



**ENVIRONMENT AUDIT REPORT  
ON  
IMPACT OF CLIMATE CHANGE ON  
WATER RESOURCES OF SINDH  
AUDIT YEAR 2015-16**

**AUDITOR-GENERAL OF PAKISTAN**

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## **PREFACE**

The Auditor-General conducts audits subject to Articles 169 of the Constitution of the Islamic Republic of Pakistan 1973, read with sections 8, 10 and 12 of the Auditor- General (Functions, Powers and Terms and Conditions of Service) Ordinance 2001. The Environment Audit on “Impacts of Climate Change, rainfall, droughts, variations in seasons on water resources of Sindh” was carried out accordingly.

The Directorate General Audit Sindh conducted the environmental audit on “Impacts of Climate Change, rainfalls, droughts, variations in seasons on water resources of Sindh” from March to June, 2016 for the period from 2012-13 to 2014-15 with a view to reporting significant findings to stakeholders. Audit examined the economy, efficiency, and effectiveness aspects of the schemes launched by the departments of Government of Sindh. In addition, Audit also assessed, on test check basis, impact of climate changes on multiple sectors. The Audit Report indicates specific actions that, if taken, would help the management to improve the deteriorating situation of environment more effectively.

The Audit Report is submitted to the Governor Sindh in pursuance of the Article 171 of the Constitution of the Islamic Republic of Pakistan 1973 to cause it to be laid before the Provincial Assembly.

Dated:

**(Javaid Jehangir)**  
Auditor-General of Pakistan



## **ABBREVIATIONS AND ACRONYMS**

AWB	Area Water Board
CAC	Community Advisory Committee
DBG	Drainage Beneficiary Group
DFO	District Forest Officer
DPOD	DhoroPuran Outfall Drain
EIA	Environmental Impact Assessment
EMU	Environment Management Unit
EQS	Environmental Quality Standards
FAO	Food and Agriculture Organization
FO	Farmers Organization
GDP	Gross Domestic Product
GHGs	Green House Gases
GIS	Geographical Information System
HFA	Hyogo Framework of Action
HKH	Hindu Kush-Karakoram Himalayan
INTOSAI	International Organization of Supreme Audit Institutions
IPCC	Inter-Governmental Panel on Climate Change
IPOE	International Panel of Experts
IRSA	Indus River System Authority
KPOD	KadhanPateji Outfall Drain
LANSA	Leveraging Agriculture for Nutrition in South Asia
LBOD	Left Bank Outfall Drain
MAF	Million Acre Feet
MNVD	Main Nara Valley Drain
MoE	Ministry of Environment
NDMF	National Disaster Management Framework
NDMO	National Disaster Management Ordinance
NDMS	National Disaster Management Strategy
O&M	Operation and Management
PCRWR	Pakistan Council of Research in Water Resources
PPR	Peste des Petits Ruminants (Viral Diseases)
RBM	Result-based Monitoring
RBOD	Right Bank Outfall Drain
RFO	Range Forest Officer
SCOPE	Society of Conservation and Protection of Environment
SEPA	Sindh Environmental Protection Agency
SIDA	Sindh Irrigation & Drainage Authority

SRS	Satellite Remote Sensing
SWMO	Sindh Water Management Ordinance
THI	Temperature Humidity Index
UNEP	United Nations Environment Programme
WMO	World Meteorological Organization



## EXECUTIVE SUMMARY

The Directorate General of Audit Sindh conducted Environmental Audit on “Impacts of climate change, rainfalls, droughts, variations in seasons on water resources of Sindh” from period March to June, 2016 for the period from 2012-13 to 2014-15. The main objectives of the audit were to assess on test check basis impact of climate changes on agriculture, various crops and yield, water resources including River Indus, its canals, lakes and sub-soil water, droughts and floods, saline water intrusion, coastal erosion, increased demand of water for agriculture, soil and cultivation potential of various crops including soil erosion, salinity etc. Besides, compliance of management of water resources in Sindh and its distribution issues, implementation of environmental regulations & rules, monitoring & evaluation challenges, achievements of schemes/studies executed by the Forest Department and Director General Environmental Protection Agency, Government of Sindh. Another objective was examination of the economy, efficiency, and effectiveness aspects of the schemes launched by the departments. The audit was conducted in accordance with the International Standards of Supreme Audit Institutions of SAIs (ISSAIs).

The environmental audit in respect of scope of topic relates to various Government Departments which are directly or indirectly concerned with climate change scenario, its effects and impact on environment and other resources of Sindh including Departments of Environment, Climate Change and Coastal Development, Forest & Wildlife, Irrigation, Agriculture, Environmental Protection Agency and Sindh Irrigation & Drainage Authority. The audit was conducted in order to ascertain effectiveness, internal controls and implementation of Environmental Rules, effectiveness of schemes in respect of environment / climate change and their impact on resources of Sindh.

### **Key Findings:**

Major findings of the environmental study are that the water quality deterioration is caused by the discharge of hazardous wastes. Main industrial estates of Karachi, Kotri, Hyderabad and Sukkur are the key sources of increasing pollution in natural streams, rivers and sea. No strategies have been developed by the SIDA for improvement of irrigation and drainage services, integrated water management, flood



protection, prevention of sea water intrusion, water distribution in times of drought and wetland management. No capacity development of Human Resources in the SEPA has been done. No Environmental inspection reports of institutions etc. have been carried out. No latest research work and pro-active strategies have been carried out and developed respectively by the Agriculture department's research wing in respect of introduction of hybrid species of crops to cater to climate change challenges especially variations in seasons' time periods, un-predictable rainfalls & floods and droughts which badly affect agriculture production, delay maturity of fruits and their size/nutritional requirements. Lower crop production has been observed. There is no up-gradated mechanism of planning, monitoring & evaluation of schemes. There is no Result Based Monitoring Framework in the Forest Department. There is no initiative on employment generation, improvement of skills of villagers on areas covered for tree plantation. The schemes in various departments have been planned but those are not successfully implemented.

### **Audit recommendations:**

The audit mainly recommends steps for minimizing and ultimate removal of industrial pollutants and waste from the disposed-off wastages with the intervention of Government departments along with effective monitoring mechanism. The implementation of Sindh Environmental Protection Act, 2014 should be in place in letter and spirit. The drains' dispose-off system of sewage directly into the irrigation channels should be adhered to. The domestic sewage and industrial effluents should be separated so that former could be recycled and treated as per existing standards exist in the developed countries. The coastal areas of Badin and Thatta districts should be focused by the Government Departments as they are prone to cyclones and sea water intrusion and other drainage effluent. The industrial and municipal effluents must be treated before disposing off or used for other agriculture purposes through means of physical, chemical and biological treatments. Capacity building of SIDA, AWBs & FOs should be improved in Irrigation and Drainage system. Proper environmental-oriented trainings should be imparted to the personnel of EPA in respect of air, water and effluent emissions. The Industries in Sindh with the collaboration of Government of Sindh should install treatment plants. The EPA should collaborate with the Karachi Water & Sewerage Board for improving of quality of water. The Research & Analysis Wing should be established in the EPA

and mechanism of identification of potential significant environmental risks should be evolved. The units of laboratories be established nearby industrial sites of Nooriabad, Kotri, SITE and Korangi Industrial areas. The agriculture department must produce new climate resilient hybrid crop varieties, which can sustain floods, droughts, heat waves and salinity for better production. The species Eucalyptus must be replaced with other species. The prolong issue of loss of mangroves due to less availability of water and sea intrusion must be dealt with on urgent basis. The projects must be completed in accordance with timelines mentioned in the PC-I documents and their achievements could be evaluated accordingly.

## 1. INTRODUCTION

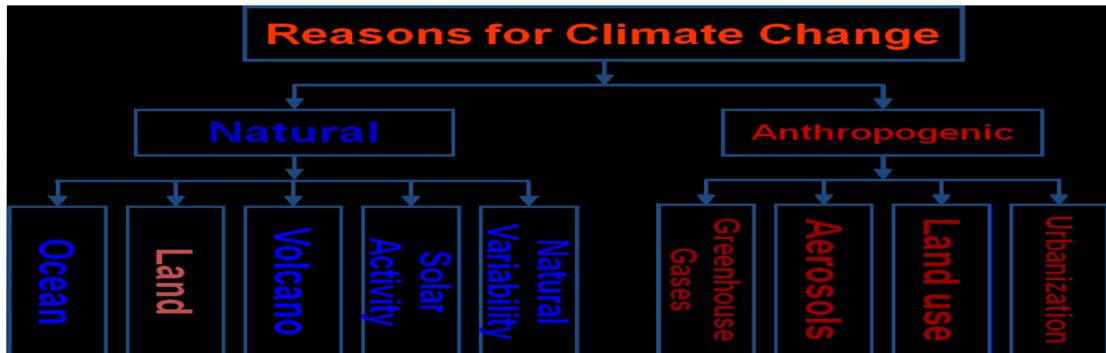
Pakistan is particularly vulnerable to climate change because it has generally a warm climate; it lies in a geographical region where the temperature increases are expected to be higher than the global average; its land area is mostly arid and semi-arid. Under the influence of all these factors the water, food and energy security of the country are under serious threat. Compounding these problems are expected risks to coastal areas and the Indus deltaic region due to sea level rise, coastal erosion, saline sea water intrusion and increasing cyclonic activity in the Arabian Sea.

Pakistan has been bearing the brunt of intense floods over the past five years. The huge downpours, lack of water reservoirs and good governance are the contributing factors in adding to the miseries leading to diseases, food insecurity and poverty. Climate change will continue to hit Pakistan very hard like we have seen with the Karachi heatwave. In the absence of any adaptation strategy, lack of investment in storage for past 48 years flooding and drought will continue to inflict losses. Both banks of the Indus River in Sindh are vulnerable to damage caused by floods as it flows centrally through the province and have been provided with flood protection embankments. In addition, a bund along the western periphery of the Sukkur Barrage Right Bank Canal Command area known as the Flood Protection Bund has been constructed to protect the irrigated area from torrential discharges from Khirthar Hills Range and Balochistan.

### 1.1 Climate Change and their implications

Climate is a product of weather which always experiences variations over space and time. Land, ocean and atmosphere interactions have been resulting into usual cyclic variations in weather and hence climatic conditions over the globe. Anthropogenic activities are mainly blamed for global warming and climate change. Anthropogenic reasons are controllable but they been dominating now over the natural, due to which balance of the atmospheric heat budget has been disturbed and more amount of heat has been trapped in the biosphere than usually required to regulate the life processes. The dominant component of the climate variations was spatial shifts in the rainfall patterns. Changes in rainfall pattern directly affect water, agriculture and disaster management sectors. According to the report of apex body

“Task Force on Climate Change” established in 2010 in Pakistan, the country is exposed to a number of natural disasters, including cyclones, floods, drought, intense rainfall and earthquakes.



## 1.2 Global Warming impacts on Climate system

Global warming has been affecting the dynamics of climate system whose five components viz., atmosphere, cryosphere, hydrosphere, biosphere and lithosphere are interacting each other in a complex way. Sixty-seven percent of world’s glaciers are retreating at a startling rate in the Himalayas and the major causal factors have been identified as climate change due to burning of fossil fuels such as coal, oil and natural gas in factories, cars and to generate electricity. Glacial melt will affect freshwater flows with dramatic adverse effects on biodiversity and livelihood, with possible long-term implications on regional food security. There are more than 5000 glaciers in Pakistan territory having Volume of water in the frozen form to sustain our water supplies through melting process, which have been steadily losing ice mass like Siachen Glacier has lost 17 per cent of ice during past 21 years.

## 1.3 Climate of Sindh

Sindh is the second largest province of Pakistan according to population. The province covers an area of 140,900 sq. km. The Province of Sindh is facing an extreme weather pattern, including waves of cold weather, drought, extreme heat, continuous floods and extreme rainfall. The impact of climate change has disturbed social, economic and political conditions of people across the province in urban and rural areas. People in rural areas rely on agriculture or livestock and continuous

droughts and floods have affected both sectors. In Sindh, climate change impact is being observed since 1999 cyclone that badly hit coastal areas of Sindh. The subsequent year an earthquake followed with extreme rains in 2005. This led to a food crisis. After long drought, floods in 2010 badly affected the right bank of the Indus River and 20 million people were affected and displaced. This outbalances three major securities of the country, namely water, food and energy. The World Bank's recent study says that 15 per cent of the total GDP of Sindh is being lost yearly due to the environmental degradation and climate change. Sindh is the lower riparian and, hence, both dry weather and floods hit Sindh relentlessly. The extreme droughts in Tharparkar, Achhro Thar, Nara, Kohistan, Kachho and the coastal belt have been wrought largely by climate change. About 65 per cent of Sindh's area is classified as arid [drought prone]. People in these areas completely rely on rainfall and one can imagine the situation if there is no rain for years. Monsoon in summer is another blessing of nature which transports water from the Bay of Bengal and the Arabian Sea to Pakistan which makes the western border for this weather system to reach. On one hand, the seasonal march of monsoon is disturbed due to changing climate, on the other hand its inter-annual variability (repeated drought/flood events) has posed a serious challenge for the sustainable crop production.

## **2. ENVIRONMENTAL AUDIT OBJECTIVES**

- 2.1 Management of water resources in Sindh and its distribution issues;
- 2.2 Implementation of Environmental regulations & rules;
- 2.3 Monitoring & evaluation issues;
- 2.4 Achievements of schemes/plans/studies executed by Secretary, Forest & Wildlife and DG Environmental Protection Agency, Government of Sindh;
- 2.5 Overall impact of climate changes on resources of Sindh like variations in water availability, agriculture, irrigation, livestock, forest and environment.

### **3. SCOPE AND METHODOLOGY**

- 3.1 The Environmental Audit has been conducted to the review of record from financial year 2012-13 to 2014-15.
- 3.2 The scope of audit covered general information about climate change and its effects, especially in Sindh, the measures undertaken by the Departments of Government of Sindh and its Agencies and their performance according to their set Acts, Rules and Regulations.
- 3.3 The Government Departments' Secretaries have been contacted and meetings were held for the overall understanding of environmental audit, purview, issues of potential significance and their coverage in respect of topic of the environmental audit.
- 3.4 The Director Generals' of Agriculture Extension, Research and Engineering wings, Environmental Protection Agency and SIDA were contacted and meeting held accordingly. However, the Departments of the Government of Sindh were not aware of the significance of environmental audit and impacts of climate change in Sindh.
- 3.5 The audit was conducted with the help of development of Questionnaires, interviews, discussions, some internet articles, Environmental Audit Guidelines of AGP, information shared by the departments, Acts, Rules and Regulations and general understanding.
- 3.6 Effectiveness of schemes / plans/ studies executed by Secretary, Forest, Environment & Wildlife and Director General Environment Protection Agency, Government of Sindh and their impact on environment.
- 3.7 Examination of Planning Commission Documents including PC-I of Schemes in respect of environment and forest sectors.
- 3.8 Analysis of Acts, Regulations/Rules vis-à-vis implementation efforts.
- 3.9 Physical visits, interviews, discussions, observations and internet material/articles.

## **4. AUDIT FINDINGS AND RECOMMENDATIONS**

The audit findings and recommendations in this section were pointed out to the Principal Accounting Officer(s) during January 2017, but no reply of the management was received. The report was issued to the Principal Accounting Officers/Secretaries of Forest & Wildlife; Environment, Climate Change & Coastal Development; Agriculture, Supplies and Prices and Irrigation Departments with the request to convene the DAC meeting but the same was not convened despite of issuance of three reminders dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

### **4.1 Water-related Findings**

#### **4.1.1 Contamination of water by hazardous discharge of industrial waste**

According to para 4.3.6 (Volume-I) of Report of the contractor “Louis Berger Group Inc.” in association with “Indus Associated Consultants (Pvt.) Ltd”, June 2011 on Sindh Water Sector Improvement Project Phase-I (WSIP-I) of Sindh Irrigation and Drainage Authority, the water quality deterioration is caused by the discharge of hazardous industrial wastes including persistent toxic synthetic organic chemicals, heavy metals, pesticide products, municipal wastes and untreated sewage water to natural water bodies. These substances also caused widespread water-borne diseases.

During environmental audit of financial year 2012-13 to 2014-15, it was observed that severe levels of water pollution exist in some areas due to unchecked release of industrial pollutants such as from sugar mills etc. which needs to be adhered to by the Government of Sindh on priority basis with the effective mechanisms of monitoring and protecting the quality of surface and ground waters.

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has been received till finalization of this report. Further no DAC was convened by the PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

Audit recommends that necessary precautionary measures be taken by the SIDA alongwith other stakeholders/Government Departments on urgent basis for ensuring water quality to the masses of Sindh.

#### **4.1.2 Non-treatment of sewage and industrial effluents polluting the River Indus**

According to para 4.3.10 (Volume-I) of Report of the contractor “Louis Berger Group Inc.” in association with “Indus Associated Consultants (Pvt.) Ltd”, June 2011 on Sindh Water Sector Improvement Project Phase-I (WSIP-I) of Sindh Irrigation and Drainage Authority, pollutants enter the river Indus from different locations in Sindh and these include municipal, industrial and agricultural wastes from Punjab reaching at Guddu and Sukkur. Municipal and industrial effluents of Sukkur and Rohri are added in the river. The water from Manchar lake, containing pesticides, nitrates, nitrites, chromium, lead, copper, zinc, hazardous chemicals from pharmaceutical, power plants, and coal industries also join the river upstream of Kotri. Downstream of Kotri, the main source of pollution is untreated sewage and industrial effluents from urban areas of Hyderabad and Kotri.

During environmental audit of financial year 2012-13 to 2014-15, it was observed that the irrigation department has not been performing its core function by adopting effective measures in order to cater to industrial effluents and sewage disposal by installation of treatment plants especially in the Industrial zones/areas in Sindh.

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has been received till finalization of this report. Further no DAC was convened by the PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

Audit recommends that effective measures with the collaboration of SIDA, irrigation department and Sindh Environmental Protection Agency to implement and enforce pollution controls at the source of effluent disposal, improvement of sanitation system, proper reforms in the infrastructure and initiatives by the Government in the wake of climate changes in Sindh.



### **4.1.3 Non-exploration of alternative sources of water**

According to para 4.3.6 (Volume-I) of Report of the contractor “Louis Berger Group Inc.” in association with “Indus Associated Consultants (Pvt.) Ltd”, June 2011 on Sindh Water Sector Improvement Project Phase-I (WSIP-I) of Sindh Irrigation and Drainage Authority, over pumping of groundwater due to extended drought has adversely affected the water quality. According to a recent study about 70% of the about 560 thousand tube wells in the Indus Basin are pumping sodic water (PCRWR Water Quality Monitoring Program) and such water is highly injurious to the soils resulting in reduced permeability and infiltration rates, particularly in the heavy textured soils. Surface-water from most of our rivers is also polluted due to dumping of solid wastes and industrial pollutants.

During environmental audit of financial year 2012-13 to 2014-15, it was observed that the irrigation department has not been working in this area which requires immediate measures.

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has been received till finalization of this report. Further no DAC was convened by the PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

Audit recommends that alternative sources of conservation of water must be explored in order to halt degraded groundwater quality increased due to un-controlled pumping of groundwater.

## **4.2 Audit Findings on Sindh Irrigation and Drainage Authority (SIDA)**

### **4.2.1 Non-performance of functions as per Sindh Water Management Ordinance, 2002**

As per Sindh Water Management Ordinance (SWMO) 2002, section (11), in order to perform its role and functions, the SIDA shall perform the tasks to develop, on periodic basis, a strategy for improvement of irrigation and drainage services, integrated water management, flood protection, prevention of sea water intrusion,

water distribution in times of drought and wetland management within its command and catchment areas setting goals and objectives, formulating implementation policies and identifying priority and other actions.

During environmental audit of financial year 2012-13 to 2014-15, it was observed that there was no effective mechanism and implementation policy guidelines followed in the light of Sindh Water Management Ordinance 2002 in consultation with the Irrigation Department for proper performance of its basic functions like system of distribution and delivery of irrigation water, removal of drainage water and management of flood waters especially in the wake of frequent climatic changes and global warming and their implications in Sindh. Moreover, some of the basic functions have also not been performed by the SIDA viz.,

1. No infrastructural improvements, rehabilitation efforts and modernization besides extension of main canals, Branch Canals, distributaries/Minors have been carried out by the Area Water Boards (AWBs).
2. No measures were taken in respect of transition process of formation, growth and development of Area Water Boards (AWBs) and Farmers Organizations (FOs) to help them self-supporting and financially self-sustaining entities within 7 to 10 years.
3. No strategies and periodic statements were developed by the SIDA for improvement of irrigation and drainage services, integrated water management, flood protection, prevention of sea water intrusion, water distribution in times of drought and wetland management.
4. No studies and research programs were conducted relevant to SIDA's functions and tasks.
5. No efforts were undertaken for the ascertainment of impact of the operations and policies of the SIDA on the ecology and on environment including protection of wetlands, minimizing its adverse impacts and adopting best alternatives for further action.
6. No progress and outcome of the Scheme "Establishment of Environment Management Unit (EMU) in SIDA" costing Rs94.000 million was furnished.

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has

been received till finalization of this report. Further no DAC was convened by the PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

Audit recommends that implementation of SWMO 2002 in letter and spirit and performance of tasks and functions by the SIDA accordingly.

### **4.3 Audit Findings on Sindh Environmental Protection Agency**

#### **4.3.1 Non-implementation of Sindh Environmental Protection Rules**

As per Sindh Environmental Protection Act, 2014, 6 (1) a, the agency shall administer and implement the provisions of this Act and the rules and regulations.

During environmental audit of financial year 2012-13 to 2014-15, it was observed that the implementation mechanism and strategy to make effective the functions of the agency in respect of application of Sindh Environmental Protection Rules were lacking as there was no road map for addressing the environmental issues and identification of potential threats.

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has been received till finalization of this report. Further no DAC was convened by the PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

Audit recommends streamlined mechanism, proper machinery & evaluation system of implementing the enforcement of rules & regulations of the EPA Act, 2014 needs to be improved across Sindh especially focused on Industrial Regions of Karachi, Hyderabad and Sukkur.

#### **4.3.2 Non-conduct of environmental monitoring of the projects in Sindh**

As per Sindh Environmental Protection Act, 2014, 19. (1) the Agency shall carry out or arrange environmental monitoring of all projects in respect of which it has approved an initial environmental examination or environmental impact assessment to determine whether the actual environmental impact exceeds the level

predicted in the assessment and whether the conditions of the approval are being complied with. Further as per 20. (1) The Agency shall from time to time require the person in charge of a project to furnish, within such period as may be specified, an environmental audit or environmental review report or environmental management plan containing a comprehensive appraisal of the environmental aspects of the project.

During environmental audit of financial year 2012-13 to 2014-15, it was observed that the Agency reviewed Environmental Management Plans of only 170 Industries during 2013, 2014 & 2015 out of about 16,000 industries in Sindh, which shows only 1.0625 per cent of total industries.

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has been received till finalization of this report. Further no DAC was convened by the PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

Audit recommends that the Agency must perform its basic function for carrying out environmental monitoring of all projects in Sindh in order to determine their environmental impacts. Moreover, the environmental audit or review report / management plan containing comprehensive appraisal of environmental aspects of the projects should also be implemented.

#### **4.3.3 Non-conduct of environmental inspections of industries and other commercial institutions by the Agency**

As per Sindh Environmental Protection Act, 2014, 6 (2) (a), the agency undertakes inquiries or investigation into environmental issues, either of its own accord or upon complaint from any person or organization.

During environmental audit of financial year 2012-13 to 2014-15, it was observed that inspection reports of institutions /industries/ hospitals /emissions/ wastages were not carried out and thus no samples were collected & tested and compared to Standards framed for discharge or emission from different sources in Sindh during the years 2012-13, 2013-14 & 2014-15.

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has been received till finalization of this report. Further no DAC was convened by the PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

Audit recommends that investigation and inquiries should be conducted by the Agency relating to the environmental issues and potential issues of significance across Sindh with especial focus on Industrial and other commercial concerns in order to vet the status of environmental issues so that future strategies and policies could be evolved accordingly which contribute to policy-making decisions in the upcoming years and thus better Governance in the Province of Sindh.

#### **4.3.4 Non-appointment of senior officers& trainings to the technical officials in the SEPA**

As per Sindh Environmental Protection Act, 2014, 5(3) the Agency shall have such administrative, technical and legal staff as Government may specify, to be appointed in accordance with such procedure as may be prescribed.

During environmental audit of financial year 2012-13 to 2014-15, it was observed that no procedures of appointments of administrative, technical and legal staff was followed, as Junior officers/lower grades of BPS-17 have been working on the senior posts of Directors like in Hyderabad and Sukkur Regions, wherein Incharges were holding offices instead of Directors. Moreover, during interviews conducted by the Audit team, it was observed that field officials/inspectors in the regions did not possess technical qualification relevant to their fields / nature of workings, as such working require exposure to environmental-related fields. Moreover, no on-the-job trainings were imparted to the staff vis-à-vis their contributions/efforts in mitigating environmental hazards/degradation, especially with respect to changes in climate trends and environmental challenges in Sindh.

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has been received till finalization of this report. Further no DAC was convened by the

PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

Audit recommends probe into the matter of appointment of junior officers in the Agency besides imparting appropriate trainings to the technical staff/officials, to overcome the emergency situations.

#### **4.3.5 Non-appointment of members in the advisory committees of SEPA**

As per Sindh Environmental Protection Act, 2014, 5(6) for assisting the Agency in the discharge of its functions Government shall establish Advisory Committees for various sectors and appoint as members thereof eminent representatives of the relevant sector, educational institutions, research institutes and non- governmental organizations.

During environmental audit of financial year 2012-13 to 2014-15, it was observed that the members were not appointed in the Advisory Committees for various sectors for assisting the Agency in due performance of its functions.

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has been received till finalization of this report. Further no DAC was convened by the PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

Audit recommends that appointment of members in the advisory committees may be made as per SEPA Act, 2014 so that its functions could be performed accordingly.

#### **4.3.6 Non-publishing of Annual Sindh Environment Report by the Agency**

As per Sindh Environmental Protection Act, 2014, 6 (1)(d) the agency must prepare and publish an Annual Sindh Environment Report on the state of the environment in the province.

During environmental audit of financial year 2012-13 to 2014-15, it was observed that the Agency was not preparing and publishing the Annual Sindh Environmental Reports in violation of the Act.

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has been received till finalization of this report. Further no DAC was convened by the PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

Audit recommends that publication of Annual Sindh Environmental Report by the Agency for the ascertainment of environmental status in Sindh which could help the Government to adopt strategies accordingly and should take precautionary measures in the wake of environmental challenges and issues faced in Sindh.

#### **4.3.7 Non-establishment of systems & procedures for controlling environmental pollution**

As per Sindh Environmental Protection Act, 2014, 6(1)(h) the agency establishes systems and procedures for surveys, surveillance, monitoring, measurement, examination, investigation, research, inspection and audit to prevent and control pollution, and to estimate the costs of cleaning up pollution and rehabilitating the environment in various sectors.

During environmental audit of financial year 2012-13 to 2014-15, it was observed that proper internal controls and distribution of work were not enforced by the Agency wherein work is delegated with functions according to expertise of the staff with respect to their skills in the areas like surveys, surveillance, monitoring, measurement, examination, investigation, research, inspection and audit to prevent and control pollution. Moreover, no estimate of costs of cleaning up pollution and environmental rehabilitation in various sectors were performed.

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has been received till finalization of this report. Further no DAC was convened by the

PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

Audit recommends that proper procedures should be framed in the light of above areas for the prevention of pollution besides internal controls and distribution of works should be done with respect to areas mentioned above.

#### **4.3.8 Non-issuance of licenses for handling hazardous substances**

As per Sindh Environmental Protection Act, 2014, 6(1)(j) the Agency issue licenses, approval for the consignment, handling, transport, treatment, disposal of, storage, handling or otherwise dealing with hazardous substances.

During environmental audit of financial year 2012-13 to 2014-15, it was observed that there were four firms to whom licenses have been issued by the Agency on conditional basis for carrying out collection, transportation and safe disposal of hazardous waste material generated from the Industries in Karachi. However, these four firms were not sufficient for the Industrial Mega city of Karachi. Moreover, more firms may be issued licenses for safe disposal of waste material in Sindh vis-à-vis efforts in promoting practice of recycling of waste material as exercised in the developed Countries.

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has been received till finalization of this report. Further no DAC was convened by the PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

Audit recommends that more licenses be issued to the firms as per Government procedure for the proper handling, transport, treatment, disposal of, storage or otherwise dealing with hazardous substances especially in the Industrial and other commercial institutions in Sindh.



#### **4.3.9 Non-establishment of laboratories across Sindh**

As per Sindh Environmental Protection Act, 2014, 6(2)(e), the agency establishes and maintain laboratories to help in the performance of its functions under this Act and to conduct research in various aspects of the environment and provide or arrange necessary assistance for the establishment of similar laboratories in the private sector. Furthermore, as per 6(1) (k) certify laboratories as approved laboratories for conducting tests and analysis and one or more research institutes as environmental research institutes for conducting research and investigation for the purposes of this Act.

During environmental audit of financial year 2012-13 to 2014-15, it was observed that separate laboratory in the Karachi Region was not established by the Agency resultantly no frame work and proper full-time establishment was recruited wherein research could be conducted on the basis of samples collected from different sectors/effluents.

However, one Laboratory exists in the premises of Director General's Office, which was non-functional due to non-availability of funds and full-time laboratory staff, accessories, chemicals, sensors, calibration kits for measurement of air pollutants, wastewater, vehicle and industrial emissions. Furthermore, no sample reports of effluents/emissions of industries/hospital/municipal wastes etc. vis-à-vis surveys & monitoring reports were available at the Laboratories situated in the regions of Hyderabad and Sukkur, as evidenced during the visit by the Audit Team.

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has been received till finalization of this report. Further no DAC was convened by the PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

Audit recommends that more laboratories in Karachi, sub-units in Kotri, SITE area, Nooriabad, Landhi and Korangi Industrial areas should be established with full-time technical staff besides provision of funds for their maintenance.

#### **4.3.10 Non-preparation of emergency contingency plans by the Agency**

As per Sindh Environmental Protection Act, 2014, 37(2)(b), the agency preparation of emergency contingency plans for coping with environmental hazards and pollution caused by accidents, natural disasters and calamities.

During environmental audit of financial year 2012-13 to 2014-15, it was observed that no efforts have been made in respect of preparation of emergency contingency plans by the agency to cope up with environmental hazards and pollution in Sindh. Moreover, no assistance were provided to the Federal and Provincial Government Agencies in the management of environment accidents and natural disasters, including inquiries thereto.

Moreover, the Agency only issued notices to the Hospitals, Local Councils etc. at the initiative of audit during the year 2016 for compliance of provisions of the Act in respect of proper disposal of wastes and assist Government Agencies, local councils, local authorities and other persons to implement schemes by following environmental compliance vis-à-vis public awareness initiatives but no follow-ups, implementation efforts were undertaken by the Agency. However, no initiatives and actions took by the agency during the years 2012-13, 2013-14 & 2014-15 under audit.

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has been received till finalization of this report. Further no DAC was convened by the PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

Audit recommends that preparation of emergency contingency plans by the Agency to cater to environmental challenges in Sindh on urgent basis and its sharing with other Government Departments.

#### **4.3.11 Non-recommendation of financial and fiscal programmes/schemes/ measures to the Government of Sindh**

As per Sindh Environmental Protection Act, 2014, 6(2)(d) the Agency recommend to Government and the Council the adoption of financial and fiscal programmes, schemes or measures for achieving environmental objectives and goals and the purposes of this Act, including -(i) taxes, duties, cesses and other levies; and(ii) incentives, prizes, awards, rewards, subsidies, tax exemptions, rebates and depreciation allowances.

During environmental audit of financial year 2012-13 to 2014-15, it was observed that initiatives were not taken by the Agency, with the approval of Government, for foreign assistance and recommendations to Government and the Council for adoption of financial and fiscal programmes, schemes or measures for achieving environmental objectives including taxes, duties, cesses and other levies, incentives, prizes, awards, rewards, subsidies, tax exemptions, rebates and depreciation allowances.

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has been received till finalization of this report. Further no DAC was convened by the PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

Audit recommends that the Agency should recommend financial and fiscal programmes / schemes/ measures to the Government and the Council for the achievement of environmental objectives and due performance of the Act of SEPA.

#### **4.3.12 Non-conduct of inspections of monitoring records of industries by the Agency**

As per Sindh Environmental Protection Act, 2014, 11(2) All persons, in industrial or commercial or other operations, shall ensure compliance with the Environmental Quality Standards for ambient air, drinking water, noise or any other Standards established under section 6(1)(g)(i); shall maintain monitoring records for such compliances; shall make available these records to the authorized person for

inspection; and shall report or communicate the record to the Agency as required under any directions issued, notified or required under any rules and regulations.

During environmental audit of financial year 2012-13 to 2014-15, it was observed that no work was done on account of carrying out the examinations and inspections of monitoring records of industrial, commercial or other operations by the Agency to ensure compliance with Environmental Quality Standards (EQS) in the areas of air, drinking water, noise or any other standards established under *ibid* section.

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has been received till finalization of this report. Further no DAC was convened by the PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

Audit recommends that inspections and monitoring records of industrial and other commercial concerned in Sindh should be conducted for checking of compliance of Environmental Quality Standards in air, drinking water, noise and other standards on urgent basis.

#### **4.3.13 Non-implementation of Environmental Protection Order by the Agency**

As per Sindh Environmental Protection Act, 2014, Environmental Protection Order rule 21(1) Where the Agency is satisfied that the discharge or emission of any effluent, waste, air pollutant or noise, or the disposal of waste, or the handling of hazardous substances, or any other act or omission is likely to occur, or is occurring, or has occurred, in violation of any provision of this Act, the rules or regulations or of the conditions of a license, or is likely to cause, or is causing or has caused an adverse environmental effect, the Agency may, after giving the person responsible for such discharge, emission, disposal, handling, act or omission an opportunity of being heard, by order direct such person to take such measures as the Agency may consider necessary within such period as may be specified in the order.

During environmental audit of financial year 2012-13 to 2014-15, it was observed that progress report was not compiled by the Agency in respect of measures taken as per Environmental Protection Order during 2012-13, 2013-14 & 2014-15.

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has been received till finalization of this report. Further no DAC was convened by the PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

Audit recommends that implementation of the provision of Environmental Protection Order by the Agency across Sindh in order to assess discharge or emission of effluent, waste, air pollution or noise, disposal of waste, handling of hazardous substances or any act of omission in violation of the Act, Rules or Regulations committed by the Industrial and other commercial institutions and measures taken so far.

#### **4.3.14 Non-production of record – Rs1,413.806 million**

As per Section 14(2) of the Auditor General's (Functions, Powers and Terms and Conditions of Service) Ordinance, 2001, "The officials shall afford all facilities and provide record for Audit and comply with request for information in as complete a form as possible and with all reasonable expedition". Further as per Section 14 (3) *ibid*, "Any person or authority hindering the auditorial functions of the Auditor-General regarding inspection of accounts shall be subject to disciplinary action under relevant Efficiency and Discipline Rules, applicable to such person".

During environmental audit of financial year 2012-13 to 2014-15, it was observed that the progress reports of Rs1,413.806 million in respect of the schemes/projects executed by the Environmental Protection Agency for the assessment of economy, efficiency and effectiveness vis-à-vis attainment/achievement of set objectives and their contribution towards betterment of environment in Sindh were not produced for audit.

Name of Scheme (2012-13 to 2014-15)	Approved estimated Cost (Rs. in million)
<b>Scheme: Environment Protection Agency</b>	
Study on impacts of Climate Change in Sindh including Floods and Rains 2010 and 2011	36.250
Study on wetlands especially Ramsar sites, Sindh Province (Jacobabad, Larkana, Shaheed Benazirabad, Thatta, Badin, Tharparkar, Karachi, Dadu)	53.800
Study for E-Waste Management in Sindh	18.996
Awareness & preparation of Action plan for improving Hospital waste management in public sector hospitals	18.660
Environmental Awareness and Education for protection and conservation of Natural Resources in Sindh	115.000
Strengthening of Environmental Monitoring System in EPA (Sukkur, Hyderabad, Karachi)	140.000
Feasibility study and remedial measures for restoration of lakes and other water bodies in Sindh	886.100
Establishment of Planning & Monitoring Cell in Environment & Alternative Energy Department, Karachi	40.000
Study of Environmental & Health impacts of Pesticides and chemical fertilizer in Sindh (Larkana, Karachi, Mirpurkhas, Jacobabad, Kashmore, Ghotki, Sukkur, Shaheed Benazirabad, T.A. Yar, Thatta& Badin)	33.000
Establishment / construction of Regional offices at Sukkur and Hyderabad and expansion of EPA Building Korangi Industrial Area, Karachi.	72.000
<b>Total</b>	<b>1,413.806</b>

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has been received till finalization of this report. Further no DAC was convened by the PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

Audit recommends that production of progress reports of the above schemes in order to assess their effectiveness and contribution towards environmental betterment in Sindh to audit for verification, besides fixing of responsibility against the persons at fault.

#### 4.4 Audit Findings on Agriculture Department

##### 4.4.1 Non-achievement of increase in crop production despite of increase in per hectare proportionally

As per progress report in respect of agriculture production, no increase in the crop yield has been achieved despite of increase in area per hectare in proportion. However, in some cases lower production of crop attained despite of increase in area during the years 2012-13, 2013-14 & 2014-15 in Major crops, as detailed below.

Name of Crop(s)	Year	Area in Hectares	Production (M.Tons)	% age In area	% age In production	Remarks
Wheat	2014-15	1,106,880	3,672,224	(1.32)	(8.24)	Area decreased but yield significantly decreased
	2013-14	1,121,636	4,002,113			
Wheat	2012-13	1,058,400	3,598,690	0.88	(4.33)	Area increased but yield significantly decreased
	2011-12	1,049,175	3,761,468			
Rice	2014	781,679	2,652,583	4.85	1.35	Area increased considerably but yield slightly increased
	2013	745,539	2,617,338			
Sugarcane	2014	316,749	16,613,835	6.45	(9.52)	Area increased significantly but yield considerably decreased
	2013	297,558	18,362,515			

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has been received till finalization of this report. Further no DAC was convened by the PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

Audit recommends that measures for exploration of the latest research as per international standards, introduction of new hybrid species of crops to cater to climate changes, appointment of technical climate-oriented experts, trainings and workshops for awareness of climate change and its effects on agriculture production, prohibition of low quality pesticides & fertilizers and adoption of new research techniques & methods.

## 4.5 Audit Findings on Chief Conservator Forest

### 4.5.1 Non-conducting result-based monitoring of projects and their evaluation

According to the Guidelines for Project Management, issued by the Planning Commission, Government of Pakistan, Chapter-08, Result-Based Monitoring has a wider horizon than just monitoring. Traditional monitoring looks into financial and physical progress but RBM probes into the outcomes and impacts of development projects and programs. RBM has been promoted as an important means to improve the quality and impact of development efforts. It is essentially a special public management tool; governments can use to measure and evaluate outcomes, and then feed the information back into the ongoing processes of governance and decision making. At its core are notions of:

- **\_Goal-oriented ness:** Setting clear goals and results provides targets for change, and opportunities to assess whether change has occurred.
- **\_Causality:** Various inputs and activities leading logically to outputs, outcomes and impacts are also called the „result chain“.
- **\_Continuous improvement:** Periodically measuring results provides the basis for adjustment (tactical and strategic shifts) to keep programs on track and to maximize their outcomes.

During environmental audit of financial year 2012-13 to 2014-15, it was observed that Result Based Monitoring (RBM) Framework and subsequent quantifying or measuring results in respect of Project Evaluation and Monitoring and role/ responsibilities of Project Directors/Managers were not formulated & addressed by the Executing Agency in all projects, as required under Guidelines for Project Management.

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has been received till finalization of this report. Further no DAC was convened by the PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.



Audit recommends adoption of proper framework of result-based monitoring system in all projects initiated and completed by the Forest Department in order to assess their performance according to the above tool.

#### **4.5.2 Non-achievement of project objectives – Rs3,810.977 million**

As per PC-I documents of eight (08) schemes of the Forest & Wildlife Department, various objectives have been set including employment generation, poverty alleviation, improvement of skills of villages, areas covered for tree farming along with crop farming, efforts for conservation of soil, output in respect of self-sufficiency and self-management in the production and distribution of forest products, efforts in reintroduction of extinct local tree species, establishment of model nurseries to supply tree stocks to farmers and tree growers, enhancing tree cover, improve and protect the environment and reduce further degradation and Public awareness and techniques adopted for tree growing.

During environmental audit of financial year 2012-13 to 2014-15, it was observed that as per progress reports of the schemes worth Rs3,810.977 million executed by the Forest & Wildlife Department, Government of Sindh, no much progress weremade in the light of PC-I objectives of the schemes in respect of above areas, detail as **Annex-A**.

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has been received till finalization of this report. Further no DAC was convened by the PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

Audit recommends that proper preparation of the PC-I documents in the light of Planning Commission documents and quantification of the project objectives and their result-based monitoring for the ascertainment of actual results / outputs in respect of environmental betterment.

#### **4.5.3 Non-production of record– Rs4,810.977 million**

As per Section 14(2) of the Auditor General's (Functions, Powers and Terms and Conditions of Service) Ordinance, 2001, "The officials shall afford all facilities

and provide record for Audit and comply with request for information in as complete a form as possible and with all reasonable expedition”. Further as per Section 14 (3) ibid, “Any person or authority hindering the auditorial functions of the Auditor-General regarding inspection of accounts shall be subject to disciplinary action under relevant Efficiency and Discipline Rules, applicable to such person”.

(Rs. in million)

<b>Scheme: Forest &amp; Wildlife Department (Approved Estimated cost) 2012-13 to 2014-15</b>	
Strengthening of Forest conservation to combat Drought & Desertification & Improvement of Rangelands	500.000
Planting of 1.25 million tree saplings to reduce effects of Climate Change in Cities & Towns of Sindh	500.000
Mass scale Tree Plantation outside Forest area to mitigate Climate change affects in Sindh	705.000
Establishment and management of network of Biodiversity Parks in Sindh (Sukkur, Larkana, Ghotki, Khairpur, Matiari, Tharparkar, Thatta & Dadu)	494.000
Conservation Development and Management of Indus Delta Mangroves to check sea intrusion (Karachi, Thatta, Sajawal & Badin)	631.670
Possible role of Mangroves in Curbing sea intrusion in Indus Delta (Thatta & Sajawal)	698.110
Enhancing forest cover on state forest lands in Sindh	708.000
Habitat restoration and promotion of Eco-Tourism through Development of Wildlife Safari in Bookharki Forest, District Badin	250.000
Rehabilitation, restoration and management of Flora and Fauna in Pai Forest of Afforestation Division, Shaheed Benazirabad	77.714
Geo-referred demarcation and construction of Earthen bunds for protection of forest land and upgradation of GIS Laboratory at Hyderabad (Larkana, Kandhkot, Shikarpur, Dadu, Sukkur, Ghotki, Khairpur, Shaheed Benazirabad, Sanghar, Thatta, T.M.Khan, Karachi, N. Feroze, Tharparkar, Jacobabad, Mirpurkhas and Badin)	246.483
<b>Total</b>	<b>4,810.977</b>

During environmental audit of financial year 2012-13 to 2014-15, it was observed that the above record of expenditure worth Rs4,810.977 million in respect of the schemes/projects executed by the Forest & Wildlife Department for the assessment of economy, efficiency and effectiveness vis-à-vis attainment/achievement of set objectives and betterment of environment in Sindh was not produced to audit for verification.

The irregularities were pointed out to the Management vide this office letter No.DGAS/Environ/Audit/2014-15/03-08/3-8, dated 27-01-2017, but no response has been received till finalization of this report. Further no DAC was convened by the

PAOs even repeated written requests dated 13-03-2018, 08-05-2018, 06-09-2018 followed by Final Reminder dated 27-11-2018.

Audit recommends production of record of the above schemes in order to assess their effectiveness and contribution towards environmental betterment in Sindh to audit for verification, besides fixing of responsibility against the persons at fault.

## 5. CONCLUSION

### 5.1 Key Audit Findings

**The key audit findings based on macro level are as follows: -**

- i. Sindh should devise its own province-specific policies on climate change and disaster risk reduction, while mainstreaming it in overall development policy.
- ii. It is imperative that climate change is made popular subject as it is a matter of life and death for people in Sindh. Given the fact that after the 18<sup>th</sup> Amendment climate change and environment have become provincial subjects, Sindh government must allocate more resources and give high priority to climate change and its effects on Sindh.
- iii. The institutions envisioned under the National Disaster Management Ordinance (NDMO), 2007 and the modalities called for from the National Disaster Management Plan must be implemented in letter and spirit and effective coordination efforts amongst stakeholders/departments be streamlined.
- iv. Natural flood retardation basins can be used instead of breaching of bunds to protect barrages from damage or failure from extreme values of flood water flows.
- v. The importance of climate projections in policy making, resource management, economic activity and technological advancement must be realized and incorporated in the policy decisions at the helm of affairs.
- vi. Policies are not followed in spirit and there are serious gaps in their effective implementation. Pakistan needs to adopt an approach of climatically appropriate planning to avoid more catastrophes in the future.
- vii. Adaptation to climate change and building resilience among ecosystems and peoples to respond to climate variability and hazard threats are relatively new concepts. For this reason, networks for sharing experiences and ideas, especially between Delta areas, will have a fundamental role in helping to address adaptation within specific ecosystems or sites. Information about changes in climate change and variability is required to better anticipate potential impacts of climate change on the water resources, agriculture, energy, economic, health, industrial and private sectors.

- viii. Although the perception is present at all levels of government and within all classes of society but there is a clear need of adoption of policy for a new approach to water disaster and flood management in the country, especially in the Lower Indus River Basin in Sindh.
- ix. There must be presence of effective and sincere political will to implement the National Disaster Management Ordinance or establish the methodologies called for in the National Disaster Management Framework.

## **5.2 Lessons Learnt**

1. The Sindh Forest Department in specific has been preparing PC-I documents with setting objectives of the Projects/Schemes without quantifying the benefits in respect of environmental betterment and contributions towards climate challenges. The objectives for the socio-economic benefits have not been adhered to properly and also not quantified and also without accurate results, as there was no mechanism of analysis and post evaluation tools for the ascertainment of environmental benefits and achievements of targets. The progress of the schemes has been very low in comparison to PC-I objectives and also not meeting timelines/deadlines.
2. The Departments of Government of Sindh including Environment, Climate Change and Coastal Development Department, Forest & Wildlife Department, Irrigation Department, Agriculture Department, Environmental Protection Agency (EPA) and Sindh Irrigation & Drainage Authority (SIDA) have not yet been prepared to cater to challenges of climate change and its effects and thus need to do remedial measures on urgent basis in the wake of un-predictable scenario of climate change every year, which is being faced world-wide, so that scarce resources could be used efficiently and without risks of contamination/hazards at an optimum level.

## References:

1. AGP Guidelines (Questionnaires) on Environmental Audit.
2. Sindh Environmental Protection Act, 2014
3. Sindh Water Management Ordinance 2002
4. “An Analysis of Knowledge Gaps in Climate Change Research”, by Ghulam Rasul, Vol7, Issue 13, Pakistan Journal of Meteorology.
5. “Water Resources in the South: Present Scenario and Future Prospects”, by Commission on Science and Technology for Sustainable Development in the South (COMSATS)”, by Muhammad Hanif
6. “Investigation of Rainfall Variability for Pakistan”, by Ghazala Naheed, Ghulam Rasul, Vol. 7, Issue 14, Pakistan Journal of Meteorology.
7. “Rainfall Trends in Different Climate Zones of Pakistan”, by Salma, S., S. Rehman, M.A. Shah, Vol.9, Issue 17: Jul 2012, Pakistan Journal of Meteorology.
8. “Vulnerability of the Indus Delta to Climate Change in Pakistan” by Rasul, G., A. Mahmood, A. Sadiq, S.I. Khan, Vol. 8, Issue 16: Jan 2012, Pakistan Journal of Meteorology.
9. Preparation of Environmental Audit Reports on risk to the Environment, EPA Victoria, publication number 952.5, December, 2015 (for having insight into guidelines in respect of environmental audit).
10. “Plantation forests, climate change and biodiversity”, by S.M. Pawson, A. Brin, E.G. Brockerhoff, D. Lamb, T.W. Payn, A. Paquette, J.A. Parrotta, Biodivers Conserv (2013) 22:1203-1227.
11. “Sindh Water Resources Management- Issues and options” by A. Azad, FAO Investment Centre Occasional Paper Series No.15, Rome.
12. “Climate Change and Precipitation in Pakistan – A Meteorological Prospect”, by Muhammad Sohail Gadiwala and Farkhunda Burke, Pakistan Metrological Department, University road, Karachi, Department of Geography, University of Karachi, Int.j.econ.enviro.n.geol.Vol:4(2) 10-15, 2013.
13. “Climate Change in Pakistan – Focused on Sindh Province”, Technical Report No.PMD-25/2012, Pakistan Meteorological Department, Islamabad, By Dr. Ghulam Rasul and others
14. “Guidelines for Project Management” by Projects Wing Planning Commission, Government of Pakistan, Islamabad.

15. “Lower Indus Basin Irrigation System: A Critical Analysis of Sindh Water Challenges 2014-15”, by Indus Consortium, Humanitarian, Environmental & Development Initiatives- OXFAM.
16. “Presentation on Institutional Reforms Experience in Sindh Province” by Shuja Ahmed Junejo, Ex-Secretary, Irrigation and Power department Govt of Sindh.
17. “Situational Analysis of Sindh Coast – Issues and Options”, Managing Natural Resources for Sustaining Future Agriculture, Research Briefings, Volume (2), No (11), 2010, by Sidra Majeed, Sumia Bint Zaman, Irfan Ali and Dr. Shahid Ahmed.
18. “Environmental Audit- A Simple Guide”.
19. “Cattle in Sindh hit by Viral Diseases”, from papermagazine – Published March 13, 2011.

**1. Mass scale Tree Plantation outside Forest area to mitigate Climate change affects in Sindh (2013-14 to 2017-18) Rs705.000 million All Social Forestry Divisions**

As per progress report as on 31-03-2016, only Rs42.381 million expenditure was incurred during 2013-14 & 2014-15, out of approved cost of Rs705.000 million, that is only 6.0%, which shows that only a nominal progress has been made during first two years of the project and thus contributions towards betterment of climate.

- How project objectives would be achieved during the remaining period of 27 months whereas only 12% expenditure incurred out of 100%.
- Pace of progress of expenditure is irregular as only Rs42.381 million were spent during 2013-14 & 2014-15 (in two years) whereas heavy amount of Rs41.366 million was spent during just 09 months of 2015-16.
- The progress upto 2014-15 shows weak performance in various areas/components of the project like Raising of new canal side plantations, linear plantation along various roads, raising of macro size plants etc. against targets set in PC-I.
- The provision of some inputs in the PC-I has been made but no procurement made despite of lapse of around 3 years out of 5 years project life.
- Project objectives are framed without proper survey of the field work, feasibility and attainability of objectives, as they are broadest ones and without quantitative outputs and climatic effects area-wise. For instance, employment generation, poverty alleviation etc. are mentioned but no survey of surrounding areas, wherein field work is to be done, has been worked out. The impact of climate, as a result of this project, has also not been worked out, as the scheme itself envisaged mitigation of climatic change affects in Sindh.
- The basic scope/functions in the field areas of Forest departments in various districts of Sindh covers same functions assigned to social forestry and afforestation divisions but no progress has been mentioned, that is before start



of this project, in order to assess their working/output for betterment of forestry and thus contribution to climate and also evolving latest methodologies in the wake of climatic changes in Sindh.

**2. Establishment and Management of Network of Biodiversity Parks in Sindh (2013-14 to 2015-16) Rs494.000 million (Social Forestry Sukkur/Khairpur, Afforestation Division Larkana/M-Mathelo/Sukkur/Hyderabad/Khairpur/Thatta/Dadu, Range Management Mirpurkhas.**

- The period of the project completion has been fixed for 3 years (2013-14 to 2015-16). However, as per progress report, Rs1.402 million expenditure has been incurred out of approved cost of Rs494.000 million over about 3 years now. It shows that the project has failed to achieve its set objectives defined in the PC-I document and only one washroom has been constructed over the years whereas no such non-civil / environment related work, as per PC-I has been executed. Moreover, no work is required to be executed in Districts Hyderabad & Mirpurkhas, as per ADP Scheme approved.
- Audit observed that the performance of the project is nil as no work has begun in the light of set objectives of PC-I.

**3. Enhancing Tree Cover on State Forest Lands in Sindh (2013-14 to 2017-18) Rs708.000 million (All Afforestation Divisions except Thatta, SFDP Division, Hyderabad/Thatta, Sericulture Division, Hyderabad)**

As per progress report as on 31-03-2016, only Rs47.025 million expenditure was incurred during 2013-14 & 2014-15, out of approved cost of Rs708.000 million, that is only 6.64%, which shows that only a nominal progress has been made during first two years of the project and thus failures in achievements of contributions towards betterment of climate.

- How project objectives would be achieved during the remaining period of 27 months whereas only 12% expenditure incurred out of 100%.
- Pace of progress of expenditure is irregular as only Rs47.025 million were spent during 2013-14 & 2014-15 (in two years) whereas heavy amount of Rs40.242 million was spent during just 09 months of 2015-16.

- The progress upto 2014-15 shows weak performance in various areas/components of the project like Afforestation in riverine forests, IPs etc. against targets set in PC-I.
- The provision of some inputs in the PC-I has been made but no procurement made despite of lapse of around 3 years out of 5 years project life.
- Project objectives are framed without proper survey of the field work, feasibility and attainability of objectives, as they are broadest ones and without quantitative outputs and climatic effects area-wise. For instance, employment generation, poverty alleviation etc. are mentioned but no survey of surrounding areas, wherein field work is to be done, has been worked out. The impact on climate, as a result of this project, has also not been worked out.
- The basic scope/functions in the field areas of Forest departments in various districts of Sindh covers same functions assigned to social forestry and afforestation divisions but no progress has been mentioned, that is before start of this project, in order to assess their working/output for betterment of forestry and thus contribution to climate and also evolving latest methodologies in the wake of climatic changes in Sindh.
- How many trainings, workshops, seminars and field visits conducted with farmers for the purpose of awareness and training in bee keeping, apiary establishment and processing of Honey and other bee products and its marketing.
- Research conducted on various aspects of forestry including propagation of medicinal and aromatic species.
- How many Research & development activities conducted on bee keeping so far introduced in the province of Sindh and its climatic impact.
- How many persons trained in bee keeping and recruitment procedure followed.
- How monitoring & supervision of field work performed without procurement of vehicles, as per progress report.
- How aim of bringing up the gap between supply and demand of energy resources achieved.

#### **4. Rehabilitation, Restoration and Management of Flora & Fauna in Pai Forest of Afforestation Division, Shaheed Benazirabad, (2012-13 to 2014-15) Rs77.714 million**

As per PC-I the project objectives consist of various areas for betterment of environmental effects like greenhouse gases and so on. However, the project approved cost is Rs77.714 million for the period from 2012-13 to 2014-15, which has been ended whereas the expenditure incurred was Rs139.92 million upto 30/06/2015, as per progress report.

- As per PC-IV, actual expenditure incurred of Rs70.708 million and completed in 2014-15. However, as per Progress report upto 30/6/2015, Rs139.92 million (Rs95.086 million upto June, 2014 & Rs44.836 million upto 30/6/2015) has been incurred, which shows Rs62.20 million (80%) spent over and above approved cost of the project.
- No revised PC-I and approval of revised estimate was obtained.
- Some variations in the achievements of project were noticed like 50,000 feet work done of “Fencing of Odki wall along boundary”, as per progress report versus 56,000 feet work done as per PC-IV, which created ambiguity in respect of actual work done.
- Non-achievement of target in the component “New plantation in harvested areas (acre) of 50 acre against 198 acres.
- Purchase of 07 Motorcycles against approved 06 as per PC-I (economy).
- Actual expenditure on component of “Fencing Odki wall along boundary” of Rs6.750 million against Rs6.000 million approved cost, as per PC-I.
- No Third Party Monitoring expenditure was incurred and thus tantamount to no monitoring of the project was exercised.
- As per Progress report upto 30/6/2015, work on “Raising of container plants” done is 461,000 (Nos) whereas as per PC-IV target of 700,000 achieved, which is contradictory. However, during field visit, it was observed that remaining container plants were lying in the nursery instead of their plantation in the field, as the project has already been completed in the year 2014-15, which shows non achievement of the project objectives to contribute by mitigating climatic adverse effects.

- No efforts taken for afforestation in degraded/ depleted forests.
- As per progress report 110 pair of species were purchased in the light of PC-I. However, during field visit, it was noticed that only 35 pair of ducks, rabbits, peacock and teetar were found in the cage for their rehabilitation/breeding of indigenous species, which are readily available and seen outside the cage in Pai forest. The procuring agency should have purchased extinct species instead of local ones.
- No efforts undertaken before the commencement of this project in respect of following areas, as the reason of this project and its necessity is explained in the PC-I on the following grounds:
  - i. Deterioration of adjacent Mari Reverine Forest and its rehabilitation.
  - ii. Measures to curb illicit cutting for fuel wood requirements.
  - iii. Measures taken to get occupation of forcible encroachment of that forest by the landowner so that environmental degradation and its adverse impact on climate could be mitigated.
- Measure of increasing tree cover and indigenous species.
- No work done of removal of Eucalyptus trees as per PC-I.

**5. Habitat Restoration & Promotion of Ecotourism through Development of Wildlife Sarari in Booharki Forest, District Badin (2010-11 to 2014-15) Rs250.000 million (Afforestation Division, T.M Khan)**

As per progress report as on 30-06-2015, only Rs162.000 million expenditure was incurred during 2010-11 to 2014-15 (05 years), out of approved cost of Rs250.000 million, that is only 65%, which shows slow progress has been made at the close of project period.

- As compared to PC-I document, targets in different components had not been achieved as per progress report like less “plantation on reclaimed areas” of only 42 acres against target of 230 acres, “silt clearance of minors / water courses” of 675,000 cft against target of 1,225,000 cft and purchase of birds / animals of only 7 pairs out of 621 pairs.

- The position shows non-achievement of set objectives in the light of PC-I and thus failure of project of Habitat restoration and promotion of ecotourism through development of wildlife safari in Booharki Forest in Badin.
- As the project period has been lapsed but no reasons and justification has been furnished to Audit for non-completion of project within due time period
- No progress of Establishment of Game Reserves at Booharki Forest, procurement of key wildlife species, efforts for Conservation and Improvement of water resources, number of land usage expended and livestock increased, Biodiversity management / conservation and its sustainability efforts taken with the focus on promoting education, awareness and scientific research among local community, Development of monitoring & evaluation system for project area, Hunting areas developed for promotion of ecotourism and measures taken for controlled hunting and Awareness campaigns launched for Game Management.

**6 Conservation, Development and Management of Indus Delta Mangroves to Check Sea Intrusion (2011-12 to 2017-18) Rs631.670 million (Karachi, Thatta, Sajawal & Badin)- PD, CDMIDMCSI, Karachi**

**PROJECT OBJECTIVES**

- Degraded areas wherein plantation of mangroves done.
- Rehabilitation of existing sparse mangroves in areas.
- Mechanism adopted of surveillance and monitoring of mangroves of Indus delta.
- Employment and income generation opportunities created through project activity.
- How capacity building developed of human resource of Sindh Forest department.
- How participatory natural resource management techniques adopted.
- What eco-tourism activities created?

In the light of above project objectives, the local office did not provide details in the light of Questionnaire furnished to them.

**7. Geo-Referred Demarcation and Construction of Earthen Bunds for Protection of Previous Forestland and Upgradation of GIS Laboratory at Hyderabad (2013-14 to 2015-16) Rs246.483 million (Afforestation Division Hyderabad/Shahed Benazirabad/Sanghar/Thatta/T.M Khan/Kandhkot/Shikarpur/Larkana/Dadu/Sukkur/Khairpur/Mathelo)-(Social Forestry Division Sukkur, Range Management Division, Karachi)**

As per progress report as on 31-03-2016, only Rs9.083 million expenditure was incurred during 2013-14 to 2015-16 (02 years & 9 months), out of approved cost of Rs246.483 million, that is only 3%, which shows negligible progress has been made at the close end of project period and thus failures in achievements of contributions towards betterment of climate by construction of earthen bunds for protection of precious forestland.

- How project objectives would be achieved during the remaining period of 02 months only whereas only 3% expenditure incurred out of 100%.
- The progress as on 31/03/2016 (about 03 years) shows negligible/bad performance in various major and essential areas/components of the project like “construction of earthen protection bunds” of 08 Km out of 100 Km, “Afforestation of 50 feet wide green strips along boundaries” of only 10 hectares out of 200 hectares targets set in PC-I.
- Project objectives are framed without proper survey of the field work, feasibility and attainability of objectives, as they are broadest ones and without quantitative outputs and climatic effects area-wise.
- In what areas/locations demarcation of forest lands done.
- In what areas/locations earthen protection bunds were constructed.
- In what areas/locations live tree hedges / strips established surrounding forest lands.
- What devices/ software equipped in the GIS Labs and what progress/output achieved and functions performed during the last three years.
- How management capacity increased and in what fields.
- How much work done on linear plantation along roads/canals of Sindh.

**8. Possible role of Mangroves in curbing sea intrusion in Indus Delta (2010-11 to 2016-17) Rs698.110 million (Thatta & Sajawal), Coastal Forest Division, Karachi.**

As per progress report as on 31/03/2016, the objectives of the project have not been achieved in the light of objectives envisaged in PC-I, which are as follows: -

- Only 10,665 (hectares) “Mangroves planted” out of 44,000 hectares, only 320 hectares “Mangroves sand dune stabilization plantation” done against 1,000 hectares and only 380 hectares “inland block / liner salt tolerant plantation” work done against 5,000 hectares, which shows nominal progress of the project objectives during period 2010-11 to 2015-16.
- No work has been commenced on the various components/items of the project like “re-stocking, community mobility & incentive based programme”, “research & development programme”, “training & consultancy programme” and “Third party monitoring system”.
- Only Rs95.743 million expenditure has been made against approved cost of Rs698.110 million during period 2010-11 to 2014-15 and Rs30.974 million during 09 months of 2015-16.
- Only 18% expenditure has been incurred during 2010-11 to 2015-16 (9 months of 2015-16), which shows negligible performance of the Department in 6 years whereas only one year is left of the project completion cycle and the department has yet to utilize heavy amount of Rs 571.400 million (126.71 million out of 698.110 million during 6 years).
- How project objectives would be achieved during the remaining period of project cycle, which are mandatory to be addressed in the light of their significance and impact on climate in Sindh especially Coastal Belt.