integrated hospital waste management programme | Sustainable monitoring and implementation of hospital (hazardous) waste management |

| | | |
|--|---|--|
| waste per annum, which contains 20 per cent infectious waste. Inappropriate and limited capacity of the EPAs for enforcement of hazardous waste | Institutional strengthening of the EPAs for handling such programmes | policy and programme Installation of incinerators for handling hospital waste under the public-private partnership Institutional strengthening of the EPAs will be targeted for achieving results. |
| Inadequate institutional capacity in harnessing opportunities under the Multilateral Environmental Agreements and Protocols | Strengthening and capacity-building of national institutions, civil society, academia and international NGOs Improve knowledge management and networking | Enhanced focus on capacity-building of institutions in earlier half of the Plan period for improved delivery in the later half The media, community and academic institutions will be targeted for mass awareness regarding environmental challenges, and the roles and responsibilities of stakeholders. |
| Depletion of forest cover by over-grazing and inefficient use of forest resources Inadequate management and unsustainable levels of fuel wood consumption, encroachment of forest lands and loss of biodiversity Urban and amenity forestry is ignored in town planning and management and green cover of majority of cities is shrinking. | National and provincial Forest policies will focus on integrated and participatory forest resources management. Land be set apart and marked as forest land and protection be granted under the law New species of forest to be grown to meet the demand of wood in the country | Implementation and execution of the national and provincial forest policies Forest cover will be increased through massive plantation along with a focus on urban greening, rehabilitation of rangelands with participatory forest resources management models. Involvement of the private sector and NGOs, academia and community in specific relation to the public-private partnership for effective and efficient conservation and management of natural forest resources. Increase in forest cover will be advocated through awareness campaigns and media programmes. |
| Lack of governance and implementation capacities on environmental programmes and projects, and Environmental Impact Assessment | Efficient monitoring and evaluation of programmes at all levels of execution and interventions | Capacity-building to implement the rules and regulations, and undertaking the Environmental Impact Assessment of all projects |
| Energy use inefficiency (lack of awareness, commitment and approach) | Reduce dependence on non-renewable forms of energy, mainly fossil fuels via piloting of eco-friendly and green city concept | Environment-friendly energy generation by renewable energy technologies through dissemination of wind, solar and bio fuels Optimal use of available natural resources |
| Surge in number of vehicles and inefficient automotive technology, use of unclean fuels, uncontrolled emission of industrial units, burning of garbage and presence of loose dust has polluted the air. Smog, haze, dense fog and suspended particles have | Policy for old, unreliable and inefficient vehicles to be taken off the road New efficient mass transportation systems to be introduced with the involvement of the private sector and other stakeholders New vehicles to comply with | Implementation of energy efficient, environment-friendly mass transit programme in big cities The Pak-II Emission Standards for new vehicles will be enforced and cleaner fuels for vehicles encouraged along with an effective network of vehicle inspection and emission testing system. |

| | | |
|---|--|--|
| affected visibility in cities and lead to respiratory diseases. Control on trans-boundary pollution from city-to-city and from across the borders | strict energy efficiency and emission rules | |
| Absence of Pay-for-Environmental-Services mechanism | Policy framework on the polluter-pays-principles for the environmental fiscal reforms | Seminars and workshops will be organised to develop and disseminate environmentally effective ideas and knowledge. |
| Impact of climate change causing irrevocable harm on water, energy, health, and biodiversity due to changes in land and water resources, enhanced frequency and intensity of natural hazards such as droughts and floods, and glacier melt Lack of insight about the dangers of climate change as well as mitigation and adaptation gaps | The economics and impacts of climate change be deliberated Mitigation and adaptation, including clean development mechanism projects, be undertaken | Mitigation and adaptation measures to combat climate change impact, including capacity-building and human resource development will be initiated. Preparedness for the impacts of climate change with respect to mitigation and adaptation programmes will be ensured. Environment-related policies will be translated into on-ground actions. |