TERMINAL EVALUATION REPORT

COMPREHENSIVE REDUCTION AND ELIMINATION OF PERSISTANT ORGANIC POLLUTANTS IN PAKISTAN

GEF Project ID: 4477
UNDP Project ID (PIMS #): 4600
Evaluation Period: Nov 2020 – Feb 2021
Date of Evaluation Report: 28 Feb 2021
Country and Region: Pakistan, South Asia
GEF Operational Programme: POPs
GEF Agency: UNDP
Executing Partner: Ministry of Climate Change

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i EXECUTIVE SUMMARY

Project Title:	**Comprehensive Reduction and Elimination of Persistent Organic Pollutants in Pakistan**		
UNDP Project ID (PIMS #):	4600	**Project duration**	60 months
GEF Project ID (PMIS #):	4477	**CEO Endorsement Date:**	19 Nov. 2014
ATLAS Award ID:	00081936	**Project Document (ProDoc) Signature Date (date project began):**	20 March 2015
Country(ies):	Pakistan	**Date project manager hired:**	
Region:	Asia	**Inception Workshop date:**	11 November 2015
Focal Area:	Persistent Organic Pollutants	**Midterm Completion date:**	15 Sep. 2018
GEF-5 Strategic Programs:	Objective 1: Phase out POPs and Reduce POPs Releases	**Planned closing date:**	31 Dec. 2020
Trust Fund:	GEF TF		
Executing Agency:	Ministry of Climate Change		
Other execution partners:	Nil		

Project Financing	**At CEO Endorsement (US $)**	**Realized at TE- April 2021 (US $)**
GEF Project Grant	**5,150,000**	**5,062,410**
Co-Financing	**34,234,822**	**15,855,165**
- **Ministry of Climate Change**	2,070,000	2,070,000
- **PARC/NARC**	4,500,000	5,925,000
- **Pesticide Residues Lab, Peshawar**	100,000	0
- **Pesticides Residues Lab Faisalabad**	4,000,000	0
- **IESCO**	7,906,000	2,500,000
- **UNDP**	300,000	410,165
- **PESCO**	3,100,000	1,800,000
- **K-Electric**	7,000,000	1,000,000
- **ECO Conservation**	2,000,000	0
- **Bestway Cement (ex-Lafarge)**	1,000,000	500,000
- **Bond**	761,222	0
- **PCRWR**	597,600	0
- **Geo Links Private Limited**	0	100,000
- **HESCO**	0	750,000
- **GEPCO**	0	800,000
Grand Total	**39,384,822**	**20,917,575**

Project Description

The attention towards the hazardous effects of POPs pesticides and PCBs in Pakistan was drawn in early 1990s, when cotton crop boomed with heavy use of pesticides, but leading to continued emerging hazards to humans/ environment as well as development of resistance in pests against pesticides. POPs emerged as a major environmental threat, when it was found that during the super-floods in 2010 in the Khyber Pakhtunkhwa (KP), Punjab and Sindh and 2011 floods in Sindh resulted in washing away of the many stocks of pesticides. Consequently, the Ministry of Climate Change and UNDP, with funding support of the GEF, geared up to address this issue through a project on reduction and safe disposal of POPs pesticides and PCBs.

The objectives of the project is to reduce environmental and human health risks by enhancing management capacities and disposal of POPs in Pakistan through developing the regulatory system, safe disposal of 1,200 tons of pesticidal POPs and 300 tons of PCBs, while and enhancing the management capacities and disposal of POPs and PCBs. It was envisaged that by establishing a proper regulatory and monitoring system and enhancing the disposal capability of the country, the project will ensure that further POPs stockpiles could be effectively and safely disposed. The project has four components, viz., Component 1. Development and implementation of a Regulatory, Policy and enforcement system to reduce POPs releases; Component 2. Capacity building of local communities and public and private sector stakeholders to reduce exposure to and releases of POPs; Component 3. Collection, Transport and Disposal of PCBS and POPs Pesticides and Component 4. Monitoring and evaluation which is cross-cutting among the components.

Purpose and Methodology

The Terminal Evaluation (TE) main objectives includes assessment of the achievement of project results and to draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming. The TE helps demonstrate accountability for the expenditures to date and the associated delivery of outputs and assess relevance, effectiveness, efficiency, country ownership, mainstreaming, sustainability, impacts, lessons learned and future recommendations to ensure sustainability and effective and efficient future programming. The Terms of Reference (ToRs) for the TE are given in greater detail in Annex 1.

The TE was conducted by a team of two consultants, an International and a National Consultant. The TE focused on reviewing project documents and interacting with the Project's key stakeholders, including the GEF Implementing Agency UNDP, the Executing Agency Ministry of Climate Change (MOCC), Project Management Unit (PMU), Environmental Protection Agencies (EPAs), National Agricultural Research Centre, National Electric and Power Regulatory Authority (NEPRA), Islamabad, Electric Supply Companies, K-Electric, Karachi, Geolinks, Karachi, Bestway Cement, Kalar Kahar, Department of Plant Protection, Karachi, pesticides dealers, and various agriculture departments. Due to COVID-19 pandemic most of the consultations were made over zoom/phone calls. A one-day field mission was conducted to observe the POPs disposal facility at the Bestway Cement Ltd., and to interact with the general public around the cement plant to gauge their opinion about the flu gases from the cement kiln while burning POPs pesticides and PCBs.

Evaluation Rating Table

The project produced updated National Chemical Profile which was submitted to the Stockholm Convention secretariate as per international commitment; it developed policy for the management of POPs in the country; guidelines/protocols for taking inventory of POPs, safe handling, management, transportation and disposal of POPs; provided equipment to the national laboratories for testing of POPs; made arrangements for the disposal of 786 metric tons of pesticides in a cement kiln and the facility of Geolinks; it also disposed 52 metric of PCB contaminated oil following BAT/BEP; and have made arrangements for the replacement of 300,243 litres of POPs contaminated oil- 83% of which is already disposed in the cement kiln and the remainder is in progress. Thus, the project has created the capacity of monitoring, testing and disposal of POPs, created mass awareness among the workers in the industries and power companies. Before the project, there was no policy regarding the management of POPs, the project has drafted policies, and drafted rules and regulations which are awaiting enactment by the government. At present there is no POPs pesticide stockpile available in the country for taking any action. Thus, the project has fully achieved its objectives, **and Rating 5 (Satisfactory) has been awarded to the project**.

Table 1. Rating of project performance

Rating the Project Performance Criteria	Rating
Monitoring and Evaluation: Highly Satisfactory (HS), Satisfactory (S) Moderately Satisfactory (MS), Moderately Unsatisfactory (MU), Unsatisfactory (U), Highly Unsatisfactory (HU)	
The overall quality of M&E	**MS**
M&E design at project start-up	**MS**
M&E Plan Implementation	**S**
IA & EA Execution: Highly Satisfactory (HS), Satisfactory (S) Moderately Satisfactory (MS), Moderately Unsatisfactory (MU), Unsatisfactory (U), Highly Unsatisfactory (HU)	
The overall quality of Implementation / Execution	**S**
Implementing Agency Execution	**HS**
Executing Agency Execution	**S**
Outcomes: Highly Satisfactory (HS), Satisfactory (S) Moderately Satisfactory (MS), Moderately Unsatisfactory (MU), Unsatisfactory (U), Highly Unsatisfactory (HU)	
Overall Quality of Project Outcomes	**HS**
Relevance: relevant (R) or not relevant (NR)	**R**
Effectiveness	**HS**
Efficiency	**HS**
Sustainability: Likely (L); Moderately Likely (ML); Moderately Unlikely (MU); Unlikely (U).	
The overall likelihood of risks to sustainability	**ML**
Financial resources	**L**
Socio-economic	**ML**
Institutional framework and governance	**L**
Environmental	**L**
Impact: Significant (3=S), Minimal (2=M), Negligible (1=N)	
Environmental Status Improvement	**3**
Environmental Stress Reduction (rate 3 pt. scale)	**3**
Progress towards stress/status change (rate 3 pt. scale)	**3**
Overall Project Results	**S**

Summary of Conclusions, Recommendations and Lessons Learned

Summary of Conclusions

The project is directly related to the GEF's Persistent Organic Pollutants focal area and addresses Pakistan's environment and development priorities. Pakistan as party to the Stockholm Convention under Article 6 is obligated to provide for the environmentally sound disposal of POPs stockpiles. The first objective of any POPs disposal project is to have a comprehensive inventory of the POPs pesticides and PCBS. During the green revolution period, Pakistan, imported tens of thousands of chlorinated hydrocarbons to control crops and household pests, and these were distributed in all the agricultural areas across the provinces. However, when awareness about these pesticides started in early 1990s, these were left abandoned in field stores, without taking any protective measure. In fact, due to extremely deteriorated conditions of stores and pesticides containers, no one visited these stores.

The project initiated a novel exercise and completed the inventory of POPs pesticides which is given in the Chemical Profile of Pakistan, and tested oil from 4,184 transformers sampled from all the provinces, Azad Jammu & Kashmir (AJK), and Gilgit & Baltistan (GB). It was found that in total 786 metric tons POPs pesticides were in stockpiles, the figure of 1,200 metric tons set as a target in the ProDoc was incorrect. The project collected all the POPs pesticides from all over the country and disposed it – 443 metric tons at the Bestway Cement, and 343 metric tons at the Geolinks facility Karachi. Of the total 4,184 transformer oil samples, only 161 samples (3.8%) were positive for PCBS (limit exceeding the permissible level of 50 ppm). The project disposed 52,000 litres of PCB contaminated oil at the Bestway Cement up till the project end and planned to dispose 300,243 liters of contaminated oil during 2021. **The process was delayed due to COVID-19 pandemic**. The remainder quantity has been disposed by end April 2021 . K-electric, Karachi informed that it has tested all its transformers and none is now having PCB contaminated oil. This a good example for other companies to follow. EPA Punjab informed

that it has already undertaken an inventory of small entrepreneurs engaged in transformer repair and re-processing of transformer/automobile oil in the province and is geared to enforce the BAT/BEP for contaminated oil.

On the regulatory and policy side, the project prepared the draft regulation on POPs management at the federal level; prepared National Technical POPs Management Guidelines for adoption at federal and provincial levels along with documents on (i) POPs legislation; (ii) POPs pesticides; (iii) PCBs; (iv) industrial and unintentional POPs; (v) imports and exports of POPs and (vi) contaminated sites; and Developed the PCBs Management Plan. At present, the EPA's do not have the mandate to monitor PCBs in transformer oil, once the rules are enacted by the federal and provincial governments, EPAs will be empowered to initiate monitoring of PCBS. The project updated the National Profile for Chemicals Management in December 2019; which aimed at assessing the overall situation of chemicals including their import, export, management status, infrastructure, relevant national capacity, disposal and safe disposal of chemicals in line with global conventions. This plan was submitted to the Stockholm Convention Secretariat as a part of Pakistan's global commitment.

The project undertook a series of capacity building and awareness initiatives, such as training of 1,295 persons through 35 training sessions which included staff from agriculture and energy sectors, provincial EPAs, private sector, customs, industry, representatives of the Chambers of Commerce and Industry, academia, and communities. It trained operators from 22 industrial sectors on POPs reduction utilizing BAT/BEP. Of the total trainees, 300 were women.

The project implementation in the first half of its life, faced several issues, like frequent transfers of the key ministerial staff, non-availability of international consultants, and the handing over of the stock of POPs pesticides by the provincial government to the disposal firms engaged for the purpose. The COVID-19 pandemic in 2020 also slowed down the implementation.

In terms of impacts, the project has certainly contributed to the reduction of risks of exposure of POPs to humans and biodiversity. Considerable technical manpower has been developed to deal with POPs, and legislation is developed to deal with the situation. However, the government has yet to establish proper enforcement mechanisms to manage the PCBS. Currently, the government agencies, such as EPAs are resource constrained to deal with the situation. The TE team was able to find chlordane in hardware stores for the control of termites, though it was never registered in the country. This requires EPAs and the district governments to be vigilant with the situation.

In terms of financials, at the end of financial year 2020, the project delivered US $ 4,318,124 against total budget US $ 5,150,000 for GEF. In addition, the project committed US $ 744,286 for the disposal of 300,000 litres of PCB contaminated oil and provision of PCB free oil to public power companies. It was committed but not accomplished in 2020 due to COIVD-19 related lockdowns. **The overall delivery by April 2021 was 98.3% for GEF.**

Bestway Cement (formerly Lafarge Cement) invested an amount of US$ 500,000 for the upgradation of their facilities to dispose POPs as per BAT/BEP. In addition to the co-financing commitments honoured by various organizations, Geolinks (US $ 100,000) and Ecotoxicology Laboratories (US$ 5.925 million) carried out additional investments in their respective area of responsibility which could be considered as a supplement measures in the overall efforts towards POPs eradication. The MOCC contribution was considered to be US$ 2,070,000 in the form of cost of office space/venues for meetings and trainings and staff time engaged in coordination, advocacy to minimize POPs and follow ups with various provincial governments and ministries. K-Electric a private company expended about US$ 1,000,000 to test all the transformers in its jurisdiction and replaced the PCB contaminated oil. It claims that at present none of the transformers in its jurisdiction is contaminated with PCBS. The other co-financiers (Pesticides Residues Labs, Peshawar and Faisalabad, ECO Conservation, Bond, and PCRWR) did not provide any co-finance, whereas additional co-financing was from Geolinks Pvt. Ltd., HESCO and GEPCO. The total co-finance mobilized was **US$ 15,855,165**, against a commitment of US$ **34,234,822.**

Recommendations

The TE recommendations are outlined below in **Table 2**, which aim at ensuring sustainability and future programming.

Table 2. Terminal evaluation recommendations

#	Recommendation	Responsible	Time-frame
A	**Sustainability**		
1	To ensure the sustainability of POPs pesticides free environment, the federal and provincial EPAs should remain vigilant about any illegal import or sale of POPs pesticides in the country. If any stock is found, the MOCC should take over the stock, contain it securely to avoid immediate risks and get it disposed as quickly as possible following guidelines and SOPs established by the project.	MOCC	Recurrent process
2	UNDP should work closely with the MoCC and ensure that the rules developed under the POPs project are formally approved and enacted by the concerned government department(s).	UNDP, MOCC,	December 2021
3	The EPAs should undertake an inventory of all the electric/transformer companies engaged in the business of manufacturing and repair of equipment containing mobile oil and enforce to provide the PCB contaminated oil to the designated factory such as Bestway Cement for disposal. EPAs should serve as a bridge between the industry and the Bestway Cement. Since the oil has a calorific value, it will cut the fuel cost of cement plant, which will be an incentive for it. It is a win-win situation for both the parties. Likewise, the EPAs should strictly monitor and ensure that no used mobile oil, plastic or used tyres are used as fuel in the brick kilns.	MOCC, EPAs	March 2022
4	Being a member of the Project Board and the regulatory body for the import of pesticides, the Ministry of National Food Security and Research should collect data about the illegal trade of POPs pesticides in the country and take measures to curb it. It should also initiate a "Programme on Certified Pesticides Applicators" and provide training and issue license to farmers for the use of pesticides and proper disposal of empty containers.	MNFSR	September 2021
5	To ensure long term sustainability of the project, it is proposed that UNDP may advocate to the government to submit a bill to the Parliament to establish a central "Hazardous Waste Management Authority" on the pattern of "Food Authority" in the country under the umbrella of MOCC. This authority should be established in the spirit of public-private partnership.	UNDP, MOCC	February 2022
B.	**Successor Project**		
6	MOCC should work closely with UNDP on the formulation of a successor project to reduce/eliminate hazardous chemicals wastes, other unintended POPs especially in the ship breaking industry in the Gadani area, Balochistan. The project may consolidate the successes of this project and ensure implementation and enforcement of laws/rules developed under the project.	MOCC, UNDP	June 2022

Lessons Learned

1. There have been too many outcomes in the Results Framework in the ProDoc, confused with the components, and the confusion continued in quarterly reports and PIRs. There were targets to enhance awareness but no method in the ProDoc to measure the level of awareness. The Inception Workshop is a critical event during the project life, and issues like indicators, targets, data collection methodologies, outcomes/components should be clarified at this stage.

2. The 18th Constitutional Amendment has decentralized the subject of environment and agriculture to the provinces. Since all the POPs pesticides stockpiles were in the custody of the Provincial Agriculture Departments, the project faced difficulties to have access to these stockpiles, which was a reason of slow progress initially. The provincial governments should have been taken on board at the project formulation stage or during the Inception Workshop, and the custody of stockpiles should have been transferred to the MOCC to facilitate efficient implementation.
3. The project implementation was delayed due to difficulties in assembling the project team, recruitment and availability of international technical consultants, and frequent transfers of the National Project Directors (6 in total during project life) and other staff in MOCC. The technical capacity about POPs BAT/BEP is weak in Pakistan. COVID-19 pandemic posed difficulties in the availability of international consultants as well as the travel of project staff and contractors within the country. A clear exit strategy should have been developed at the formulation stage or at least during the second half of the project to adjust the project duration with the project targets. Clearly there is a need of a Phase II project/cell in the MOCC to deal with this vital subject as it is dealing with the three international protocols to which the government is a co-signatory.
4. The project has solved the decades old issue of abandoned stockpiles of POPs pesticides but has just touched the tip of the iceberg of PCB problem regarding the use of intended POPs, and production of the unintended POPs in large scale industries and small entrepreneurs engaged in repair of electricity transformers. The private sector is also engaged in refining and recycling the used mobile oil. EPA Punjab has taken an exceptionally good step to engage the intelligence agencies to explore those dealing with the refining and recycling of used mobile oil. Similar action could be taken by the other EPAs.

5. The project has set up a system and SOPs for the collection of POPs and PCBs, transportation of these to disposal facilities and ultimate disposal according to BAT/BEP. Since the oil has a calorific value, the cement factories could reduce their cost of fuel and use released energy for co-generation. The EPAs may strike a deal with the factories to use some of their proceeds for reinvestment in POPs elimination and enforcement projects.
6. There is a continuous need for monitoring of POPs and PCBS in the environment, awareness raising about POPs and PCBS. In fact, staff of some power companies reported that before the project they had not heard the health hazards of PCB contaminated oil. There is a need for continued advocacy and awareness about POPs/PCBs.
7. The EPAs are the key institutions to implement policies, and regulations and for the exception of Punjab EPA, other EPAs lack qualified technical staff to analyze samples. Lack of coordination among the institutions dealing with POPs complicates the situation, as there is no central agency to regulate this national/global issue.
8. Lastly, enhancing the enabling environment and building national and provincial capacities complementing each other and actual demonstration of disposal of POPs/PCBs at a scale proved an exceptionally good approach to win appreciation of the government and public at large.

The project benefited from the use of some of the MTR recommendations. It helped, among other factors, in moving the project's performance from moderately unsatisfactory to satisfactory. Timely adaptive management measures were undertaken after the MTR which avoided further implementation delay.

ii ACRONYMS AND ABBREVIATION

AJK	Azad Jammu and Kashmir
APR	Annual Progress Report / Annual Project Review
BAT	Best Available Technique
BEP	Best Environmental Practice
COP	Conference of the Parties
DISCO	Electricity Distribution Company
EPA	Environmental Protection Agency
EU	European Union
FAO	Food and Agriculture Organization
GB	Gilgit Baltistan
GCMS	Gas Chromatography Mass-Spectrophotometry
GEF	Global Environment Facility
GEPCO	Gujranwala Electric Power Supply Company
GENCO	Generation Company
GHS	Globally Harmonized System
GHS	Globally Harmonized System
GLOF	Glacial Lakes Outburst Flood
GOP	Government of Pakistan
HESCO	Hyderabad Electric Supply Company
HW	Hazardous Waste
HWM	Hazardous Waste Management
IESCO	Islamabad Electric Supply Company
INGO	International Non-Government Organization
KAP	Knowledge, Aptitude and Practices
LPAC	Local Programme Advisory Committee
M&E	Monitoring and Evaluation
MNFSR	Ministry of National Food Security & Research
MOCC	Ministry of Climate Change
MT	Metric ton
MTR	Mid-term Review
NARC	National Agricultural Research Canter
NDC	Nationally Document Communication
NEP	National Environment Policy
NEPRA	National Electric Power Regulatory Authority
NGO	Non-Government Organisation
NIM	National Implementation Modality
NIP	National Implementation Plan
NPD	National Project Director
NPM	National Project Manager

PARC	Pakistan Agricultural Research Council
PBDE	Polybrominated Diphenyl Ethers
PCB	Polychlorinated Biphenyl
PCRWR	Pakistan Council of Research in Water Resources
PCSIR	Pakistan Council of Scientific and Industrial Research
PEPA	Pakistan Environmental Protection Agency
PESCO	Peshawar Electric Supply Company
PIC	Prior Informed Consent
PIR	Project Information Review
PMU	Project Management Unit (PMU)
POPs	Persistent Organic Pollutants
PPD	Plant Protection Department
ProDoc	Project Document
PVC	Poly Vinyl Chloride
SC	Stockholm Convention
SMART	Specific, Measurable, Attributable, Realistic and Time-bound
T2D	Type 2 Diabetes
TE	Terminal Evaluation
ToRs	Terms of Reference
TOT	Training of Trainers
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Programme
USAID	United States Agency International Development
USD	United States Dollar
USEPA	United States Environment Protection Agency
WAPDA	Water and Power Distribution Authority
WHO	World Health Organization

1. INTRODUCTION

1.1. Purpose of Terminal Evaluation and Objectives

The purpose of the Terminal Evaluation (TE) include understanding of how and the extent to which the intended and unintended results are accrued, and their impact on the environment and stakeholders. It is an important source of evidence of the achievement of results and institutional performance and contributes to knowledge and organizational learning. Evaluation learnings could be used to improve the design and performance of future similar projects. It is a mandatory requirement of GEF that all of its projects will be subjected to the mid-term review at mid-point and terminal evaluation at the end of project to take a stock of the results achieved against the targets set in the Project Document, record lessons learned and provide recommendations for future programming. This evaluation follows the guidance outlined in the *UNDP Guidance for Conducting Terminal Evaluations of UNDP-supported GEF-financed projects.*

1.2. Scope and Methodology

The TE provides evidence-based information that is credible, reliable, and useful. The evaluation covers the DAC criteria of evaluation viz., relevance, effectiveness, efficiency, sustainability, and impact as outlined in the TORs **(Annex 1).** Besides, it also takes into account the use of financial resources used for the achievement of results, pace of project delivery and achievement of results over time, adaptive actions taken during the course of implementation, assessment of the monitoring and evaluation system followed, gender mainstreaming, UNDP comparative advantage, GEF additionality, lessons learned and recommendations for taking any corrective action or future programming.

The evaluation relied on three tools, namely, (i) analysis of documents related with the project, national plans and policies, UNDP documents at the country level, (ii) interview of key stakeholders, and (iii) visit to the POPs disposal facility (Bestway Cement Pvt. Ltd.). The Team Leader could not undertake mission to Pakistan due to COVID-19 pandemic. The National Consultant conducted Key Informant Interviews (KIIs) via zoom, phone calls or in-person meetings. The National Consultant also visited the hardware and pesticides market in Islamabad and Rawalpindi to determine if POPs pesticides are still available in the market. The list of documents reviewed is given in **Annex 4,** and the stakeholders interviewed in **Annex 3.**

Our approach to the TE was highly participatory. A set of questionnaires was prepared for various stakeholders to be interviewed, and input to the questionnaires was solicited from UNDP and the project team. The exercise began with the validation of the Inception Report by UNDP. Only the credible and reliable information which could be verified by more than one source was presented in the report.

1.3. Structure of the Terminal Evaluation Report

The report follows the guidelines for conducting the terminal evaluations of the UNDP supported GEF financed projects. The Final Report is structured along with the following chapters:

- Executive summary, including i) Project Information Table, ii) Project Description, iii) Project Progress Summary, iv) Evaluation Rating and Achievement Summary Table, v) A Concise Summary of Conclusions, and vi) Recommendations Summary Table.
- Introduction, including i,) Purpose of the Terminal Evaluation and Objectives, ii) Scope and Methodology; Principles and Design and Execution of the IE, Approach and Data Collection Methods, Limitations to the IE, and iii) Structure of the Terminal Evaluation Report.
- Project Description and Background Context, including i) Development Context, ii) Problem that the Project Sought to Address, iii) Project Description and Strategy, iv) Project Implementation Arrangements, v) Project Timing and Milestones, and vi) Main Stakeholders.
- Findings, including i) Project strategy, ii) Relevance, iii) Effectiveness and Efficiency, iv) Progress Towards Results, v) Project Implementation and Adaptive Management, (vi) Innovativeness in

Results Areas, vii) Environmental and Social Safeguards and Progress concerned the Gender Action Plan, viii) Replication and Scalability, ix) Project Impact and untended and unintended Results both Positive and Negative, x) sustainability, and xi) Needs of the Receipt and Country Ownership.

- Conclusions and recommendations, including i) conclusions, and ii) Recommendations.
- Annexes, covering TORs of TE, evaluation matrix, example questionnaires/interview guides, rating scales, mission itinerary, list of persons interviewed, list of documents reviewed, singed UNEG code of conduct form, singed interim evaluation report clearance form, and audit trail (annexed in a separate file).

1.4. Rating Scales

As per the Guidelines for Conducting Terminal Evaluations of UNDP-Supported, GEF Finance Projects, ratings were assigned to project relevance (2-point scale), efficiency, effectiveness, objective, outcome and outcome indicators on 6-point scale; impact on 3-point scale and sustainability on 4-point scale.

1.5. Ethics/Seeking Informed Consent

The TE consultants strived to safeguard the rights and welfare of interview partners. The TE was conducted in a transparent manner and interview partners were informed about the purpose of the TE, the use, processing, and storage of the data, and measures are taken to safeguard their anonymity. The TE report ensured to avoid that individual opinions can be traced back to a particular respondent.

The TE team sought adequate representation of women and disadvantaged groups and encouraged their contributions and voicing of opinions. The signed evaluation consultant code of agreement form is given in **Annex 10.**

1.6. Audit Trail

Reviews and comments received on the draft TE Final Report are documented in an audit trail document that forms a separate annex to the TE Final Report. The audit trail lists all comments received and the responses to these by the TE consultant. Relevant modifications resulting from the audit trail are included in the final version of the TE Final Report.

1.7. Limitations

The Team Leader could not undertake mission to Pakistan due to COVID-19 pandemic. However, the National Consultant was able to conduct important meetings in-person, and conduct key informant interviews over zoom, phone calls, etc., and visit the POPs disposal facility (Bestway Cement Pvt. Ltd.) and interact with the onsite staff and communities in the neighbourhood of the plant. He was also able to visit the Rawalpindi/Islamabad pesticides market to capture the information regarding the availability of POPs pesticides in the market. Thus, sufficient data/information was collected to draw inferences given in this report.

2. PROJECT DESCRIPTION AND DEVELOPMENT CONTEXT

2.1 Project Start and Duration

The project started on 20 March 2015 for a period of 60 months but extended 2 times for a period of eight months at the recommendation of MTR to fully achieve the objectives. It was closed on 31 December 2020 and will;; be operationally closed on 30 November 2021. The extension in operational closure was mainly to complete the on-going contracts for the disposal of PCB contaminated oil which could not be accomplished in time due to COVID-19 pandemic.

2.2 Problem that the Project Sought to Address

Persistent Organic Pollutants (POPs) sometimes known as "forever chemicals" are a group of compounds that are prone to long-range atmospheric transport and deposition, and readily undergo biomagnification in food chains. The global ubiquity of POPs became apparent following detection of these in even remote regions of the earth, including polar regions, at levels posing risks to both wildlife (Barrie et al., 1992[1]) and humans (Mulvad et al., 1996[2]; Bjerregaard et al., 2001[3]). These are organic compounds that are resistant to environmental degradation through chemical, biological, and photolytic processes. Because of persistence, POPs bioaccumulate with potential adverse impacts on human health and the environment.

Of the numerous POPs that are prevalent in the environment, a "blacklist" POPs have been designated under the diplomatic signing of the Stockholm Convention in 2001. The compounds include pesticides, namely, aldrin, DDT, dieldrin, endrin, heptachlor, chlordane, mirex, and toxaphene; industrial compounds, namely, hexachlorobenzene and polychlorinated biphenyls (PCBs); and other chemical by-products, namely, polychlorinated dibenzodioxins (PCDD) and polychlorinated dibenzofurans (PCDF)—the general name "dioxins" is used for PCDDs and PCDFs. Since the recognition of POPs as dangerous chemicals, additional substances such as carcinogenic polycyclic aromatic hydrocarbons (PAHs) and certain brominated flame-retardants, as well as organometallic compounds such as tributyltin (TBT) have been added to the list of Persistent Organic Pollutants[4]. Many of the pesticides in this group are no longer used for agricultural purposes but a few continue to be used in developing countries.

The POPs are known to be particularly toxic with a strong propensity for food-chain biomagnification and have been associated with both carcinogenic and endocrine disrupting effects in a range of biota. Although the effects on human health from environmental exposure to these POPs remain unclear, there is growing concern over elevated concentrations of a broad spectrum of POPs in a range of human tissues, including venous and cord blood, adipose tissue, and breast milk. Exposure to POPs in humans can cause several negative health effects including death, cancers, allergies, hypersensitivity, developmental changes, damage to the central and peripheral nervous system, disruption of the endocrine, reproductive, and immune systems[5]. A study published in 2018 suggested that an increased level of POPs in human blood serum can be linked to Diabetes (Lee et al 2018)[6]. Recent studies have indicated that the low dose persistent organic pollutants have emerged as a new risk for type 2 diabetes (T2D). POPs can directly reduce insulin secretion of beta cells, the role of POPs may be more prominent in the development of beta-cell dysfunction-dominant T2D rather than insulin resistance-dominant T2D. Third, there are multidimensional interrelationships between POPs and adipose tissue. Even though POPs are now considered as a new risk factor for T2D, independent of obesity, POPs and obesity are mechanistically linked to each other. POPs are involved in key mechanisms linking obesity and T2D, such as chronic inflammation of adipose tissue and lipotoxicity with ectopic fat accumulation. Also, POPs can explain puzzling human findings which suggest benefits of obesity because healthy adipose tissue can be protective by reducing the quantity of POPs reaching to other organs. Fourth, non-linear dose-response relationships between POPs and T2D are biologically possible.

Due to their lipophilic properties, POPs readily accumulate in human adipose tissue following ingestion of contaminated foodstuffs and serve as a useful matrix for comparing accumulated levels in different countries. The ecotoxicological effects of POPs in the aquatic environment are of great concern. Based on the global distillation theory, POPs are volatilized into the atmosphere at tropical and temperate latitudes and are

[1] Barrie, L. A., Gregor, D., Hargrave, B., Lake, R., Muir, D., Shearer, R., Tracey, B., and Bidleman, T. F. 1992. Arctic contaminants: sources, occurrence and pathways. *Sci. Total Environ*. 122:1–74.

[2] Mulvad, G., Pederson, H. S., Hansen, J. C., Dewaily, E., Jul, E., Pedersen, M. B., Bjerregaard, P., Malcolm, G. T., Deguchi, Y., and Middaugh, J. P. 1996. Exposure of Greenlandic Inuit to organochlorines and heavy metals through the marine food-chain: An international study. *Sci. Total Environ*. 186:137–139.

[3] Bjerregaard, P., Dewailly, E., Ayotte, P., Pars, T., Ferron, L., and Mulvad, G. 2001. Exposure of Inuit in Greenland to organochlorines through the marine diet. *J. Toxicol. Environ. Health A* 62:69–81.

[4] http://en.wikipedia.org/wiki/Persistent_Organic_Pollutant

[5] http://en.wikipedia.org/wiki/Persistent_Organic_Pollutant, http://web.worldbank.org/

[6] Lee, Y. M., and D. H. Lee. 2018. Persistent Organic Pollutants and Type 2Diabetes: A Critical Review of Review Articles. Front. Endocrinol., https://doi.org/10.3389/fendo.2018.00712.

subjected to long-range transport resulting in widespread environmental contamination (Iwata et al., 1993[7]; Skaare et al., 2001)[8].

According to the U.S Environmental Protection Agency (EPA) there are links between POPs exposure and the increased frequency of diseases and/or abnormalities in wildlife species as well, including certain kinds of fish, birds, and mammals[9]. The negative effects of pesticides in the marine and coastal environments include changes in reef community structure, such as decreases in live coral cover and increases in algae and sponges and damage to seagrass beds and other aquatic vegetation from herbicides.

Sources of pollution from POPs include the improper use and/or disposal of agrochemicals and industrial chemicals, elevated temperatures and combustion processes, and unwanted by-products of industrial processes or combustion.

There are a number of International Conventions dealing with POPs and Pesticides, and Pakistan is a signatory of these. These are:

- **Stockholm Convention** on Persistent Organic Pollutants (POPs). Aims to reduce releases of POPs chemicals on a global basis. The convention entered into force on 17 May, 2004. http://chm.POPs.int/

- **Rotterdam Convention** on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade. Aim to promote shared responsibilities in relation to importation of hazardous chemicals and contribute safe use. The Convention entered into force on 24 February 2004. http://www.pic.int/home.php?type=t&id=5&sid=16.

- The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. Aims to protect human health and the environment against the adverse effects resulting from the generation, management, transboundary movements, and disposal of hazardous and other wastes. It has 170 Parties and came into force in 1992. http://www.basel.int/.

- Convention on Long-Range Transboundary Air Pollutants (LRTAP), Protocol on Persistent Organic Pollutants (POPs). The aim of the Convention is that Parties shall endeavour to limit and, as far as possible, gradually reduce and prevent air pollution including long-range transboundary air pollution. The aim of the protocol on POPs is to control, reduce, or eliminate discharges, emissions, and losses of persistent organic pollutants. The protocol entered into force on 23 October 2003. http://www.unece.org/env/lrtap/.

- **Globally** Harmonized System (GHS) for Classification and Labelling of Chemicals. Is a Globally Harmonized System (GHS) of Classification and Labelling of Chemicals promoting standard criteria for classifying chemicals according to their health, physical and environmental hazards. http://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html.

- International Convention on the Control of Harmful Anti-fouling Systems on Ships. Aim to prohibit the use of harmful organotin in anti-fouling paints. It entered into force on 17 September 2008. http://www.imo.org/conventions/mainframe.asp?topic_id=529.

- The Vienna Convention for the Protection of the Ozone Layer & The Montreal Protocol on Substances that Deplete the **Ozone Layer**. Aims protect the ozone layer by phasing out the production of several substances believed to be responsible for ozone depletion. It entered into force on January 1, 1989. http://ozone.unep.org/.

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[7] Iwata, H., Tanabe, S., Sakai, N., and Tatsukawa, R. 1993. Distribution of persistent organochlorines in the oceanic air and surface seawater and the role of ocean on their global transport and fate. *Environ. Sci. Technol*. 27:1080–1098.

[8] Skaare J. U., Bernhoft A., Wiig O., Norum K. R., Haug E., Eide D. G., and Derocher A. E. 2001. Relationships between plasma levels of organochlorines, retinol and thyroid hormones from polarbears (*Ursus maritimus*) at Svalbard. *J. Toxicol. Environ. Health A* 62:227–241.

[9] http://www.epa.gov/international/toxics/pop.htm#affect

Situation of POPs Pesticides in Pakistan

Pakistan used to hold a large stock of obsolete pesticides. The stocks accumulated up until 1980, when national requirements were purchased centrally by the Government. The quantity was estimated to lie between 3,000 and 5,000 tonnes. The stocks were held in an estimated 200 major stores and up to 1,700 field stores. The stocks comprised of organochlorines and organophosphates mainly in cotton growing areas of Punjab, Sindh and fruit and sugarcane growing areas in KP and fruit growing areas of Balochistan. The stocks held over decades were in a debilitated condition, with considerable leakage and pilferage. This posed a serious risk to those who enter the store as the store integrity and security is not good in some locations. Fortunately, after pesticide purchase moved to the private section in 1980, there has been little subsequent accumulation of pesticide stocks and hence further accumulation was not seen as a major problem.

There have been several significant past initiatives to deal with the problem. The first was in 1987 when USAID sponsored the visit to Pakistan of a team of hazardous waste disposal experts to assess the situation. The team estimated the stocks and associated hazardous materials at some 8,000 tonnes. Some of the stores visited were considered to present a danger to those entering there. The annual report 2017 of the POPs project narrates that based on the inventory survey conducted during the NIP preparation, it was recorded that there are approximately 6,033 MT of obsolete stocks of POPs pesticides (3,800 MT Punjab, 2,016 MT Sindh, 48 MT KPK, 135 MT Balochistan, 31.5 MT AJK and 0.5 MT Northern areas). Large stocks of obsolete pesticides are situated in areas of intensive cash crops/ agricultural activities.

Following the above visit of USAID/USEPA in collaboration with the Government of Pakistan and others, carried out a disposal experiment (1.5 ton of pesticide using a modern cement kiln at D.G. Khan). Although the experiment was claimed a technical success, there was controversy related to apparent bird deaths and a safety concern from the nearby community and a local opposition to cement produced from kiln burning pesticides[10].

Subsequently, a proposal to dump these expired pesticides in the desert areas of Punjab province remained under consideration of the provincial government. In fact, some landfill sites were also prepared. However, before implementation could progress several NGOs voiced their concern against this approach from environmental point of view. Later, several other half-hearted attempts to deal with the problem remained under consideration. None came to fruition, partially due to the inability of the Government organizations to find a viable solution to this problem, but mainly due to public opposition to any unscientifically proven method of disposal of these expired pesticides.

The unsuccessful results of past efforts brought in The Royal Netherlands Embassy (RNE) which became aware of this problem in 1996. It was also recognised that some of the stocks may have originated from the Netherlands and hence RNE should be called to assist in the disposal of the obsolete pesticide stocks. It was against this background that the RNE commissioned a full-scale study. The study observed that the current level of stock is not known, neither are the numbers of stores and their locations. The best estimate is 3,000 tons of pesticide stocks and perhaps 500 tons of associated waste.

Based on above, a Scoping Inventory was prepared to identify those stores and stocks posing the greatest risk to the communities. Following this inventory, a pilot project was launched to collect and dispose, by offshore incineration in Europe of 500 tons of the highest risk stock and stores. Mohsin et al. (2000)[11] reported that around 300 tonnes of obsolete pesticides and associated materials were removed from 13 stores and destroyed by incineration in The Netherlands. The other part of the project involved the analytical survey and risk assessment of the remaining 162 stores. A major part of the funding came from the Royal Netherlands Embassy, Islamabad, but with GCPF member companies covered the incineration cost of around one third of the stocks.

[10] https://www.academia.edu/11914175/Pesticides_Book_Chapter_8_PESTICIDES_USAGE_IN_PAKISTAN

[11] Mohsan, S., R. M. Shafique, W. Schimpf and L. Dollimore. 2000. Pesticide Disposal and Survey project in Punjab province, Pakistan. OECD-FAO-UNEP Workshop on obsolete pesticides – Virginia.

The unprecedented flood in 2010 in all over the country and 2011 particularly in Sindh posed a serious concern of POPs pesticides being washed away. In 2010, floods submerged 17 million acres (69,000 km^2) of Pakistan's most fertile crop land, killed 200,000 livestock and washed away massive amounts of grain[12]. At least 1.7 million acres of arable land was inundated because of the flooding in Sindh[13]. It is not documented anywhere how much pesticides were washed away with flood water, but the situation was horrible, as the areas holding stores were inundated. Khan et al. (2020)[14] have given an excellent review of the pesticides' residues in water, soil and food in the country, and the situation is alarming.

Pakistan has banned use of all severely toxic and hazardous pesticides included in the PIC and POP list in the early 1990s. In addition to PIC/ POP pesticides, several other pesticides have also been banned. All formulations of monocrotophos and methamidophos have been also banned in 1997. Practically no pesticide falling in the WHO Category I is used in Pakistan. Due to availability of comparatively safe new chemistry molecules and IGRs at competitive prices, the use of pesticides falling into WHO Category II is also declining. However, illegally the chlorinated hydrocarbon, such as chlordane (which is not registered in Pakistan) is still available in the country as was observed in the Rawalpindi/Islamabad market at the time of this Terminal Evaluation.

Situation of PCBs in Pakistan

The initial survey reports quoted in the NIP from Sindh, Punjab and KPK indicated that about 80% of the samples tested (45 samples) in the provinces had PCB levels higher than the safe limits (> 50 ppm). The samples were taken in containers of drained oil, in transformers and in soil located within the "transformer reclamation facilities", and analyzed with test kits (Clor-N-oil). The overall number of transformers installed in Pakistan (on the side of electricity production and distribution) exceeds 470,000 units. There are several studies highlighting the presence of PCBS in water, air and soil samples taken from various places in the country.

Eqani et al. 2012[15] studied the contamination of Polychlorinated biphenyl (PCBs, sum of 31 congeners) concentrations in sediments collected from the River Chenab during two years of monitoring ranged from 9.33 to 129.45 (ng g−1 dry weight) in winter and from 12.55 to 144.23 in summer. Levels of PCBs in sediments from the feeding tributaries were relatively greater. Sediments from the mainstream sites were dominated by tetra-CBs and penta-CBs, while hepta-CBs and octa-CBs were predominant in industrial and urban sites near tributaries. The Risk assessment carried out by comparing the results with established sediment quality guidelines; indicated that PCB concentrations in 35% of sediments exceeded effect range low (ELR) and threshold effect level (TEL) values, however, none of sediments showed PCB concentrations greater than the effect range median (ERM) and probable effect level (PEL) except for site S-20 (144.23 ng g−1, dry weight), which showed values higher than ERL and TEL. This site showed the highest concentration of PCBs and was located at an industrial drain receiving untreated effluents from paper, textile, rubber, and other industries from Faisalabad and joining with the River Chenab in Jhang district.

Khan et al. (2020) reported PCBs in air samples from Faisalabad, Lahore, Sheikhupura, Cheechawatni, Mianchanu and Shahdra in the range of 34 to 390; and water samples of Nullah Aik and Palkhu tributaries of River Chenab from 41 to 299 pg/m^3.

There is not any PCB management plan in place either at national or at any electric power company level, although in many cases pure PCB transformers have been found based on their label. Damaged transformers or end of life transformers are usually sent to reclamation centres without any checking of PCBs. At the reclamation centres, these transformers are either reclaimed, auctioned as a whole, or disposed of as scrap material after being drained and dismantled. Reclamation centres operate without significant protection of the worker's health or the environment.

[12] https://en.wikipedia.org/wiki/2010_Pakistan_floods
[13] https://en.wikipedia.org/wiki/2011_Sindh_floods
[14] Khan, M., M. A. Shoukat, S. A. Cheema , H. N. Arif, N. K. Niazi, M. Azam, S. Bashir, I. Ashraf and R. Qadri. 2020. Use, Contamination and Exposure of Pesticides in Pakistan: A Review. Pak. J. Agri. Sci., 57(1), 131-149.
[15] Eqani, S. A., R. N. Malik , G. Zhang, A. Mohammad, and P. Chakraborty. 2012. Polychlorinated biphenyls (PCBs) in the sediments of the River Chenab, Pakistan. Chemistry and Ecology, 28:4, 327-339, DOI: 10.1080/02757540.2012.667085.

Management Capacity of POPs in Pakistan

Monitoring of POPs in the environment is the first step towards their management. Pakistan has a satisfactory network of laboratory infrastructure. According to Pakistan National Accreditation Council (PNAC), at present there are 140 certified laboratories dealing with chemical analysis and identification throughout Pakistan. However, some of the public sector laboratories have well erected infrastructure with availability of state-of-the-art equipment. But most of the laboratories lack required operational facilities, raw material, and mobility costs. Similarly, the relevant junior staff who are the fundamental actors in operation of the laboratories do not have skilled training to look after and operate the instruments/ equipment.

Gaps in POPs management in the country

These include inadequate policies, lack of implementation mechanism, lack of planned monitoring and poor legislation to govern POPs-pesticides management, monitoring, search for suitable alternatives, liability for POPs waste disposal and remediation of sites contaminated with POPs, public information dissemination, education, and awareness. There are no guidelines to guide POPs waste management and remediation of POPs contaminated sites. In general, there is lack of will and institutional capacity to monitor and dispose POPs. The present project was designed to remove these barriers to address the issues related to POPs pesticides and PCBs.

2.3 Immediate and Development Objectives of the Project

The objectives of the project are the *"environmentally safe disposal of POPs (1200 tons of pesticidal POPs and 300 tons of PCBs) enhancing at the same time management capacities and disposal of POPs in Pakistan".* The project intended to achieve the objective of improving the regulatory system, enhancing its enforcement, raising awareness on POPs, and by establishing the capacity for POPs monitoring, handling, transport, and disposal. **This will contribute to the broader goal, which is "to reduce risk for the human health and the environment by avoiding the release of POPs in the environment and preventing people exposure to POPs".**

The project has been arranged in four components **(Table 3)**, which are as follows:

- Component 1: Development and Implementation of a Regulatory, Policy and Enforcement system to reduce POPs releases.
- Component 2: Capacity building of local communities and public and private sector stakeholders to reduce exposure to and release of POPs.
- Component 3: Collection, Transport and Disposal of PCBs and POPs Pesticides.
- Component 4: Monitoring & Evaluation.

The following is a description of expected results under each component:

Table 3. Hierarchy of project objective

Component 1: Development and implementation of a Regulatory, Policy and enforcement system to reduce POPs releases
Outcome 1.1. Strengthened POPs regulatory and policy insturments adopted and POPs managmenet systems for controlling and reducing releases of PPPS functional.
Outcome 1.2. Government enforcement agencies and other organizations invlved in regulating POPs managmeent are able to use tools developed for POPs managment and network with /regulate main agencies handling POPs.

Outcome 1.3. Governance and enforcement particularly on illegal imports framework for controlling POPs improved.
Outcome 1.4. National Chemicals Profile updated
Component 2: Capacity building of local communities and public and private sector stakeholders to reduce exposure to and release of POPs.
Outcome 2.1. Stakeholder groups aware of sources and prepared to mitigate POPs exposure and releases with specific reference to pesticide stockpiles.
Outcome 2.2. Cost effective POPs exposure mitigation undertaken focusing mainly on PCBs.
Outcome 2.3. POPs awareness among key target groups, such as decision makers, high/risk occupations etc. raised.
Outcome 2.4 Reduced POPs exposure in occupational setting.
Component 3: Collection, Transport and Disposal of PCBs and POPs Pesticides.
Outcome 3.1. Capacity to undertake POPs disposal projects at provincial level established.
Outcome 3.2. Environmentally Sound Disposal of POPs. Removal of particularly risky POPs stockpiles and the sound disposal of up to 1200 tons of POP pesticides and of 300 tons of PCB
Outcome 3.3. National POPs management and disposal scheme and replication plan developed. Based
Component 4: Monitoring and evalaution
Outcome 4.1. M&E and adaptive management are applied to provide feedback to the project coordination process to capitalize on the project needs.
Outcome 4.2. Lessons learned and best practices are accumulated, summarized and replicated at the country level and disseminated internationally.

The outcomes, outputs, indicators and targets are given in **Annex 7.** The review of output statements given in ProDoc, reveals that in fact the components are the outcomes and the outcomes listed in the ProDoc[16] are the outputs. The same hierarchy is followed in the ATLAS.

2.4. Baseline Indicators Established

In the baseline scenario, there were the following indicators. The set indicators at the project and outcome level, baseline scenario and targets set for the end of project are given in **Annex 7**:

- The Stockholm Convention (SC) requirement on POPs in the existing regulation is extremely limited.
- A harmonized regulatory system aimed at reducing release of, and exposure to POPs and hazardous chemicals is still missing.
- Awareness of institutional and Industrial stakeholders, as well as the public is low.
- POPs pesticide stockpile and PCB contaminated equipment is unsafely stored and often dispersed in the environment because of floods.
- Capacity and infrastructures for the management and disposal of POPs stockpiles and PCBs is missing.
- The initial POPs pesticides as included in the Stockholm Convention before 2009 are banned in Pakistan, through the Agricultural Pesticides Ordinance, 1971. New POPs like PFOs and brominated flame retardants are not regulated in Pakistan A PCBs regulation is completely missing. Regulation on U-POPs emission is not compliant with the SC BAT/BEP.
- Inadequate specialized skills, financial resources, equipment and working tools by respective institutions dealing with POPs; Lack of dedicated Administrative structure.
- Inadequate awareness of importers and custom officers on imports requirements.
- Inadequate POPs inspectorate services Lack of control on the export of PCB content of end-of-life electrical equipment
- A chemical profile for the country was completed in 2009 by the International Cooperation Wing of the former Ministry of Environment. The chemical profile includes description of the chemical management

[16] ProDoc Page 32-38

in the country, including regulatory framework and management of hazardous waste, which will obviously need to be updated because of the activity of the project.

- Poor information exchange and data Keeping. Inadequate resources for dissemination of information on the viable POPs alternatives.
- Lack of awareness, both for the public at large, decision makers or farmers, on public awareness on health and environmental risks associated with POP pesticides.
- Lacking information and procedures for preventing exposure to and release of POPs.
- Inadequate resources to support preparation and execution of training and awareness raising program. Lack of knowledge on safety at workplace, risk reduction, use of PPE in most industries.
- The National Implementation Plan (NIP) for POPs, Inventories approximately 6,031 MT of obsolete stocks of POPs pesticides in 430identified sites. Of these 3,800 MT are in Punjab, 2,016 MT in Sindh, 48 MT in KPK, 135 MT in Balochistan, 31.5 MT in AJK and 0.5 MT in Northern Areas of Pakistan.
- A PCB inventory is missing. Storage facilities are not safe, and POPs may be easily released in the environment.
- Storage facilities are not safe, and POPs may be easily released in the environment.
- Dismantling facilities for PCBs do not currently envisage any procedure or equipment for the safe dismantling and decontamination of PCB contaminated equipment.
- Currently the greatest part of POPs stockpiles and PCBs are not managed in an environmentally safe way. No disposal facility in Pakistan has been officially tested for disposing POPs waste.
- Disposal of obsolete pesticides have been carried out in compliance with EU BAT/BEP regulation by cement kiln incineration at Lafarge cement plan.
- The action plans for pesticidal POPs disposal and PCBs Management established in the NIP have not been implemented yet.

2.5. Main Stakeholders

The main stakeholders of the project were identified at project formulation stage and their key functions and mandate and responsibilities were adequately defined in the Stakeholder analysis section of the project document. The project was executed by the Ministry of Climate Change (MOCC) with support of UNDP Pakistan Country Office under National Implementation Modality (NIM). The project was monitored by a Steering Committee which reviewed implementation progress, endorsed work plans, provided guidance, and assisted in the resolution of issues experienced during implementation. The Steering Committee was chaired by the National Project Director (NPD) appointed by the MOCC. They role of key stakeholders is described herein:

1 Ministry of Climate Change is the focal point of all the environmental and climate change matters and is the focal point for all the all the international commitments and protocols. It is the execution arm of the government for all the GEF supported projects.

2 Ministry of National Food Security & Research (MNFSR). Prior to the 18th amendment, the ministry was responsible for agricultural research and development, legislation, import of pesticides, agricultural inputs, and commodities. However, after the 18th amendment, most of the functions have been transferred to the provinces, however, the research on national agriculture issues, procurement of food, fertilizers, seeds, etc., remain with the ministry. The Plant Protection Department is its arm which regulates the import and use of pesticides in the country and the desert locust control. Pakistan Agricultural Research Council (PARC) and the National Agricultural Research Centre (NARC) conduct research on issues of national importance, including the pesticides residues in the environment. It also builds the capacity of provincial agricultural research institutes and the research laboratories.

3 The Ministry of Health and Regulatory Services is also another important key player in this project as it deals with the health issues and regulates the use of medicines in the country. One of its affiliate institute, National Institute of Health, Islamabad, has state of the art facilities for testing poisonous residues in food and the environment.

4 National Electric Power Regulatory Authority (NEPRA). NEPRA is the authority which awards licenses to the power companies for the installation of power plants, and at the time of issuing of license, it ensures that the environmental standards are followed by the power companies.

5 Electric Distribution Companies. There are 11 companies in the country, which are responsible for the distribution of electric power throughout the country. Among these, only K-Electric is in the private sector whereas all the others are in the public sector. These companies are the major installers and users of electric transformers in the country, and maintain the transformer repair facilities.
6 Provincial Agriculture Departments are the custodians of the stockpiles of obsolete pesticides. These are also responsible for the management of insect pests.
7 Environmental Protection Agencies (EPAs). The federal EPA and provincial EPAs along with the AJK and GB EPAs have the mandate to ensure compliance with the environmental standards. These agencies issue licenses for the establishment of any industrial unit in the respective province, and regularly monitor soil, air, and water pollution.
8 Ministry of Industries and Production regulates the establishment and operation of the industrial units in the country and provides policy guidance. It also manages the major State-Owned Enterprises, including the Heavy Electrical Complex.
9 National Institute of Marine Biology based in Karachi conducts research on marine biology and monitors environmental pollution and its impact on biodiversity in the oceans.
10 Smaller industrial units and transformer repair shops. Besides big industrial units, hundreds of small industrial units and transformer shops are operating in the country, and their activities remain generally unregulated.

The project utilized the services of Transportation Company Bizxert to transport POPs pesticides and PCBs at the disposal facility. The Bestway Cement Pvt. Ltd., based at Kallar Kahar and Geolinks, Karachi were engaged for the disposal of POPs.

The project engaged, Solution Environmental and Analytical Laboratory to collect and analyse transformer oil samples from GB, AJk and KP, College of Earth and Environmental Sciences, University of Punjab, Lahore to collect and analyse samples from Islamabad, Punjab and Balochistan; CASSCO Laboratories, Karachi and Ideal Expert Services, Karachi to collect and analyse samples of transformer oil from Sindh.

Bestway Cement used the services of Solution Environmental and Analytical laboratory, Lahore, and the Green Crescent Environmental Consultants (Pvt.) Ltd., Lahore to monitor the composition of flue gases during the burning of pesticides and PCBS. Both the companies have their laboratories accredited with the Environmental Protection Agency, Lahore.

2.6. Expected Results

As stated in the ProDoc, the project is expected to produce the following results:

- Strengthened POPs regulatory and policy instruments adopted and POPs management systems for controlling and reducing releases of POPs functional.
- Government enforcement agencies involved in regulating POPs management are able to use tools developed for POPs management.
- Governance and enforcement particularly on illegal imports of POPs improved.
- National Chemical Profile updated.
- Stakeholder groups aware of sources and prepared to mitigate POPs exposure and releases.
- POPs awareness among key target groups (decision makers, high risk occupations) raised.
- Reduced POPs exposure in occupational settings.
- Capacity to undertake POPs disposal projects at provincial level enhanced.
- Sound disposal of 1,200 tons of POPs pesticides and 300 tons of PCB.
- National POPs Management Plan developed and implemented.

3. FINDINGS

3.1 Project Design / Formulation

The project design is based on a well-thought-out 3-prong strategy. The first element of the strategy is to focus on policy, regulatory measures, and the development of National POPs Management Plan to effectively regulate the import and handling of POPs in the country. The second element of the strategy is to build technical capacity of the relevant stakeholders to implement the plans; and the third element was to develop protocols, procedures and manuals and demonstrate the safe disposal of POPs pesticides and PCBs at scale following the best practices. The strategy addressed the seven areas of interventions which were identified in the National Implementation Plan (NIP) 2015 for the elimination and use of POPs in Pakistan. The NIP identified to have a sound POPs management system established and operational as soon as possible. At that time, the legal and regulatory framework and enabling technical and operational capacity building measures for POPs management were not fully in place in the country. The production, supply and use of PCBs was not specifically regulated in any way in Pakistan.

The project remains is in line with the National Environment Policy formulated in 2010 and the Vision 2025 formulated in 2014. The National Disaster Response Plan 2019 has also recognized hazards in chemical industries as the emerging issues. In 2013 in Karachi a Greek Ship Tasman Spirit wreckage resulted in release of 28,00 metric tons of oil in harbour area which caused a massive loss to the environment, marine life, and public health. No information is available regarding the PCBs in the spilled oil. The project also supports the achievement of the objectives of Sustainable Goal 6, 13, 14 and 15.

The project is consistent with the Objective 1 of the GEF 5 Chemical strategy: `*POPs waste prevented, managed, and disposed of, and POPs contaminated sites managed in an environmentally sound manner*'.

The chain of results described in the ProDoc is logical. However, there is a bit confusion in the organizations of outcomes and outputs. The three components (component 1-3) are in fact the outcomes, as these have clear set of outputs under each category. The outcomes listed in the ProDoc are in fact the outputs, and the outputs listed are the activities. This is the same way that the data has been entered in ATLAS- component referring to Activity 1-4 (or say projects). The component 4- monitoring and evaluation is in fact a cross-cutting subject covering the components- monitoring, learning, adaptive action, etc.

3.1.1 Analysis of LFA/Results Framework

At the objective level, the ProDoc listed the following five indicators:

- Extent to which provision on POPs comprehensively integrated into the regulation on chemicals, waste, environmental targets.
- Comprehensive regulation clean up targets, and guidance on POPs contaminated sites in place and tested on a number of contaminated sites.
- Extent to which awareness on POPs of relevant stakeholders measurably enhanced.
- Extent to which capacity of local communities and public and private sector stakeholders to reduce exposure to POPs and their releases enhanced.
- Percentage increase in tons of POPs pesticide stockpiles and PCBs properly managed and disposed of.

All the targets, except the third target on level of awareness among stakeholders were SMART (Specific, Measurable, Attributable, Realistic and Time-bound). The targets set for each indicator are given in the Annual Work Plans along with the estimated financial resources for each, and the end-of-project are also truly clear. **To estimate the gain in awareness about POPs, the project should have conducted a KAP (Knowledge, Aptitude and Practices) survey immediately at the initiation of project, and prior to TE but unfortunately it was not conducted.**

Under component 1, there were four outcomes (in fact outputs), and the following six indicators:

- Number of regulatory tools relevant to the management of POPs including PCBs, hazardous waste pesticides, release, and emission limits for disposal facilities, analyzed, revised and amended to consistently take into account SC provisions on POPs.
- Number of national Technical POPs Management Guidelines compliant and effectively implemented.
- Number of management and enforcement staff at national and provincial level in at least 4 provinces have enhanced skills/capacities on POPs management and enforcement.
- Number of main custom offices out of the total number which have adopted procedures and circulars establishing POPs management.
- Number of officers from all the main customs successfully trained.
- Availability of an updated chemical profile report for Pakistan.

All the indicators are SMART and clear end-of projects are given in the ProDoc.

Under Component 2, there were four outcomes and following eight indicators:

- Number of institutes and communities receiving effective Training on POPs exposure
- Percentage increase in the level of awareness of main private and public stakeholders, on cost effective POPs exposure, POPs release reduction and alternative to POPs.
- Number of people successfully trained for each relevant sector.
- Percentage of people have enhanced post training skills for safe PCB handling during maintenance.
- Number of institutes and communities effectively trained.
- Percentage of women with enhanced awareness on POPs.
- Number of specific industrial sector for which training on POPs have been effectively delivered.
- Extent to which industries have integrated POPs issues adopted into their management and supervision structure.

All the indicators are SMART and clear end-of projects are given in the ProDoc.

Under Component 3, there were four outcomes and following seven indicators:

- Percentage of inventory of POPs stockpiles mapped and digitised.
- Number of electrical equipment tested for PCB.
- Extent to which training on sampling, analysis and labelling of PCB contaminated equipment has been effective.
- Number of PCB storage and dismantling facilities effectively upgraded.
- Quantity of POPs pesticide disposed of in an environmentally safe way.
- Quantity of PCBs disposed of in an environmentally safe way.
- Existence of National POPs management and Disposal Plan with detailed plans on: (i) National scheme for POPs pesticide disposal and (ii) Management plan for PCBs.

All the indicators are SMART and have clear end of project targets. However, due to limited time available and COVID-19 pandemic work on the upgradation of PCB storage and dismantling facilities was not conducted.

3.1.2 Risks and Assumptions

Assumptions and risks for each Outcome were logically and practically identified for the project components.

The ProDoc identified the following 14 risks- applicable for various components.

1 Lack of coordination of the relevant institutions and ministries.
2 Conflicting objectives of different ministries / stakeholders which may render difficult the negotiation on an integrated regulation.
3 Lack of commitment of relevant stakeholders.

4 Timing and complexities of procedures for the examination, voting and adoption of new technical regulations.
5 Provisions on import/export activities would require bilateral agreement with boundary countries which may be difficult to implement.
6 Lack of commitment – capacity in drafting the Pakistan chemical profile.
7 Training effectiveness limited or not accurately assessed due to limited participation or limited quality control.
8 Stakeholders and interest groups not properly identified.
9 Awareness and training program not properly targeted to the audience.
10 Enterprises may not be committed to send their personnel for training or workers not allowed / not willing to leave the job for training.
11 Safety issues in some areas of Pakistan.
12 Weak governance.
13 Risks associated with climatic change issues.
14 Risk of further release of POPs pesticides and PCBs because of floods.

The level of achievement of results, and active participation of the stakeholders indicated that these were very low-level risks, since the issue of POPs pesticides, fatalities due to direct contact of pesticides, residues of these in blood of farm works, milk of lactating mothers, food items, and open dumping of pesticides containers was very much highlighted in Pakistan since 1990. Several attempts were made by the donors and government in the past to resolve this issue on sustainable basis, therefore, no resistance from any stakeholder appeared during the implementation of project activities. The KIIs with the power companies revealed that even the staff of power companies was less familiar with the health hazards of PCB contaminated oil, therefore, everyone was eager to participate in the project.

However, the power companies showed their inabilities to exercise power cuts for several days for taking the transformers to overhauling facilities for the replacement of oil, however, they were offered to replace the oil onsite, especially for the large transformers. This option was acceptable to them.

Likewise, the power companies were reluctant to replace the PCB contaminated oil with the PCB free oil at their own expenses due to the cost implications. However, the project offered to provide them PCB free oil without any cost in lieu of the PCB contaminated oil for disposal, which was accepted by the power companies.

Overall, the governance and law enforcement are weak in Pakistan, so nothing much could be done in this regard, except to wait for increase in awareness and self-regulation by the people.

The project faced a major obstacle in having the custody of pesticides stockpiles (risk 2) especially from the Sindh Agriculture Department as per the 18th Constitutional Amendment, the provincial governments are the custodians of such stocks. However, the project with the support of MOCC was able to retrieve all the identified stockpiles. It is our view that the reluctance of the Sindh Government initially could be due to the fact that some stocks as reported in the past were not there, as during Flood of 2011 this area was submerged in 10-12 feet water and the stocks have been already washed away.

The approval of the legislation by the parliament is a slow process (risk 4), and at present the government does not have a majority to get the legislation passed, therefore, this issue will take another 2-3 years until new government comes in force. Risk 5 (bilateral agreements between countries to control POPs) identified in ProDoc did not impact the project. The risk 6 (limited in-country technical capacity) was successfully averted by the engagement of international consultants. The risk 13 and 14 did not impact the project in any way as there was no major extreme weather event in the country.

A risk which was not perceived by the ProDoc is the slow industrial growth and lack of capital available to the industries for establishing processes and equipment for dealing with POPs. During the last two years, the industrial growth is negative, and the investors are not in a position to invest. However, if EPAs initiate enforcement, the action will be soon adopted by the industry.

The MTR perceived a risk that the government may not have enough funds for the continuation of activities, however, the MTR missed a major project of the government costing US$ 5.925 million to upgrade and enhance capacity of six pesticides residues laboratories in the country, and substantial allocation of funds for promoting the Integrated Pest Management federal government, European Union and the FAO.

3.1.3 Lessons from Other Relevant Projects

The project formulation capitalized the efforts made by the government, USAID and the RNE in the past to raise awareness and disposal of POPs pesticides. In fact, the awareness raised by the USAID, RNE and the NGOs paid dividend to the project in the form of little or no effort needed in the approval process, mobilization of stakeholders and implementation of the activities. The reports produced by various actors served as a baseline to start with the issue of disposal of POPs pesticides. According to ProDoc (page 8), Pakistan has received assistance for the following project which were directly related with the POPs project:

a. POPs Enabling Activity: Preparation of the POPs National Implementation Plan (NIP) under the Stockholm Convention
b. Subregional Action Plan (Asia) for PBDEs Management and Reduction
c. Global Project on the Updating of National Implementation Plans for POPs

The reports of these project and NIP provided an important insight for designing project activities and setting targets.

3.1.4 Planned Stakeholders Participation

The main stakeholder of the project is the Ministry of Climate Change. It is responsible for the state management of environmental protection, setting of national environmental quality standards, environmental monitoring and remediation and prevention. It is the focal point for the implementation of international conventions including the Stockholm Convention, the Basel Convention, Montreal Protocol, and the Minamata Convention. Each province has an Environment Department with regulatory power on environmental issues and have enacted its own Environmental Protection Act and the relevant downstream regulation. In general, with some differences, the Acts are based or reflect the National Environmental Policy and the Environmental Protection Act. The Ministry of National Food Security and Research is responsible for food security and research, management of agricultural land and regulating agrochemicals. The Ministry conducts research and monitoring activities on chemical residue in food, water, and the environment through its subsidiary organization- Pakistan Agricultural Research Council / National Agricultural Research Center. The electric power companies are interested stakeholders as they are expected to receive benefits in terms of technical assistance related to PCB regulatory tools developed under the project.

During project implementation, a Project Steering Committee met annually to review implementation progress, endorse work plans, provide guidance, and assist in the resolution of issues experienced during implementation. The Steering Committee was chaired by the Secretary, MOCC and included the following stakeholders[17]:

- Secretary Ministry of Climate Change Islamabad (Chair)
- Secretary Ministry of Food Security and Research Islamabad or representative not below the rank of Joint Secretary
- Secretary Ministry of Industries and Production Islamabad or representative
- Chairman NEPRA Islamabad or representative not below the rank of member
- National Project Director
- Representative of UNDP
- Representative of Economic Affairs Division Islamabad not below the rank of Joint Secretary.
- Director General Federal Environment Protection Agency Islamabad
- Director Environment Policy, Ministry of Climate Change Islamabad

[17] MOCC letter dated 19 August 2015

- National Project Manager (to serve as secretary to the Committee

The project engaged private sector firms in sampling, monitoring, transportation and disposal of POPs pesticides/PCBs which is mentioned in detail in Section 2.5.

3.1.5 Replication Approach

The Eco-toxicology Laboratory, NARC has been advocating for the POPs pesticides and residues of pesticides in food items, soil and water and it had published several research papers since late 1980s. In parallel to the POPs project, the Government of Pakistan, funded the Ecotoxicology Laboratories to upgrade its facilities in NARC, Islamabad, and establish satellite laboratories in other provinces, these were in Kala Shah Kaku, Tandojam, Karachi, Quetta, and Peshawar with a financing to the tune of US$ 5.925 million (PRS 800 million) for a period of five years. The project is ending in June 2021. The laboratories are fully equipped and staffed to analyze quality of pesticides, assessment of adulteration in various formulations, and pesticides residues in food items, air and water. The laboratories also conduct research on allelochemicals for the control of pests, and the Integrated Pest Management (IPM).

Besides this major project, the universities are also engaged in monitoring of PCBs in industrial effluents as part of their core programme activities. One such good publication about PCB levels at various locations in Chenab river was published by Eqani et al. (2012) [18]. Likewise, several universities are engaged in research on pollutants and PCBs in the effluents of the Hattar Industrial Estate, Haripur. It is worth to undertake a review of research conducted in this regard and target the concerned industries for adopting mitigation measures. It is estimated that of the 6,634 registered industries in Pakistan, 1,228 are considered to be highly polluting. Thus, regarding PCBS (intended or unintended), the project has just touched the tip of the iceberg and a lot more work needs to be done.

3.1.6 UNDP Comparative Advantage

UNDP's comparative advantage for the GEF lies in its global network of country offices, its experience in integrated policy development, human resources development, institutional strengthening, and non-governmental and community participation. UNDP assists countries in promoting, designing, and implementing activities consistent with both the GEF mandate and national sustainable development plans. UNDP also has extensive inter-country programming experience. Its global network of country offices underpins the role of the United Nations as a partner in 166 countries. It is one of the accredited agencies for the implementation of GEF and GCF projects and provides support to the MOCC for the preparation of annual updates/plans for reporting progress on various protocols to which Pakistan is the co-signatory. Besides mega projects, UNDP Pakistan has the experience of implementing 274 GEF Small Projects through the NGOs. Of these, 124 projects were in the area of Climate Change Mitigation, 119 on Biodiversity Conservation, 15 on Land Degradation, 10 on International Waters, 12 on Chemicals/Persistent Organic Pollutants (POPs) and 3 on community-based adaptation[19]. Thus, it has a strong network of civil society organizations to raise awareness and advance environmental advocacy agenda.

At the time of project formulation, UNDP committed to provide US$ 300,000 for project management and monitoring which was effectively done, rather at the time of TE, its contribution reached to US$ 410,165. It also UNDP facilitated the identification and fielding of International consultants to fill-up the technical capacity gaps.

[18] Eqani, S. A., R. N. Malik , G. Zhang, A. Mohammad, and P. Chakraborty. 2012. Polychlorinated biphenyls (PCBs) in the sediments of the River Chenab, Pakistan. Chemistry and Ecology, 28:4, 327-339, DOI: 10.1080/02757540.2012.667085.

[19] https://www.urdupoint.com/en/pakistan/gef-sgp-pakistan-implemented-274-projects-38-465014.html

3.1.7 Linkages between Project and other Interventions within the Sector

According to ProDoc (page 8), Pakistan has received assistance to the following project which were directly related with the POPs project:

d. POPs Enabling Activity: Preparation of the POPs National Implementation Plan under the Stockholm Convention
e. Subregional Action Plan (Asia) for PBDEs Management and Reduction
f. Global Project on the Updating of National Implementation Plans for POPs

In addition, several number of projects are indirectly related with POPs project as these contribute towards the improvement of environment, provision of clean energy and policy development.

Presently, the MOCC has a Global Project on the Updating of National Implementation Plan (NIP) which is directly related to the POPs project and is supported by the UNEP.

3.1.8. Management Arrangements

The project was implemented following the NIM modality and the project constituted a Project Steering Committee as well as a technical committee to oversee and steer the project. These committees were represented by relevant government ministries and department including UNDP. A senior official of the MOCC served as the National Project Director (NPD). A lean Project Management Unit (PMU) was established in Islamabad. The following full-time staff served in the PMU: Project Manager, Technical Advisor and Admin. & Finance Assistant. Although the project did not engage any full-time M&E Officer (not budgeted), it engaged short-term M&E consultants to monitor on the collection, transportation and handing over of the hazardous wastes at the disposal facilities, who regularly submitted the reports to PMU. This was followed by another receipt report prepared by the disposal facility about the condition of the shipment. The project leveraged several national and international consultants during implementation. The details of the consultants engaged are given in **Table 4**. It ensured the provision of high-quality expert advice to the team.

Table 4. Consultants engaged by the project for having various services

S.No.	Name of Consultant	Duration and Type of Assignment
1	Dr. Rodrigo Romero, International Consultant	June 2016– May 2017 – PCB Management System in Pakistan
2	Mr. Mohsin Kamal, Local Consultant	March 2018– Dec 2019 – National Expert on Institutional and Legislatives Issues of POPs Management
3	Mr. Omer Hallac, International Consultant	Sep 2019 – Mar 2020 – Preparation of Feasibility for Procurement and Installation of PCB Treatment Technology.
4	Mr. Boudewijn Fokke, International Consultant	Sep – Dec 2019 – Formulation of Technical Guidelines for POPs Management and Control at National and Provincial Level
5	Mr. Jose M. Cabral, International Consultant	Sep 2019 – May 2020 – Development of PCB Management Plan for Pakistan.
6	Mr. Carlo Lupi, International Consultant	Nov 2019 – June 2020 – Formulation of Technical Guidelines for POPs Management and Control
7	Ms. Zehra Sapci, International Consultant	July 2020 - December 2020 – Bioremidiation of POPs Contaminated Sites through Green and Sustainable Solution.

S.No.	Name of Consultant	Duration and Type of Assignment
8	Mr. Mouro Fasula, International Consultant	September 2020 – December 2020 - Assessment of Chemical deposition / residues on pesticides laden vegetation covers in Punjab.

In addition to regular staff and consultants, the project engaged the following consultancy firms/service providers to undertake special tasks:

a. Solution Environmental and Analytical Laboratory, Lahore- for undertaking study on PCB contaminated transformer oil in AJK, GB, and Islamabad.
b. College of Earth and Environmental Science, University of the Punjab, Lahore- for undertaking study on PCB contaminated transformer oil in Punjab and Balochistan.
c. CASSCO Laboratories, Karachi- for undertaking study on PCB contaminated transformer oil in Sindh.
d. Ideal Expert Services, Karachi- for undertaking study on PCB contaminated transformer oil in Sindh.
e. Bestway Cement Ltd., Kalar Kahar- for disposal of POPs obsolete pesticides and PCB contaminated oil.
f. Geolinks, Karachi, for disposal of POPs obsolete pesticides and PCB contaminated oil.
g. Bizxert Transport Company- for transporting POPs pesticides and PCB contaminated oil.
h. Solution Environment and Analytical Laboratory, for monitoring flue gases from kilns.
i. Green Crescent Environmental Consultants Pvt. Ltd.- for monitoring of flue gases from kilns.

The implementation was negatively impacted by the frequent transfers of the senior officers at the MOCC, particularly the NPD. During the project life, six NPDs were changed, which was major factor in slow progress as the NPDs is the chair of the PSC, and signing authority for the approval of expenditures. This requires the attention of the MOCC. The other impediment in implementation was the availability of technical international experts and travel restrictions due to COVID-19 pandemic.

3.2 Project Implementation

This sub-section covers the adaptive management, partnership arrangements, monitoring and evaluation, and finance and co-finance.

3.2.1 Adaptive Management

During the initial start-up of the project, challenges to hire, maintain and develop a full-strength PMU caused considerable delays. The problem was compounded by frequent changes of the NPD, six in all during the project. However, in 2017, a Project Manager joined who continued till the end of project. Improved situation resulted in the production of exceptionally good results.

The project followed a highly participatory and consultative approach to work with various stakeholders. For instance, it was informed by the electric distribution companies that it is difficult for them to make the transformers offline and then test the oil as the power breakdowns for longer periods creates outrage among the public at large. The project agreed with companies to test the transformer oil onsite by using user-friendly colour kits. The electric companies also reported that if the transformer is working properly, there is no need to change the oil (whether contaminated with PCB) as it is contained in the transformer and there is no question of any exposure to PCBS. The PCB issue becomes serious only when the transformers are over-hauled or undergo repair. Further, the companies reported that they are facing budgetary constraints and are not able to change the oil in big transformers. The project agreed with the companies to provide them 300,243 litres of PCB free oil in lieu of the PCB contaminated oil which will handed over to the disposal facility for disposal. At the time of TE, the contracts are in place and the process has been initiated. So far, the project has replaced 249,000 litres of contaminated oil which has been disposed properly. The remainder 51,000 litres will be replaced in coming months. This was an innovative approach to motivate the power distribution companies to eliminate POPs in their system. A private power company K-Electric reported that it has already tested all its transformers and replaced the PCB contaminated oil in all the transformers at its own expenses. It also informed that it is investing

a lot on clean energy, and one of its projects is coming soon on the installation of solar streetlights, and another on wind energy.

3.2.2 Partnership Arrangements

The project worked closely with the MOCC, MNFSR, power companies through the NEPRA, provincial agricultural departments, and the private sector. The MOCC being the lead implementing agency, played a great role in the mobilization of concerned government departments, EPAs, obtaining the custody of POPs pesticides from the agricultural extension department and obtaining the valuable input on the policy and legal framework from the Ministry of Law and Justice. Without the support of MOCC, it could not have been possible to obtain stocks of POPs pesticides from the provincial governments.

The project worked with the power distribution companies through NEPRA. The NEPRA awards the licenses to private power companies to install power stations, and one of the requirements is to have environmental compliance certification issued by the concerned EPA. Once the license is issued, then the role of NEPRA is finished. The project engaged with NEPRA and MOCC to give a role in the legislation to NEPRA to ensure environmental compliance during the operation of the power plants.

The private transformer making companies such as PEL, Heavy Electrical Complex and hundreds of small transformer repair shops remain unregulated regarding the PCB leakage. The project worked with several private transformer repair companies and tested the oil for PCBs and imparted training to their staff.

Another major stakeholder having exposure to intended or unintended POPs (produced unknowingly during an industrial process) is the industrial units, their associations and the Chambers of Commerce and Industries. The project mobilized the Chambers of Commerce and Industry, and member industries, such as textile, shipbreaking at Gadani, invited them in the awareness workshops to sensitize them about the issue, responsibilities of industries for health and safety of their staff and the environment and legal responsibilities. Likewise, the project also invited the staff of Customs Departments to make them aware of the health and safety issues, and laws which regulate the import and export of pesticides and other POPs. In total 1,295 persons were trained.

The private sector was engaged to collect the hazardous waste stocks scattered all over the country, thus also building its capacity. Likewise, no standard facility was available to burn the hazardous chemicals, it invited the private sector to develop its facilities for use on sustainable basis. For example, the Bestway Cement invested US$ 500,000 to build the temporary storage of pesticides and containers and upgrade its fuel injection system and to capture the waste heat for co-generation to the extent of 12 MW. Likewise, the Geolinks upgraded its facility in Karachi, and established a brand-new facility at Sheikhupura for this purpose. The project also invited staff of universities in the awareness workshops to sensitize them about the POPs subject to advance the research agenda on POPs. Rapid literature review revealed several research publications from Pakistan on POPs pesticides, and PCBs in air, water and soil.

3.2.3 Feedback from M&E Activities used for Adaptive Management

A superbly detailed Results Framework is given in ProDoc, along with indicators, baseline and end of project targets (Ref. Section 3.1.1.). The component 4 was specifically identified to record the monitoring and evaluation activities. The component aimed at monitoring and evaluation of results achieved to improve the implementation of the project and disseminate lessons learnt domestically and internationally. The project organized the Project Inception Workshop on 11 November 2015. The report gives an account of the project, its components, baselines, Pakistan's commitments to Stockholm Convention, and the nature and kind of work which each partner is doing. There was no revision of the indictors or targets mentioned in the ProDoc.

The project prepared the well-informed Annual Work Plans (AWPs). Monitoring visits were undertaken by the concerned UNDP staff and the NPD, and the back to office reports were produced. UNDP Programme Officer

visited various incineration facilities available in the country and finalized Bestway Cement Ltd., and Geolinks, Karachi for the purpose. The project timely produced the PIRs which described in detail the results achieved, and the adaptive actions taken. The mid-term review was conducted during August-September 2018, and TE was conducted during Nov., 21-February 2021. The project prepared the GEF Indicator Table (Tracking Tool) at the time of MTR and TE.

The service providers provided regular reports on shipments to disposal facilities, incineration report, flue gas emission reports. The project produced comprehensive reports on the testing of transformer oil from transformers from all over the country.

The financial audit was conducted on annual basis, and no significant observation was made by the audit team.

The project produced several knowledge products, such as PCB Management Plan, NIP 2019, training manuals for trainers, guidelines/SOPS for safe handling of POPs pesticides and PCBs, and POPs Draft Rules 2020. These are all available on the project website www.POPspakistan.com The adaptive actions taken by the project are given in Section 3.2.1.

The project maintains a Facebook page www.facebook/POPspakistan/ which is followed by 1,417 persons. The page lists all the new job openings, consultancies, requests for proposals, and technical information and news. It proved to be an intelligent way of disseminating the project results.

3.2.4. Project Finance and Co-Finance

The ProDoc budget for GEF was US$ 5.15 million for a period of 60 months, of which until 31 December 2020, the project has delivered 84%. The project had made commitments of US$ 744,286, which could not be met in time due to COVID-19 pandemic and lockdowns, for the disposal of 30,243 litres tons of PCB contaminated oil. The total GEF delivery by April 2021 was 5,062,410 which is 98.3% of the GEF budget **(Table 5).**

At the time of signing of the ProDoc, UNDP agreed to provide US$ 300,000 from its TRAC resources as cost-sharing. However, it increased its allocation which was US$ 410,165 by the end of 2020. **Thus, the total project delivery by the end of April 2021 was US$ 5,062,410 of the total budget. The total GEF delivery was 98.3%.**

Table 5. The financial position of the project (US $) at the time of CEO endorsement, and end project

Year	ProDoc GEF Budget	GEF Expenses	TRAC Expenses	Total Expenses
2015	750,800	153,184	39,050	192,234
2016	1,240,900	154,551	41,082	195,633
2017	1,373,500	1,030,449	119,136	1,149,585
2018	975,620	558,174	78,984	637,158
2019	809,180	811,371	72,141	883,512
2020		1,610,395	53,184	1,663,579
2021		744,286		744,286
TOTAL	**5,150,000**	**5,062,410**	**410,165**	**5,472,598**

Table 6. Co-financing by various partners at CEO endorsement, MTR and TE

Source of Co-financing	Name of Cofinancier	Type of Cofinancing	Amount confirmed at CEO Endorsement (US$)	Actual Amount Contributed at MTR (US$)[20]	Actual Amount Contributed at the TE
GEF			5,150,000	1,383,619	5,062,410
CO-FINANCING					
Government	MOCC	In-kind	2,070,000	No figure was mentioned[21]	2,070,000[22]
	PARC/NARC		4,500,000	No direct contribution (not estimated)	5,925,000
	Pesticiedes Residues Lab Peshawar		1,000,000	No direct contribution	No direct contribution
	Pesticides Residues Lab Faisalabad		4,000,000	No direct contribution	No direct contribution
UNDP	UNDP	Grant	300,000	210,000	410,165
Power Sectpr	PESCO	In-kind	3,100,000	No direct contribution	1,800,000
	K-Elecric		7,000,000	Not estimated	1,000,000[23]
	IESCO		7,906,000	No direct contribution	2,500,000
Private Sector	Eco Conservation Initiatives	In-kind	2,000,000	No contribution	No contribution
	Bestways Cement Pvt. Ltd. (Lafarge Cement)		1,000,000	Amount not estimated but reported work in progress	500,000[24]
	PCRWR		597,600	No direct contribution	No direct contribution

[20] Source: MTR Report, page 13
[21] Contributed through counterpart staff, provision of office/venue for workshops, etc.
[22] Contributed through counterpart staff, provision of office/venue for workshops, etc., coordination with other government departments/ministries, mobilization of power sector to replace PCB contaminated oil, preparation of documents for the Stockholm Convention and advocacy with the government and private sector to halt production/use of POPs.
[23] Testing of all the transformers and replacement of PCB contaminated oil.
[24] Upgradation of waste storage and disposal facility.

Source of Co-financing	Name of Cofinancier	Type of Cofinancing	Amount confirmed at CEO Endorsement (US$)	Actual Amount Contributed at MTR (US$)[20]	Actual Amount Contributed at the TE
	BOND		761,222	No direct conribution	No direct conribution
	Geolinks pvt. Ltd.	In-kind	No commitment	0	100,000
	HESCO		No commitment	0	750,000
	GEPCO		No commitment	0	800.000
Total Co-financing			**34,234,822**	**210,000**	**15,855,165**
GRAND TOTAL			**39,384,822**	**1,593,619**	**20,917,575**

The ProDoc was signed in March 2015, and the duration was extended up to 31 December 2020. The project delivery in the first half of the project was awfully slow due to the initiation problems and frequent transfers of the NPDS, however, the project delivery and production of results increased significantly during the second half of the project life.

At the time of project formulation, the government institutions and private sector provided commitments for investment in the form of parallel financing (funds not channelled through the UNDP financial system). The project did not record parallel financing investments in the PIRs. However, the TE Team found, and confirmed by the Country Office the following investments **(Table 5)** which were made during the project life:

a. Financing of US$ 5.925 million by the Ministry of National Food Security and Research to upgrade the Ecotoxicology Laboratories at the National Agricultural Research Centre, Islamabad, and establishment of pesticides research laboratories at Kala Shah Kaku (rice-wheat ecosystem), Multan (cotton-wheat ecosystem), Tandojam (rice-cotton-wheat ecosystem), Karachi (desert locust control area), Quetta and Peshawar (fruit and vegetable growing areas). This has been a major investment by the government in this sector.
b. The Bestway Cement Pvt. Ltd. invested US$ 500,000 for the upgradation of its hazardous waste disposal facilities. A new warehouse was established to store the stocks of pesticides and empty containers, upgradation of kiln to accommodate different types of fuels (including plastic and PCB contaminated oil), installation of electromagnetic precipitators to trap dust and flue gases molecules), and co-generation of about 12 MW of electric power. In fact, the company has invested a great deal of funds for rainwater harvesting from its field area to meet all the water requirements of the plant. It could be termed as a state-of-the-art GREEN INDUSTRY, which could serve as model for other industrial units.
c. K-Electric, Karachi informed that it has inspected all the transformers in its area of operation, and the contaminated oil has been replaced. At present, it has no PCB contaminated oil transformer. It also informed that its two projects are in pipeline, viz., solarization of streetlights, and installation of a wind power plant to promote clean energy in the country. Its contribution estimated to be US$ 1,000,000. Likewise, the Geolinks Pvt. Ltd., spent US$ 100,000 for upgradation of its facilities.
d. It is important to record that the contribution of the MOCC staff in implementation of project activities, especially engagement with other government stakeholders and departments, liaising to get the custody of POPs pesticides and PCB contaminated oil, and role played in the formulation of plans, policies, rules and regulations, etc., and engagement with the Ministry of Law and Justice and parliamentarians is tremendous. The cost of time and other resources of the MOCC for the project is estimated is about US$ 2,070,000.
e. The contribution of IESCO, and PESCO was estimated to be US$ 2,500,000 and US$ 1,800,000. Additional partners also invested on the upgradation of their systems and participation in project activities. The HESCO's and GEPCOs' contribution was estimated to be US$ 750,000 and US$ 800,000, respectively **(Table 5).**

Financial Audit

The project financial audit was conducted during 2016 to 2019. There was no significant audit observation during these years, except that auditors observed that the Withholding Tax should have been conducted at source, however, as per UNDP/EAD Human Resources Policy, the tax settlement is the business of individual staff as per service contracts. The second observation was that the "Implementing Partner should ensure that there is sufficient segregation of duties between the units or individuals that (a) authorise the execution a transaction, (b) record the transaction and (c) have custody over any assets involved in the transaction. However, as per UNDP/EAD policy, every project has an Administration and Finance Office who reports to the National Project Manager, and subsequently to the NPD. UNDP Programme Assistant/Associate and the Programme Officer ensure that the human resources, procurement, and financial management is as per standard policies and guidelines. Further, UNDP also made regular spot-checks and there was no anomaly found by the audit teams.

3.2.5 Monitoring and Evaluation

The monitoring and evaluation have been discussed in detail in Sections 3.1.1 and 3.2.3. The monitoring and evaluation plan given in the ProDoc was followed and data were recorded as per indicators, and reports were prepared in time. The only limitation that the team has observed is that the project did not conduct any Knowledge, Aptitude and Practices (KAP) survey at the time of initiation and close of the project. It was in fact needed to document the improvement in knowledge, aptitude and practices being followed by the stakeholders and beneficiaries. **Thus rating 5 Satisfactory has been awarded to the monitoring and evaluation.**

3.2.6 UNDP and Implementing Partner Implementation/Execution, Coordination and Operational Issues

The TE Team did not observe any coordination or operational issue faced by the MOCC and UNDP during the project implementation. UNDP and the Ministry of Economic Affairs have jointly prepared the Project Cycle Operations Manual which formed the basis of project implementation by the government stakeholders. This system was widely accepted by the government departments, as it expedites the project delivery. However, with the adoption of NIM Modality (also accepted by the Government during the UNDP Board Meeting), the finances are to be channelled through the government system, following the Public Procurement Rules and all the payments are to be channelled through the Accountant General of Pakistan. This system is quite laborious and time consuming.

The project was granted no-cost extensions two times. First extension for six months and second extension for three months. The MOCC wanted to close it with an exit strategy which was not done. The MOCC desired that since this is the only project which helps to meet its commitment to the international protocols (Stockholm, Basel and Rotterdam Conventions),

3.3 Project Results

3.3.1 Overall Results

Outcome (Component 1)*: Development and implementation of a Regulatory, Policy and enforcement system to reduce POPs releases.*

Project has updated the National Chemical Profile of Pakistan with the aggregate quantum of all chemicals in each sector. The Profile includes the legal instruments, chemical emergency preparedness response and institutional arrangements as part of the document. This is an official reference document which aims at assessing the overall situation of chemicals including their import, export, management status, infrastructure, relevant national capacity, disposal, and safe destruction, where required, in line with the concerned global conventions on chemicals. Pakistan's first national chemical profile was prepared in 2009 and now currently, it is the second updated version finalized in May 2020.

The National technical POPs management guidelines (sector-specific) have been developed and shared with all the concerned departments. Currently, the adoption and implementation of national technical guidelines on POPs management and control at provincial and federal level is under consideration to be referred in mainstream legislation, which is the domain of the MOCC and the Law Ministry. The national technical guidelines on POPs management for all sectors have been developed and shared with all the stakeholders. For POPs pesticides, project developed reports on obsolete pesticides including POPs identification, inventory, and disposal. The data collected through these reports was validated by parallel team working on National Implementation Plan update 2019 for Ministry of Climate Change. The National Implementation plan (NIP) of Pakistan (developed in 2009) has been updated using this data collected by project and shared with the Stockholm secretariat. The NIP report is available online on Stockholm convention site. As per the international standards for the transportation, and disposal of POPs pesticides and PCBs were developed and shared with the transport/disposal companies with their contracts. The guidelines for the import and export of POPs as part of

National technical guidelines have been also developed and shared with the relevant stakeholders. Policy framework for enforcement provisions related to import/export of POPs are provided in rules on POPs. The technical guidelines documents have been shared with all the relevant stakeholders including concerned custom departments for compliance. These are: Guidance on POPs Legislation; Guidance on POPs Pesticides; Guidance on POPs PCBs; Guidance on Industrial and Unintentional POPs; Guidance on Imports and Exports of POPs 'and Guidance on Contaminated Sites.

Keeping in view the overall progress achieved by project under this component (outcome) is rated as Satisfactory (Rating 5). The ratings for the achievement of various indicators for this outcome are given in **Annex 7.** The project did not conduct any KAP survey and made after training assessment that how the trained officers are applying the training in discharging their duties, therefore, it is difficult to conclude about the use of training, otherwise, the rating for this outcome could have been Rating 6, High Satisfactory.

Outcome (Component 2): *Capacity building of local communities, public and private sector stakeholders to reduce exposure to and releases of POPs.*

So far, more than 60 people have been trained for the handling and management of POPs. Further 150 people (30 females and 120 males) participated in seven workshops organized at various locations. These workshops/trainings were on the enforcement of the draft regulation. For PCBs and Pesticides analysis, Project has provided 07 Gas Chromatograph Mass Spectrometers to all the EPAs and trained their staff for identification of POPs. The analytical Guidelines and standards have been shared with all 07 provinces. Further, Project has collected and assessed 4,184 PCBs samples from all provinces. All the samples were tested, and 3.8% were found to be contained with PCBs above the permissible limits. 57 officials (6 females and 51 males) from the Customs Department were trained in Islamabad and Karachi about the rules, and guidelines for the import and export of POPs. Further, the project developed standard training manual and used it to impart onsite trainings at thirteen locations in 2019 to build the capacity of the staff of agriculture, energy and industrial sectors for the import and export of POPs and their management. Overall, 610 (558 were male and 52 were females) persons participants in these trainings. In total the project conducted 35 trainings (including 13 onsite training). Around 1,295 participants were part of these trainings coming from academia (students, professors & lecturers from universities and colleges, etc.), relevant government stakeholders (agriculture, environment, customs, industrial and power sector), representatives of community groups, electronic and print media, Chambers of Commerce and Industries, and private sector including industries associations out of which 300 were female participants. The details of the participants who were trained during onsite trainings is: 263 from Agriculture (Plant Protection and Agriculture Extension Departments), 110 from Energy Sector departments, 40 from Environment Protection Departments, 31 from industries, 25 from Customs, 37 from academia and 104 community representatives mainly farmers and chemicals associations and villagers. 51 operators) from 22 different industrial sectors including scrap metal, waste management, paper recycling, textile manufacturing, agriculture, iron and steel, ship-breaking and control authorities were also trained on POPs reduction, best available technologies, and best management practices. Apart from these trainings, the industrial associations, waste management companies and other industries were also invited in various consultative meetings around project activities mainly around chemical profile and preparation of national technical guidelines.

The energy sector (11 power companies) or PCBs Holders have received trainings in three rounds i.e., general awareness training in 2017, PCBs BAT/BEP in 2018, onsite trainings using training of trainers (TOT) approach using standard training manual in 2019. Around 350 people from energy sector have been trained so far, out of which, 110 were trained during onsite trainings. After attending trainings in all three rounds, power sector is now fully sensitized and had supported project to carry out sampling and testing of 4,184 samples of POPs PCBs from power sector.

Besides, providing training, to female participants, the project also four female consultants (33% of total) for different project activities.

Keeping in view the overall progress achieved by project under this component (outcome) is rated as Satisfactory (Rating 5). The ratings for the achievement of various indicators for this outcome are given in **Annex**

7. The project did not record of the adoption of BAT/PEPs adapted by the participating industries (22) for the elimination and reduction of POPs; therefore, it is difficult to conclude about the use of training, otherwise, the rating for this outcome could have been Rating 6, High Satisfactory.

Outcome (Component 3): *Collection, Transport and Disposal of PCBs and POPs*

This national level inventory of POPs was completed in 2009 with only POPs pesticides and the figures were not updated till 2019 when project worked on the reconfirmation of stockpiles and found huge differences in earlier submitted document. The same inventory was also verified by a team of Ministry of Climate change and now the update National Implementation Plan 2019 has been uploaded on the Stockholm convention secretariat website. The project collected 4,184 samples of transformer oil from all over the country and found that only 3.8% of the samples were above the permissible limit of PCB. For the purpose, the project engaged four national level testing facilities and developed SOPs for labelling, sampling, and testing. The project has also developed feasibility report of proposed mobile/static technology for PCBs treatment by engaging an international expert. The project disposed 52 metric tons of PCB contaminated oil at the disposal facilities. Further, due to limited travel restrictions due to COVID-19 pandemic, the project has made arrangements to provide 300,243 litres of PCB free oil in lieu of the contaminated oil from the power companies. At the time of TE, the disposal of this oil (249,000 litres already provided and contaminated oil disposed) has been initiated. Further, it was also pointed out by the power companies, that it takes several days to remove the PCB contaminated oil, and the power must be disrupted which is not possible. Hence, the best option was to replace the PCB contaminated oil on site.

The project was instrumental in disposal of 786 metric tons of POPs pesticides (443 metric tons at the Bestway Cement) and 343 metric tons at the Geolinks Karachi). After the 18th amendment, the provincial governments are the custodians of the obsolete pesticides, and the project faced difficulties to obtain the custody of some obsolete pesticide stock from the Sindh Government. However, there are credible reports that small quantity of pesticides lying in Sanghar and Khairpur was washed away during the floods of 2010 and 2011, and stockpile of obsolete POPs exists at present. It is a constant process, and the concerned EPAs need to be vigilant about the safe storage of pesticides and PCBS.

As the project fully achieved the targets defined under this outcome (component), Rating 6, Highly Satisfactory has been assigned to this outcome.

Outcome (Component 4): *Monitoring and Reporting*
This component focused on monitoring and reporting of project activities, which are the cross-cutting activities across the other components. The activities were performed as per the Monitoring and Evaluation Plan. A national consultant was engaged to have a report on the follow up of MTR recommendations. The TE observes that all the management actions on the MTR recommendations were completed **(Annex 10).**

In addition, the project commissioned special studies to lay foundations for future project based on applied research. A study was commissioned to determine the pesticides residues from soil and vegetables at 10 sites from Punjab where most of the food crops are grown. The sites were: Kamunke, Shakargarh, Smundri, Khanewal, Talagang, Fatejang, Kabirwala, Shujabad, Daryakhan and 18-Hazari.

Descriptive statistics of each studied OCPs in the collected soils, vegetation and water samples from different agricultural zones are presented in the report. OCPs concentration trends in different matrices from different land use types followed the trend as ∑DDTs> ∑HCH> ∑Chlordane> HCB and Heptachlor. However, among all sampling sites, higher levels (ng g-1) of ∑DDTs ranged from (77.0-21221.5) followed by ∑HCH (43.5-4090.3), ∑Chlordane (0.5-577.4), HCB (1.3-100.4) and Heptachlor (0.1-28.0) were reported on the pesticide burial ground. Among DDTs, median values of p,p'-DDE (2212.3 ng g-1) and p,p'-DDT (615.9 ng g-1) were found much higher in the samples collected from Southern Punjab (cotton-belt) and its vicinity while samples collected from maize-belt zone showed relatively less DDT contamination. For HCH isomers, α-HCH (median: 1962.4 ng g-1) was reported to be the maximum at burial ground followed by γ-HCH and β-HCH, respectively. However, soil samples collected from other areas including industrial, residential and background soils showed lower levels of β-HCH and γ-HCH. Similarly, residual levels of chlordane, HCB and Heptachlor showed the same trends in the soils from the pesticide burial ground and reported higher as compared to other sampling sites.

Overall samples collected in the vicinity of the POPs-pesticides in the fields which are located near obsolete stores were found much contaminated as compared to the samples collected near urban areas. DDTs were more prevalent among all the OCPs and were found in higher amounts in all the matrices i.e., soil, vegetation, and water samples. Highest DDTs levels were found in the vegetation samples collected from Multan and Khanewal (Cotton-Belt), contributing about 50% of the total DDTs concentrations in all the samples. Highly contaminated sampling sites are in the Southern Punjab, receiving high amounts of OCPs through applications of pesticides in agriculture sector along emissions and exposure to obsolete pesticides stores. Greater levels of DDD in the samples clearly showed the anaerobic conditions.

DDTs are used in the production of dicofol as by products. The high residual level of DDTs in the study area is related to its use in agricultural activities may be due to the use of dicofol as a cheaper pesticide and it can also be identified as an additional source of o,p´-DDT. Biodegradation of DDTs into its metabolites in its agricultural zones cannot be neglected, which may be another reason for the high concentration of its metabolites in the collected samples.

The project also commissioned a study in 2020 for the bioremediation of POPs PCBs contaminated soil. It was found that certain bacterial and fungal colonies are present in the contaminated soil which could play an important role in elimination of POPs PCBS. Likewise, the study recommended soil amendments such as the use of compost, agricultural waste, crop residues, biochar, slow releasing fertilizers (SRF), zeolite, Sichar and activated carbon for eliminating the PCBs in soil.

Overall Progress/Rating

For most impact indicators, end-of-project targets were fully achieved. The project produced updated National Chemical Profile which was submitted to the Stockholm convention secretariate; it developed policy for the management of POPs in the country; guidelines/protocols for taking inventory of POPs, safe handling, management, transportation and disposal of POPs; provided equipment for testing of POPs; made arrangements for the disposal of 786 metric tons of pesticides in a cement kiln and the facility of Geolinks; it also disposed 52 metric of PCB contaminated oil following BAT/BEP; and have made arrangements for the replacement of 300,243 litres of POPs contaminated oil which is ready for disposal in the cement kiln. It has commissioned research studies to estimate POPs resides in soil, water, and vegetables in Punjab; and biological techniques for the amelioration of POPs pesticides, laying foundation of possible future project(s). Thus, the project has created the capacity of monitoring, testing and disposal of POPs, created mass awareness among the workers in the industries and power companies. Before the project, there was no policy regarding the management of POPs, the project has drafted policies, and drafted rules and regulations which are awaiting enactment by the government. Thus, the project has fully achieved its objectives. **Therefore, an overall Rating of 5 (Satisfactory) has been assigned to the project.**

3.3.2 Relevance

The Project was conceptualized under the GEF Persistent Organic Pollutants Area. The Project design remains consistent with GEF priorities. It contributes to the Outcome 1.4 “POPs waste prevented, managed, and disposed of, and POPs contaminated sites managed in an environmentally sound manner”; and “Outcome 1.5 Country capacity built to effectively phase out and reduce releases of POPs”. It also contributes to the Country Programme Output “economic growth takes into account environmental protection and rational use of natural resources for poverty reduction. It contributes to the Expected ONE PLAN II Outputs 3.2: “Vulnerable populations benefit from improved sustainable environmental management practices including climate change mitigation & adaptation”.

The Project objective was to support the Government of Pakistan in undertaking the inventory of POPs pesticides, which were imported several decades ago and lying in a miserable state of storage all over the country due to ban of these for agricultural use. The issue gained more importance, when it was found out that during 2010 and 2011 floods, some of the POPs pesticides stores were submerged with flood water, and the pesticides might have leaked into the environment. Likewise, it was feared that thousands of electric transformers might be using the PCB contaminated oil, as no information was available prior to the start of the

project. There were clear gaps in policy for the management of PCBS, and the national institutions did not have capacity to monitor, manage and dispose POPs. The project was designed to develop policies, rules, and regulations for the management of POPs, update the National Chemical Profile, provide equipment, training and best practices guidelines to the national stakeholders for the disposal and reduction of POPs. The project matches the priorities of GOP and the urgent needs of communities.

The Project remains highly relevant (Rating Relevant) in the context of national priorities, including the National Disaster Management Plan and the Pakistan Vision 2025.

3.3.4 Country Ownership

In the National Environmental Action Plan (NEAP) approved by Pakistan Environmental Protection Council (PEPC) in 2001, provided the four areas of immediate concerns are clean air, clean water, disposal of solid wastes and eco-system management. Toxic and hazardous substances including PCBs, are one of the additional areas of concerns in NEAP. However, because of signing of Stockholm Convention on POPs, in December 2001 by Pakistan, an "Enabling Activity Project" with support from UNDP-GEF was launched to strengthen capacity in the country for meeting its obligations under the convention. Though, the pesticides residues and “banning of dirty-dozen” in Pakistan was high on environmental agenda before the Stockholm Convention, a renewed effort on the reduction and elimination of intended and unintended POPs in the industries initiated. The proposed project with its implementation framework was designed in conformity with POPs SP-5 of the GEF focal area strategy that followed the initial guidelines for NIP development issued by GEF and guidance developed by World Bank and UNEP.

Prior to the project, the production, supply and use of PCBs were not specifically regulated in any way in Pakistan. Sections 13 & 14 of Pakistan Environmental Protection Act.1997 (PEPA-97) deal, in general with prohibition of import of hazardous wastes and handling of hazardous substances. PEPA-1997, Section 11 prohibits discharges/emissions into environment. Later, it was also included in the National Environment Policy.

The project design and objectives are relevant to the strategy and action plan identified in the NIP of Pakistan, which includes: (i) Elimination of pesticide POPs and rational management of obsolete stocks/contaminated sites; (ii) Promotion awareness in relation to all action plans, but particularly for POPs; (iii) Strengthening of the information base, surveillance and data management for POPs; (iv) Strengthening the legislative infrastructure for control and enforcement of POPs, (v) Institutional strengthening and (vi) Human resources development for implementation of the Stockholm convention as envisaged in the NIP. The project supported the development of NIP 2020, and it was submitted to the Stockholm Secretariat.

The GOP fully owned the project, as was evident with the role played by the MOCC in mobilizing the EPAs, Departments of Agriculture in all the provinces, AJK, and GB, obtaining the custody of obsolete pesticides stockpiles spread all over the country, and mobilizing NEPRA to advise all the power companies to test the transformer oil for PCB contamination, and replacement with PCB free oil where easily possible. The project achievements without the GOP support could not have been materialized. Yet the MOCC must play an important role in the approval of legislation and enactment of PCB rules in consultation with the concerned parliaments.

3.3.5 Mainstreaming

The project had prepared a very comprehensive Gender Action Plan for Gender Mainstreaming in the POPs project. The Plan is comprised of two parts: the first, considers what actions can be taken to mainstream gender issues within the project. This will include training and skill development on gender-related issues and promoting gender equality within project activities. The second part of the plan considers what can be done to mainstream gender issues into the project activities.

The project attempted to invite the women officers and staff of the stakeholders in all the trainings. However, the problem is that there are not very many women working in the government departments and the industry. The project trained 57 officials from Customs Departments at two main locations i.e., Islamabad and Karachi. Out of these 57 officials, 6 were females as the ratio of female officials in custom control department is incredibly low.

The project has conducted 35 total trainings including 13 onsite training. Around 1,295 participants were part of these trainings coming from academia (students, professors and lecturers from universities and colleges), relevant government stakeholders (agriculture, environment, customs, industrial and power sector), representatives of community groups, electronic and print media, Chamber of Commerce, and private sector including industries associations out of which around 300 were female participants.

The women and children are particularly involved in cotton picking, production and harvesting of vegetables on which more than 90% of the pesticides are used. There are several studies conducted by the research institution on the effects of pesticides on health of agriculture farm workers, including women, and presence of pesticides residues in the blood of cotton pickers. The direct awareness raising at the farmer level was not the mandate of the project, however, the women could be continuously benefitting from the knowledge which was gained by the staff of Agriculture and Plant Protection Departments from the project.

The project was instrumental in improved governance in the sector by developing the management plans for the safe disposal of PCBS, enhancing institutional capacity to import/export, monitor and regulate POPS in Pakistan, and by developing SOPs and rules for the disposal of pesticides. It was not directly related to the poverty alleviation, however, the reduced exposure of workers (both males and females) to POPS will reduce health risks as health is a major driver of Multi-Dimensional Poverty Index in the country. The project was instrumental in environmental enhancement and generation of new knowledge in POPS/PCBS which will open up several research avenues in universities and research institutions.

The project engaged female staff, and about 33% were women including the National Project Manager.

3.3.6 Social and Environmental Standards

The project by developing draft regulations in banning the use of toxic POPs and PCB will safeguard the health of farmers including women engaged in agriculture. The general populace will benefit by disposing off these chemicals thus preventing the release of POPs pesticide and PCBs to the environment, contributing to a safer public health environment.

The main beneficiaries of the project activities are the public, consumers and communities which may be exposed to chemicals (POPs pesticides and PCBs) that may be released into the environment. Health risks for people will decrease once a proper legislation is enforced. The enforcement of environmental legislation will not only benefit human health and the environment but also the pesticides distribution networks including the pesticide dealers and their subsidiaries. The project has raised awareness and knowledge in the distribution network, which will be able to provide safer handling of the pesticides among those who are involved in the distribution and more advanced chemical products and better services to the customers.

Enactment of the draft regulations will enable Pakistan to be compliant with the Stockholm Convention requirements with specific reference to the list of restricted chemicals including waste containing POPs and PCBs.

3.3.7 Sustainability

The sustainability of any project is judged from four perspectives, viz., financial, socio-economic, institutional, and environmental, which are discussed as follows:

3.3.3 Effectiveness and Efficiency

Effectiveness

The project fully achieved its targets by its closure in terms of technical and financial results. As mentioned earlier, the project exceeded expectations. It has established the legal framework for the handling, sampling, management and safe disposal of POPs pesticides and PCBs. Detailed guidelines have been prepared and training provided to the staff of government institutions, power companies and relevant industries. Overall, 610 (558 were male and 52 were females) persons participants in these trainings. In total the project conducted 35 trainings (including 13 onsite training). Around 1,295 participants were part of these trainings coming from academia (students, professors & lecturers from universities and colleges), relevant government stakeholders (agriculture, environment, customs, industrial and power sector), representatives of community groups, electronic and print media, Chambers of Commerce and Industries, and private sector including industries associations out of which 300 were female participants. The staff of customs department was particularly trained in import and export of POPs.

After 2009, the project undertook the inventory of POPs which was completed in 2020. Based on this inventory, the Chemical Profile of Pakistan was updated which was shared with the Stockholm Convention. The MOCC and the Law Ministry are in the process of enactment of the legislation. Once the legal framework is approved, the provincial EPAs will be monitoring the PCBs in the environment. The EPAs have been provided with the state of the art of equipment GCMS, standards and the staff have been trained in collection and analysis of samples. Besides capacity building and legal framework, the project engaged private companies to collect POPs pesticides and PCB contaminated oil from all over the country and get it disposed in a cement kiln and an incinerator in Karachi. Some 786 metric tons of pesticides and 352 metric tons of PCB contaminated oil has been disposed by following BAT/BEP. The kilns regularly monitored the composition of flue gases, and there was no toxic gas emission from the kilns. Thus, the project has put in place a system of management and disposal of POPs, which could be adopted by the government and private sector.

Financially, the project was able to deliver 98.3%% of the GEF funds. The delivery in the first half of the project was low because of the change in the government and frequent transfer of the National Project Directors. However, during the second half, the delivery improved to a great extent. Besides, GEF, UNDP also provided US$410,165 from TRAC (against an allocation of US$ 300,000 at the time of ProDoc signing), which have been all spent till the TE. Thus, the total delivery of the project was 100.41% (because of increased allocation of TRAC). Though the project did not record the cost-sharing mobilized by the project, the team observed that the Bestway Cement US$ 500,000 for the storage and upgradation of their facilities for incineration of POPs. Likewise, due to advocacy of the project, the National Agricultural Centre was able to Secure US$ 5.925 million for the upgradation of facilities at the Ecotoxicology Laboratory, NARC, and pesticides residues laboratories at the Kala Shah Kaku, Tandojam, Quetta, Karachi, and Peshawar Pesticide to carry out the pesticides residues/POPs/PCB analysis work. The laboratories have fully trained staff who could continue the work on sustainable basis. The contribution of government staff time and other resources used for the project is estimated to be US$ 2,070,000. K-Electric informed that it has tested all the transformers in its custody, and PCB contaminated oil has been replaced. Its contribution is estimated to be US$ 5,000,000.

Monitoring and evaluation systems were reasonably well, although there was no full-time M&E Officer in the project, a M&E Officer was engaged every time to ensure that the BAT/BEP principles are followed at the time of disposal. The flue gases from kilns were regularly monitored by the privately engaged laboratories, and no emission of any toxic gas was reported in the atmosphere.

The Project's stakeholder engagement plan was professionally written, and it was implemented in letter and spirit and the national ministries, EPAs and private sector entities proactively participated. The contractors provided collection and disposal of POPs/PCBS. Where capacity was not available, the project engaged consultants/consultant firms to undertake special studies and to prepared manuals.

Reporting was carried out in a timely manner, but PIRs did not aggregate data as the same information was provided repeatedly under different outcomes. In fact, there were too many outcomes listed in the Results

Framework having the repetitive indicators. The adaptive management changes were not always reported, though these were mentioned in various documents.

The Project communicated its objectives and achievements using various knowledge products/ seminar/ advocacy meetings. The project website was established with a reasonable amount of technical information. The project has an exceptionally good success story of the disposal of POPs/PCBS but unfortunately it was not well publicized.

Keeping in view the achievements of project, Rating 6 (Highly Satisfactory) has been assigned to the effectiveness.

Efficiency

The NIM modality and strategy of building and utilizing capacities at the ministerial level proved to be cost-effective and it promoted country ownership. The project undertook adaptive actions to achieve the results, e.g., instead of mobilizing the agricultural extension departments to undertake inventory of POS pesticides, and collect obsolete pesticides and containers and using government facilities for safe disposal, it engaged private firms to collect the pesticides and containers in an environmentally safe manner and deliver those to the disposal sites. Likewise, it moved the private sector to upgrade their facilities for safe burning of POPs, and yet again engaged private firms to constantly monitor the composition of flue gases. Likewise, it engaged private companies to collect samples of oils from transformers of the power companies and private entities all over the country and test those for PCB contamination. However, all the guidelines were prepared by the international consultants and training was imparted to the staff of private companies and stakeholders. This was a highly efficient system of collection and safe disposal of POPs.

The engagement of the MOCC at the forefront proved to be highly efficient to collect the obsolete POPs pesticides from the custody of provinces for safe burning. Without the support of MOCC, it was not possible. Likewise, the MOCC, played a key role in mobilizing NEPRA and power companies to allow testing of their transformer oil for PCB contamination, and replacement with the PCB free oil.

Later, it was informed by the power companies that while replacing the contaminated oil, the power supply must be discontinued for several days. To overcome this issue, the project proposed the onsite disposal of PCB contaminated oil. Likewise, the power companies were not ready to replace the contaminated oil, as the transformers were up and running satisfactorily. The project proposed to provide them 300,243 liters of PCB free oil to replace which had not cost to the power companies. Then the contaminated oil was disposed at the disposal facility in an efficient manner.

The accounting and audit system was fully in place, and the corrective actions were taken on audit observations. The progress reports were produced timely. The project implementation was cost-effective as the project surpassed the targets set in the ProDoc.

Initially, the change in government in 2018 and subsequently frequent transfers of the NPDs affected the progress. The co-financing was mostly in the form of parallel financing. The government provided parallel financing of US $ 5.925 million for the upgradation of its laboratories at the national and provincial levels. This was a major financing by the government to this sector after several decades and will strengthen the POPs management system in the country. Likewise, the government arranged major support from EU to the National Agriculture Research Centre for the promotion of Integrated Pest Management and biocontrol of crop pests.

The project was highly instrumental in the dissemination of its results, and thus creating awareness at large. The NIP was updated in 2020 and it was shared with the Stockholm Convention, all the knowledge products produced by the project are available on its website. The project also published its Facebook page (followed by 1,418 persons) on which success stories, relevant information, new job and consulting opportunities and tenders were published and thus maintained transparency.

The project commissioned two important studies, viz., POPs pesticides residues in soil, water, and food items in the food production areas of Punjab- in the cotton, wheat, rice, maize and vegetables growing areas, particularly

around the pesticides storage areas. The second study was on the bioremediation of POPs in soil. These studies lay a particularly good foundation of possible new project(s) on hazardous waste management.

Therefore, keeping in view the achievements, adaptative action and mobilization of co-financing by the project, Rating 6 (Highly Satisfactory) has been awarded to the project.

3.3.7.1 Financial Risks

The project provided catalytic support to the GOP for the reduction and elimination of POPs to comply with the Stockholm Convention Guidelines. The subject of hazardous waste management, safe and judicious use of pesticides, and pesticides residues in human bodies, food items, soil and water has been very much highlighted in the development scenario of Pakistan and electronic and print media. The development of resistance in insects against pesticides, and tremendous decline in cotton production (major recipient of pesticides) has raised concerns in the government about this issue. Consequently, the GOP had allocated substantial amount of funds from its core for the upgradation of six laboratories to monitor POPs. In addition, USAID, EU, DFID and the Royal Netherlands Embassy have been providing funds for the judicious use of pesticides, awareness, monitoring of residues, and promotion of IPM in the country. It is anticipated that the funding for this work will continue. The real challenge is to mobilize private sector and SOEs to follow SOPs for elimination of POPs PCBs in this sector. At present the GOP is facing financial constraints, the economy has been slowed down due to the COVID-19 pandemic. This may result in reduced government financing; however, it is likely that the financial assistance from INGOs and donors will continue. Therefore, the Rating for financial risks is **Moderately Likely (ML).**

3.3.7.2 Socio-Economic Risks

Regarding POPs pesticides, public is fully aware of the health hazards of pesticides, however, due to poverty in remote rural areas and lack of awareness and non-availability protective gears, farmers do not observe SOPs. Likewise, women cotton pickers get exposed to pesticides residues while picking cotton. It needs a great deal of advocacy, awareness, and enforcement measures to reduce the risks to pesticides. However, this aspect was not the mandate of the project. Several KIIs informed that they were not aware of the PCBS, and unintended POPs. Certainly, the knowledge gained by them will help to minimize the exposure. The government has banned the use of plastic shopping bags in a bid to reduce the burning of plastic, which releases PCBS. This measure is likely to be rolled out in major cities. The real issue is with the industries, they need to invest on modifying their processes to reduce and eliminate POPs and provide protective gears to their workers. The industrial growth is already negative in the country at present, therefore, the anticipated investment coming to this sector is minimal. Only the strict enforcement by the EPAs could help to alleviate this situation. Therefore, the Rating for socio-economic risk is rated as **Moderately Likely (ML).**

3.3.6.3 Institutional Risks

The regulatory tools relevant to the management of POPs and PCBs are prepared to be implemented at the Federal level and are in the process of preparation at the provincial level, the tools provide the institutional framework for enforcement and enactment at the Federal level. The project has developed appropriate institutional capacity and awareness that is self-sufficient after the project closure date. Project strategy could be mainstreamed into future project planning. Therefore, Rating for institutional framework and governance is **Likely (L).**

3.3.6.4 Environmental Risks

The disposal of obsolete POPs and PCBs has contributed to a safer environment for the country and workers engaged in agriculture and electric generating entities. There is no negative environmental effect emerging from the project interventions Public awareness of use of pesticides will contribute to increased community participation for safeguarding public health. Therefore, sustainability Rating for environmental risk is **Likely (L).**

Further, the risk register was maintained, and the PSC/Project Board was fully informed. The risks are identified in the **Table 7.**

Table 7. Risks to sustainability and ratings

Risk to Sustainability	Rating
a. **Financial Risks:** Slow economic growth and COVID-19 pandemic could reduce government financing; however, multi- bi-lateral donor assistance is probable.	ML
b. **Socio-economic Risks:** reduced allocation of funds due to low industrial growth in private sector but the stakeholders are fully aware of the issue and the alternatives.	ML
c. **Institutional Risks:** Appropraite institutional capacity has been developed, and EPAs are likely to enforce the rules.	L
d. **Environmental Risk:** No negative impact on environment, rather awareness raised by the project will contribute to minimize the use of pesticides and PCBs.	L
Overall Rating	**ML**

Keeping in view the four elements of sustainability, financial, socio-economic, institutional and environment, Rating Moderately Likely (ML) is assigned to sustainability.

3.3.7. GEF Additionality

Drawing on recent academic studies and GEF interventions from portfolio reviews, the GEF IEO classifies additionality into six factors reflected below:

e. *Specific Environmental Additionality*

The project has generated the Global Environmental Benefits by disposing 786 MT POPs pesticides and 52 MT of PCB contaminated oil. In addition, another lot of 249,000 liters of oil has been disposed, and contracts are in place for the disposal of remaining 51,000 liters following BAT/BEP technologies. At the time of ProDoc, it was estimated that the 1200 metric tons of POPs pesticides are stockpiled, however, the inventory revealed that only 786 metric tons of pesticides are remaining, which are disposed following BAT/BEP. Thus, the project surpassed the target. This would not have happened without GEF's intervention.

f. *Legal/Regulatory Additionality*

The project helped Pakistan to a transformational change to environment sustainable legal /regulatory forms that would have not occurred in the absence of the project. Draft regulation on POPs has been developed at federal government level and provincial EPAs are in the process of replication/adoption of the regulations at the provincial levels.

g. *Institutional Additionality/Governance additionality*

The project provided capacity building training and equipment to enhance the analytical and monitoring capacity various stakeholders at the federal and provincial levels to perform their functions in an efficient/sustainable environment manner.

h. *Financial Additionality*

The GEF provides an incremental cost which is associated with transforming a project with national/local benefits into one with global environmental benefits. Involvement of the GEF led to greater flows of financing from the private sector and Government in-kind and cash support.

i. *Socio-Economic Additionality*

The project will bring significant beneficial effects, both at the local and global scale by the safe disposal of large amounts of POPs pesticides by preventing their release to the environment. Additionally, disposal of PCB oil will prevent the exposure of workers and their release of PCB in the environment.

j. *Innovation Additionality*

The project demonstrated the adoption of incineration of POPs and PCBs in cement factories and local incinerator with local available technology for disposing of POPs and PCBs.

3.3.8. Catalytic Role/ Replication Effect

The evaluators recognize that adaptation of new methodologies, approaches or technologies developed elsewhere is a complex, context driven process. The project implemented several activities to promote replication though knowledge transfer and included the dissemination of training workshops, information exchange, and national forums. Additionally, the project has provided direct implementation experience in a number of areas that can support replication, both nationally and elsewhere, these include: (i) applying an approach to POPs stockpiles, waste and contaminated site elimination based on prioritizing risk mitigation, the cost effectiveness, in capturing, securing and ultimately eliminating the POPs waste and associated risk; (ii) planning and developing national POPs and general PCB management infrastructure based on country needs and (iii) integrating of proactive public consultation and awareness activities into the planning and implementation of PCB and pesticide stockpiles and contaminated sites projects. Thus, the system and procedures are in place for scaling up. The specific examples of scaling up in Pakistan are the allocation of GOP funds for strengthening the pesticides residues laboratories, and promotion of IPM, regulating the pesticides sector, banning of plastic bags, etc., and legislation to curb the POPs usage in the country.

3.3.9 Impact

The project impact is assessed from three dimensions, viz., (i) environmental status improvement, (ii) environmental stress reduction, and (iii) progress towards stress/status change. The project has demonstrated significant impact in these dimensions at various levels. The dumping of obsolete pesticides in a highly debilitated storage condition and leaking containers spread all over the country was a constant threat to humans and biodiversity. The seepage of these pesticides in soil and groundwater was a constant threat. The project made a novel contribution of collecting and burning all the pesticides following BAT/BEP. The project has developed a capacity in the public and private sector to safely dispose POPs pesticides and PCBs. The private companies could be deployed at any time for this type of work. The government was highly instrumental by providing US $ 5.925 million to equip all the major labs in the country to continue the monitoring of pesticides residues in the environment.

On the PCB contaminated oil from electric transformers, the project developed the system and procedures, guidelines for testing and disposal of PCBs. The project was able to test 4,184 transformers across the country, whereas the estimated number of transformers in the country is around half-a-million. Therefore, a lot of work has to done to check the remaining transformers. The project has developed the capacity in EPAs and power companies to test the transformer oil, and then the system is in place with the private sector to properly dispose the contaminated oil. It is expected that the system will continue after the completion of the project. It is satisfying to note that an electric company K-electric reported to the TE Team that it has tested all its transformers and none of those is having PCB contaminated oil. It is expected that the remaining companies will follow the example of K-electric.

The project has developed policy and drafted rules for the management of PCBs, which are under the approval of the respective legislature assemblies. Once the rules are enacted, the EPAs will be empowered to ensure proper testing and regulation of intended and unintended POPs. The project has trained hundreds of staff

working in various industries, and power companies and it is expected that the exposure to PCBS will be minimized.

Though not very many women are engaged in handling of PCBs in the industrial or power sector, the project provided opportunities to men and women staff of the stakeholders to become aware of the impact of POPS pesticides and PCBs on human health and environment. An unintended positive impact of the project is the increased awareness of women, engaged in cotton picking (major health hazard due to pesticides) about the health hazards of pesticides and the knowledge to stay safe from these hazards. Extensive training and awareness provided to the agricultural extension staff and master trainers will further enhance the project impacts in this regard.

The only risk perceived at the time of TE to further advancement of impacts is the overall weak governance in the country to enforce laws.

Keeping in view all the above-mentioned discussion, **the project has been awarded a rating of having a "SIGNIFICANT IMPACT".**

4 CONCLUSIONS, RECOMMENDATIONS & LESSONS LARNED

Pakistan used to hold a large stock of obsolete pesticides (POPs). The stocks accumulated up until 1980, when national requirements were purchased centrally by the Government. Fortunately, after pesticide purchase moved to the private section in 1980, there has been little subsequent accumulation of pesticide stocks and hence further accumulation was not seen as a major problem.

The POPs project was a major intervention of the GOP, UNDP and GEF to comprehensively deal with the reduction and elimination of POPs pesticides and PCBs in the country. The project began in March 2015 for a period of 60 months with the financial outlay of US$ 5.15 million from GEF, and US$ 0.3 million from the UNDP. Later, UNDP increased its cost-sharing up to US$ 410,165. The government provided US$ 5.925 million from its own resources for the upgradation of six laboratories in areas where maximum quantity of pesticides is used. This was followed by an investment on the promotion of IPM in the country. In addition, the staff time cost, and the availability of other resources of the government was estimated to be US$ 2,070,000. The private sector was also stimulated, and the Bestway Cement Pvt. Ltd., invested US$ 500,000 for the upgradation of its facilities for safe storage of POPs and its burning following BAT/BEP practices, without emission of any toxic gases. Likewise, Geolinks, Karachi also invested US$ 100,000 to upgrade its waste disposal facility in Karachi and established a modern POPs disposal facility in Sheikhupura. The in-kind support provided by project co-financiers was estimated to be US$ 15,855,165.

The project faced initial teething problems and frequent transfers of the attached GOP staff (particularly NPDs) slowed down the progress. The progress expedited delivery during the second half of project, which was again negatively impacted by the COVID-19 pandemic. The project faced difficulty in the fielding of international consultants due to COVID-19 pandemic and in-country travel of local staff. The project duration was thus extended for six months up to 31 December 2020, and it was decided to operationally close the project on 30 April 2021 to accommodate the payments of contracts already signed by the project for the disposal of 300,243 litres of PCB contaminated oil. Thus, at the time of TE (December 2020- April 2021)), the delivery of GEF funds **98.3%. With the inclusion of TRAC, it is 100.41%.**

Regarding the achievement of results, the project's contribution is highly significant to towards the elimination and reduction of POPs and building legal, operational, and human resource in this thematic area. One of the most significant outcomes of the project is the updated inventory of obsolete pesticides all over the country and testing of some 4,184 transformers oil in all the provinces, AJK, GB and FATA. This covered the transformers of the public power distribution companies as well as private repair and overhaul workshops. It was observed that out of 4,184 tested transformers, 161 transformers (3.8%) contained the PCB contaminated oil. Based on the updated information, the project facilitated the preparation of NIP for submission to the Stockholm Convention in 2020. The project reviewed all the bylaws and policies regulating the hazardous chemicals in Pakistan, and

drafted new rules to deal with POPs, after extensive national consultations. It prepared the National Management Plan for POPs and PCBs which is approved by the MOCC.

On the capacity building arena, the project developed master training manuals, guidelines and SOPs for safe handling, transportation and disposal of POPs, imparted training to the staff of the concerned government departments, private laboratories, power distribution companies EPAs and industry to deal with the POPs. The customs officers were trained on the rules and regulation of the import and export of POPs. Total 35 training sessions were conducted, in which 1,295 persons were trained. Of these 300 were women participants.

The novel effort made by the project was to develop a system of collection of hazardous waste, its safe transportation and disposal at the kilns. Private firms were engaged to collect and transport the POPs to waste disposal sites, specialized laboratories were engaged to prepare the environmentally safe shipment reports, and analysis and reporting on the handling of POPs and composition of flue gases from the kilns. The project was successful in eliminating all the stockpiled POPs pesticides (786 metric tons) and 352 metric tons of PCB contaminated oil. The role played by the MOCC in mobilizing the provincial government, EPAs, NEPRA and power companies to hand over their stocks of POPs and to ensure compliance is highly commendable, without which this project has not been progressed an inch.

Challenges and resolved barriers

The project start-up was delayed by a year due to difficulties in assembling project team. Project institutional memory suffered due to frequent transfers of NPDs, six changed during the life of the project. Change in Government in 2018 also negatively impacted project implementation. Further, the COVID-19 pandemic also affected the staff mobility and fielding of international consultants.

At the time of project formulation, the stakeholders had identified the following barriers in the management of POPs. These were: (i) incomplete environmental and chemical regulation to deal with POPs; (ii) limited awareness to POPs pesticides; (iii) limited awareness of the PCB issues in the end of life of the electric transformers; (iv) lack of understanding of the importance of preventive measures; (v) lack of disposal facilities and procedural guidelines; (vi) lack of control of POPs and PCBs across borders of the country; (vii) lack of monitoring capability; and (vii) lack of standard methodologies for selecting and evaluation POPs remediation technologies.

The TE Team is of the view that the project has attempted to remove all the above barriers and has developed a proper monitoring and management system to deal with POPs and other hazardous wastes. The monitoring and regulatory system is fully developed, and it is expected that on the pattern of Food Authority, the EPAs will be monitoring the emission of POPs in the environment by the industry. The customs officers have been trained and sensitized about the detrimental effects of POPs, however, there are gaps in enforcement of rules and regulations in the country which need constant follow ups.

The project has conducted a comprehensive study on the POPs pesticides residues in the hotspots of food producing areas of Punjab which will serve as a tool to demonstrate to the public at large and policy makers that the problem once created decades ago is not yet resolved so be careful in future. Likewise, another important study commissioned by the project identified several colonies of useful bacteria and fungi in soil contaminated with POPs pesticides which gives a ray of hope of bioremediation of POPs and PCBs.

Ratings

The project reports indicated that the project was able to achieve the project's objective and outcomes **the overall rating for the project is satisfactory.** Ratings for various elements of evaluation are given in **Table 8.**

Table 8. Rating scales assigned to various elements of evaluation

Criteria	Rating	Comments
Monitoring and Evaluation: Highly Satisfactory (HS), Satisfactory (S), Moderately Satisfactory (MS), Moderately Unsatisfactory (MU), Unsatisfactory (U), Highly Unsatisfactory (HU)		
Overall quality of M&E	MS	The M&E plan was fully executed. The list of stockpiles of POPs and inventory of PCBs were prepared; collection, transportation and disposal of POPs was monitored as per SOPs.
M&E design at project start-up	MS	The project indicators and targets were clearly defined, and these were achievable. There was a bit of confusion about the interpretation of component, outcomes, and outputs in the project log-frame. The components are in fact the outcomes, and outcomes mentioned in ProDoc are outputs. The confusion continued in the quarterly reports and the PIRs. This could have been resolved at the time of Inception Workshop. No KAP survey was planned at any stage of the project.
M&E Plan Implementation	S	M&E system was effectively in place from inventory to disposal stages of the process. The chemical composition of flu gases was also monitored.
IA & EA Execution: Highly Satisfactory (HS), Satisfactory (S), Moderately Satisfactory (MS), Moderately Unsatisfactory (MU), Unsatisfactory (U), Highly Unsatisfactory (HU)		
Overall Quality of Project Implementation/Execution	S	The project efficiently achieved the stipulated results during the second half of its life.
Implementing Agency Execution	HS	The agency provided full support to the project, there were certain delays but that is expected in all the developing countries. Further, there was change of government in 2018 and COVID-19 pandemic which slowed down the project progress. But the role played by MOCC in mobilizing the provincial and federal departments was tremendous without which no progress was possible.
Executing Agency Execution	S	UNDP role in project implementation was highly effective as is evident for timely placement of sub-contracts to the private sector POPs collection and disposal firms and mobilizing support internationally by identifying high quality technical consultants.
Outcomes: Highly Satisfactory (HS), Satisfactory (S), Moderately Satisfactory (MS), Moderately Unsatisfactory (MU), Unsatisfactory (U), Highly Unsatisfactory (HU)		
Overall quality of Project Outcomes	HS	The project achieved its stipulated results.
Relevance: relevant (R) or not relevant (NR)	R	The project is highly relevant to the needs of public and government as well as for the international community.
Effectiveness	HS	The project fully achieved its targets.
Efficiency	HS	Besides mobilizing national institutions and building their capacities, the project engaged the private firm for collection of samples, their analyses, collection, transport, disposal, and monitoring of flue gases to achieve the targets. An efficient system has been developed and in place for the disposal of POPs.
Sustainability: Likely (L), Moderately Likely (ML), Moderately Unlikely (MU), Unlikely (U)		
Overall likelihood of risks to sustainability	ML	There are some financial and institutional coordination risks.

Criteria	Rating	Comments
Financial resources	L	The government has provided funds from its core resources but the financial position of the government at present is tight. However, the project is of high importance to international donors/INGOs, so the assistance is likely to continue. The government could easily mobilize the private industries to invest in this area through strict compliance. The enforcement of laws will generate funds.
Socio-economic	ML	There is no socio-economic risk as the project is of high value for the local communities.
Institutional framework and governance	L	18th constitutional amendment provides authorities to provinces to enforce implementation. Though the system and legal framework in place, some provinces lack motivation to take actions.
Environmental	L	The project is on high importance at the national, regional, and global level and is contributing to the Global Environment Benefits.
Impact: Significant (3), Minimal (2), Negligible (1)		
Environmental status improvement	3	The project has contributed towards the environmental enhancement by eliminating POPs and PCB contaminated oil and raised awareness at all levels on the subject.
Environmental stress reduction	3	The project has reduced the environmental stress due to POPs and pesticides, and the work is in progress.
Progress towards stress/status change	3	The work is in process and it is anticipated that it will continue to yield tangible results.
Overall Project Results	S	The project has fully achieved its objectives and targets. The POPs pesticides were disposed, and PCB contaminated oil was disposed /replaced with PCB free oil. The policies and rules and regulations to control POPs/PCBs are drafted, approval and implementation of the rules and regulations are the responsibility of the government and beyond the scope of this project. A proper POPs management system and plan is in place.

Lessons Learned and Possible Corrective Actions for Future Programming

1 There have been too many outcomes in the Results Framework in the ProDoc, confused with the components, and the confusion continued in quarterly reports and PIRs. There were targets to enhance awareness but no method in the ProDoc to measure the level of awareness. The Inception Workshop is a critical event during the project life, and issues like indicators, targets, data collection methodologies, outcomes/components should be clarified at this stage.

2 The 18th Constitutional Amendment has decentralized the subject of environment and agriculture to the provinces. Since all the POPs pesticides stockpiles were in the custody of the Provincial Agriculture Departments, the project faced difficulties to have access to these stockpiles, which was a reason of slow progress initially. The provincial governments should have been taken on board at the project formulation stage or during the Inception Workshop, and the custody of stockpiles should have been transferred to the MOCC to facilitate efficient implementation.

3 The project implementation was delayed due to difficulties in assembling the project team, recruitment and availability of international technical consultants, and frequent transfers of the National Project Directors (6 in total during project life) and other staff in MOCC. The technical capacity about POPs BAT/BEP is weak in Pakistan. COVID-19 pandemic posed difficulties in the availability of international consultants as well as the travel of project staff and contractors within the country. A clear exit strategy should have been developed at the formulation stage or at least during the second half of the project to adjust the project duration with the project targets, keeping

in view the emerging constraints. Clearly there is a need of a Phase II project/cell in the MOCC to deal with this vital subject as it is dealing with the three international protocols to which the government is a co-signatory.

4 The project has solved the decades old issue of abandoned stockpiles of POPs pesticides but has just touched the tip of the iceberg of PCB problem regarding the use of intended POPs, and production of the unintended POPs in large scale industries and small entrepreneurs engaged in repair of electricity transformers. The private sector is also engaged in refining and recycling the used mobile oil. EPA Punjab has taken an exceptionally good step to engage the intelligence agencies to explore those dealing with the refining and recycling of used mobile oil. Similar action could be taken by the other EPAs.

5 The project has set up a system and SOPs for the collection of POPs and PCBs, transportation of these to disposal facilities and ultimate disposal according to BAT/BEP. Since the oil has a calorific value, the cement factories could reduce their cost of fuel and use released energy for co-generation. The EPAs may strike a deal with the factories to use some of their proceeds for reinvestment in POPs elimination and enforcement projects.

6 To sustain the project activities, the enforcement of POPs/PCB rules is a must, and the rules should have heavy penalties to the violators. The proceeds could be used for covering the operational expenditures of the EPAs.

7 There is a continuous need for monitoring of POPs and PCBS in the environment, awareness raising about POPs and PCBS. In fact, staff of some power companies reported that before the project they had not heard the health hazards of PCB contaminated oil. There is a need for continued advocacy and awareness about POPs/PCBs.

8 There are several players in POPs pesticides and PCBs. There is a lack of coordination among the regulatory and implementing agencies for monitoring of POPs and PCBs. NEPRA concludes that its mandate is to regulate the provision of electric power and set tariff rates but lacks environmental compliance mandate for PCBs after issuing the license. The Ministry of Industry and Production deals with the industrial units, while the Ministry of Communication deals with the Telcom sectors. In both the sectors, the private companies use POPs PCBs contaminated oil, or the processes generate unintended POPs. In addition, there are private units which overhaul and repair the transformers. The Department of Plant Protection, under the MNFSR, and provincial agricultural departments are the key players in dealing with the POPs pesticides. MOCC is the main regulatory body and sets environmental policies, while having limited role in implementation. The EPAs are the key institutions to implement policies, rules, and regulations and for the exception of Punjab EPA, other EPAs lack qualified technical staff to analyze samples and ensure compliance. Lack of coordination among the institutions dealing with POPs complicates the situation, as there is no central agency to regulate this issue which is not provincial or national but of global significance.

9 Lastly, enhancing the enabling environment and building national and provincial capacities complementing each other and actual demonstration of disposal of POPs/PCBs at a scale proved an exceptionally good approach to win appreciation of the government and public at large.

The project benefited from the use of some of the MTR recommendations. It helped, among other factors, in moving the project's performance from moderately unsatisfactory at MTR to satisfactory at TE. Timely adaptive management measures were undertaken after the MTR which avoided further implementation delay.

Recommendations

As this is the TE, the recommendations pertains to sustain the results, and formulation of a successor project.

Sustainability

1 To ensure the sustainability of POPs pesticides free environment, the federal and provincial EPAs should remain vigilant about any illegal import or sale of POPs pesticides in the country. If any stock is found, the MOCC should take over the stock, contain it securely to avoid immediate risks and get it disposed

as quickly as possible following guidelines and SOPs established by the project. *Responsible Party: MOCC.*

2 UNDP should work closely with the MoCC and ensure that the rules developed under the POPs project are formally approved and enacted by the concerned government department(s). *Responsible Parties: MOCC and UNDP.*

3 The EPAs should undertake an inventory of all the electric/transformer companies engaged in the business of manufacturing and repair of equipment containing mobile oil and enforce to provide the PCB contaminated oil to the designated factory such as Bestway Cement for disposal. EPAs should serve as a bridge between the industry and the Bestway Cement. Since the oil has a calorific value, it will cut the fuel cost of cement plant, which will be an incentive for it. It is a win-win situation for both the parties. Likewise, the EPAs should strictly monitor and ensure that no used mobile oil, plastic or used tyres are used as fuel in the brick kilns. *Responsible Parties: MOCC and EPAs.*

4 Being a member of the Project Board and the regulatory body for the import of pesticides, the Ministry of National Food Security and Research should collect data about the illegal trade of POPs pesticides in the country and take measures to curb it. It should also initiate a "Programme on Certified Pesticides Applicators" and provide training and issue license to farmers for the use of pesticides and proper disposal of empty containers. *Responsible Party: MNFSR.*

5 To ensure long term sustainability of the project, it is proposed that UNDP may advocate to the government to submit a bill to the Parliament to establish a central "Hazardous Waste Management Authority" on the pattern of "Food Authority" in the country under the umbrella of MOCC. This authority should be established in the spirit of public-private partnership. *Responsible Parties: MOCC and UNDP.*

Successor Project

6 MOCC should work closely with UNDP on the formulation of a successor project to reduce/eliminate hazardous chemicals wastes, other unintended POPs especially in the ship breaking industry in the Gadani area, Balochistan. The project may consolidate the successes of this project and ensure implementation and enforcement of laws/rules developed under the project. *Responsible Parties: MOCC and UNDP.*

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Annex 1. Terms of Reference *(annexed as a separate file)*

Annex 2. Terminal Evaluation Agenda

Date	Time	Name / Title / Organization
17 Dec. 20	0930-1000	Mr. Syed Sabeeh, Chief, Results Management Unit, UNDP, Islamabad
22 Dec 20	0830-0930	Ms. Nusrat Shahen, Project Manager, POPs Project
		Mr. Aman Qureshi, Technical Advisor, POPs Project
22 Dec. 20	0930-1030	Mr. Amanullah, Assistant Resident Representative, UNDP
24 Dec 20	1100-1200	Ms. Farzana Altaf Shah, DG, Pakistan EPA, Islamabad
	1200-1300	Mr. Zia Mohyuddin, Director (Retd.), Plant Protection, Peshawar
28. Dec. 20	1500-1600	Mr. Tariq khan, Director Technical, Plant Protection Department, Karachi
31 Dec. 20	1400-1500	Mr. Shafqat Abbas, Section Officer, Ministry of Industries and Production, Islamabad
4 Jan 21	0930-1030	Ms. Beena Riaz, Environmental Engineer, K-Electric, Karachi
		Mr. Farooq Bhutto, Assistant Manager, K-Electric, Karachi
		Mr. Ahmad Mushtaq, Deputy Manager, K-Electric, Karachi
4 Jan 21	1100-1200	Mr. Muhammad Yasin, Additional Manager, IESCO, Islamabad
		Mr. Sher Afzal, Incharge Environment and Social Safeguards, IECO, Islamabad
5 Jan 21	0930-1030	Mr. Hassan Akhtar, Joint Secretary UN Desk, EAD, Islamabad
8 Jan 21	1130-1230	Syed Mujtaba Hussain, Joint Secretary/NPD, MOCC, Islamabad
8 Jan 21	1300-1400	Mr. Ashiq Ahmad, Incharge Ecotoxicology Laboratory, NARC, Islamabad
9 Jan 21	1700-1800	Mr. Karam Ahad, Director, Institute of Pest and Environment Management, NARC, Islamabad
13 Jan 21	1130-1500	Mr. Muhammad Faheem Ehsan, Manager Production, Bestway Cement Ltd., Chakwal
		Mr. Ahmad Aziz Balouch, Manager Production, Bestway Cement Ltd., Chakwal
15 Jan 21	1130-1230	Mr. Khadim Hussain, Deputy Director Research & Development, EPA, Gilgit
	1500-1600	Mr. Abdullah Magsi, Deputy Director Laboratory, EPA, Karachi
18 Jan 21	1200-1400	Mr. Muhammad Wajahat, Environment, Health & Safety Segregator, Geolinks, Karachi
		Mr. Abdul Rehman, Environment, Health & Safety Officer, Geolinks, Karachi
		Mr. Asad Ali, Plant and Maintenance Manager, Geolinks, Karachi
19 Jan 21	1400-1500	Mr. Hussain Zaigham, Senior Advisor, NEPRA, Islamabad
		Mr. Shahzad Anwar, Additional Director, NEPRA, Islamabad
20 Jan 21	1200-1330	Mr. Khurram Shahzad, Director General, EPA, Lahore
		Dr. Nusrat Naz, Director, Environmental Health, Dengue Control and Hazardous Wastes, EPA, Lahore
		Ms. Pakeza Bukhari, Director, Technology Transfer, EPA, Lahore

Annex 3. List of Persons Interviewed

S. No.	Name	Title/Organization	Phone/email
1	Mr./ Hassan Akhtar	Joint Secretary, UN Desk, EAD, Islamabad	directorfmo@gmail.com
2	Syed Mujtaba Hussain	Joint Secretary/NPD POPs Project, MOCC, Islamabad	+92 321 515 5379 hussainmujtaba@hotmaik.com
3	Ms. Farzana Altaf	Director General, EPA, Islamabad	dg@environment.gov.pk far_02@yahoo.com
4	Mr. Shafqat Abbas	Section Officer, Ministry of Industries and Production, Islamabad	shafqat.climate@gmail.com
5	Mr. Muhammad Yasin	Additional Manager/ Environmental Engineer, IESCO, Islamabad	iescopmu@iesco.com.pk
6	Mr. Sher Afzal	IESCO, Islamabad	iescopmu@iesco.com.pk
7	Mr. Khurram Shahzad	Director General, EPA, Lahore	+92-42-99232230 dg.epa@punjab.gov.pk
8	Dr. Nusrat Naz	Deputy Director, Environmental Health, Dengue Control & Hazardous Waste (EDH), EPA, Lahore	+92-42-99231818 ddedh.epa@punjab.gov.pk
9	Ms. Pakeza Bukhari	Additional Director, EDH, EPA, Lahore	+92-42-99231818 ddtt.epa@gmail.com
10	Mr. Hussain Zaigham	Senior Advisor, NEPRA, Islamabad	zimran24@gmail.com
11	Mr. Shahzad Anwar	Additional Director, NEPRA, Islamabad	
12	Mr. Muhammad Wajahat	Environment, Health, & Safety Segregator, Geolinks, Karachi	+92 334 347 8310 tariqahmed@geolinks.com.pk
13	Mr. Abdul Rehman	Environment, Health & Safety Officer, Geolinks, Karachi	
14	Mr. Asad Ali	Plant Maintenance Officer, Geolinks, Karachi	
15	Mr. Abdullah Magsi	Deputy Director, EPA, Karachi	abdullahmagsi310@gmail.com
16	Mr. Khadim Hussain	Deputy Director, EPA, Gilgit	hussain.shabber786@gmail.com hussain.gbepa@yahoo.com
17	Mr. Muhammad Faheem	Head of Production, Bestway Cement, Chakwal	+92 301 856 1167
18	Mr. Ahmad Aziz Baloch	Manager Production, Bestway Cement, Chakwal	+92 300 855 7203 ahmad.balouch@Bestway.com.pk
19	Mr. Ashiq Ahmad	Former Director, Ecotoxicology Lab, NARC, Islamabad	ashiqparc@gmail.com +92 334 503 1494
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Annex 4. List of Documents Reviewed

S. No.	Title
1.	Project Document
2.	Project Identification Form
3.	PIRS 2017, 2018, 2019 and 2020
4.	Financial Audit Report 205, 2016, 2017, 2018 and 2019
5.	Annual Work Plan 2017, 2018, 2019 and 2020
6.	Field Visit Monitoring Reports
7.	Various Quarterly Reports
8.	Initiation Plan for GEF Preparation Grant 2012
9.	Back to Office Reports
10.	Combined Delivery Reports 2017, 2018, 2019 and 2020
11.	Correspondence between Stakeholders
12.	Country Programme Document
13.	Inception Workshop Report
14.	LPAC meeting agenda and minutes
15.	Monitoring and Evaluation Plan
16.	Gender Mainstreaming Plan
17.	One United Nations Programme (United Nations Sustainable Development Framework (UNSDF)
18.	LOAs with the Service Providers
19.	Press Clippings
20.	Project Document
21.	Project Risk Log
22.	Project Steering Committee minutes 2018, 2019 and 2020
23.	Reports of Service Providers
24.	Terms of Reference of Key Staff
25.	GEF Indicator Table at the Time of submission of CEO Endorsement
26.	Pakistan National Profile for Chemical Management
27.	NIP for Phasing out and Eliminating POPs

S. No.	Title
28.	PCB Management Plan for Pakistan
29.	STAP Scientific and Technical Screening
30.	Statutory Order Regulatory Notification POPs
31.	POPs Training Manual for Best Management Practices
32.	Updated NIP for Phasing out and eliminating POPs
33.	Workshop Proceeding Reports- Lahore, Islamabad, Peshawar, Quetta, Gilgit and Karachi
34.	GEF Indicator Table at the time of Submission of CEO Endorsement
35.	Audit Reports 2017, 2018, 2019 and 2020
36.	Baseline Study Report
37.	CEO Endorsement Request
38.	GEF Review Sheet
39.	Social and Environmental Screening
40.	UNDP Country Programme
41.	Bestway Cement Ltd.- company profile
42.	Co-Financing Letters from Stakeholders
43.	Flu Gases Emission Reports
44.	Reports on Disposal of POPs Pesticides and PCB contaminated oil
45.	POPs National Technical Guidelines
46.	Reports of Training Workshops

Annex 5. Evaluation Question Matrix

Evaluation Criteria	Questions	Indicators	Sources	Methodology
Relevance How does the project relate to main objective of the GEF focal area, and to the environment &development priorities at the local and national level				
Is the project objectives conform to agreed priorities in UNDP country program me Document (CPD)	How does the project support the environment and sustainable development objectives of the Govt. of Pakistan?	In line with the national priorities mentioned in the UNDP CPD?	UNDP CPD Project document	Document analysis Interview with UNDP and project Team
Is the project relevant to other international conventions objectives?	Does the project support the Stockholm Convention?	Priorities and area of work of other conventions incorporated in project design?	Project Documents National policies and strategies Others international conventional or related to environment more generally and other international convention web sites	Document analysis Interview with project team UNDP and other partners
Is the project relevant to GEF Persistent organic pollutants/Chemical waste focal area?	How does the project support the GEF persistent organic pollutants/ waste focal area?	Existence of clear relationship between the project objectives and GEF persistent organic pollutants /chemical waste focal area?	Project documents GEF focal area strategies and documents	Documents analysis GEF website Interviews with UNDP and project team
Is the project relevant to Pakistan Governments environment and sustainable development objectives?	Is the project country driven? What was the level of stakeholder participation in project design? What was the level of stakeholder participation in implementation? Does the project adequately take into account the national realities, both in terms of institutional and policy and implementation?	Degree to which the project support national environmental objectives. Degree of coherence between the project and national priorities, policies and strategies. Level of involvement of government officials and other partners in the project design process. Coherence between needs expressed by national	Project documents GEF focal area strategies and documents Key project partners	Documents analysis GEF website Interviews with UNDP and project team

Evaluation Criteria	Questions	Indicators	Sources	Methodology
		stakeholders and UNDP-GEF criteria		
Is the project addressing the needs of target beneficiaries at the local level?	How does the project support the needs of relevant stakeholders? Has implementation of the project been inclusive of all relevant stakeholders? Were local beneficiaries and stakeholders adequately involved in project design and implementation?	Relevance between expected results from the project and needs of relevant stakeholder Degree of involvement and inclusiveness of stakeholder in project design and implementation.	Project partners and stakeholders Project documents	Document analysis Interviews with relevant stakeholders.
Is the project internally coherent in its design?	Are there logical linkages between expected results of the project (log frame) and the project design (in terms of components) choice of partners, structure, delivery mechanism, scope, budget, use of resources? Is the length of the project sufficient to achieve project outcomes? Whether gender issues had been taken into account in project design and implementation.	Level of coherence between project expected results and project design logic. Level of coherence between project design and project implementation approach.	Program and project documents. Key project stakeholders.	Document analysis Key interviews
How is the project relevant with respect to other donor supported activities?	Does the GEF funding support activities and objectives not addressed by other donors? Is there coordination and complementarity between donors?	Degree to which program was coherent and complementarity to another donor programming nationally and Regionally	Documents from other donor supported activities. Others donor Representatives Project documents.	Document analysis Interviews with project partners and relevant stakeholders
Does the project provide relevant lessons and experiences for other similar projects in the future?	Has the experience of the project provided relevant lessons for other future project targeted as similar objectives?		Data collected throughout the evaluation	Data Analysis
Effectiveness To what Was extent have the expected outcomes and objectives of the project been achieved?				
Project support provided in an efficient way?	Was Adaptive management used or needed to ensure efficient resource use?	Availability and quality of financial and progress reports.	Project documents and evaluations. UNDP project team.	Document analysis Key Interview

Evaluation Criteria	Questions	Indicators	Sources	Methodology
	Did the project logical framework and work plans and any changes made to then use as management tools during implementations? Were the accounting and financial systems in place adequate for project management and producing accurate and timely financial information? Were progress reports produced accurately, timely and responded to reporting requirements including adaptive management changes? Was project implementation as cost effective as originally proposed (planned vs actual)? Did the leveraging of funds (conveyancing) happen as planned? Were financial resources utilized efficiently? Could financial resource have been used more efficiently? Was procurement carried out in a manner making efficient use of project resources? How was results- based management used during project implementation?	Timeliness and adequacy of reporting provided. Level of discrepancy between planned and utilized financial expenditures. Planned vs Actual funds leveraged. Cost in view of results achieved compared to costs of similar projects from other organization. Adequacy of project choice in view of existing context, infrastructure and cost. Quality of results-based management reporting (Monitoring &evaluation). Occurrence of change in project design / implementation approach (i.e., restructuring) when needed to improve project efficiency. Cost associated with delivery mechanism and management structure compared to alternative.		
How efficient are partnership arrangements for the project?	To what extent partnership /linkages between instructions/ organizations/were encouraged and supported?	Specific activities conducted to support the development of cooperative arrangement between partners.	Project documents and evaluations. Project partners and relevant stakeholders.	Document analysis Interviews

Evaluation Criteria	Questions	Indicators	Sources	Methodology
	Which partnership / linkages were facilitated? Which ones can be considered sustainable? What was the level of efficiency of cooperation and collaboration arrangements? Which methods were successful not and why?	Example of Supported Partnerships. Evidence / linkages will be sustained. Types/quality of partnership cooperation methods utilized.	Project partners and relevant stakeholders.	
Efficiency				
Did the project efficiently utilize local capacity in implementation?	Was an appropriate balance stuck between utilization of international expertise as well as local capacity? Did the project take into account local capacity in design and implementation of the project? Was there an effective collaboration between instructions responsible for implementing the project?	Project of expertise utilized from international experts compared to national experts. Number /quality of analysis done to assess local capacity potential and absorptive capacity.	Project documents and evaluations, UNDP Beneficiaries	Document analysis interviews
What lessons can be drawn regarding efficiency for other similar projects in the future?	What lessons can be learnt from the project regarding efficiency? How could the project have more efficiently carried out implementation (in terms of management structure and procedure, partnership arrangements? What changes could have been made (if any) to the project in order to improve efficiency?		Data collected in the course of evaluation	Data analysis
Has the project been effective in achieving the expected outcomes and objectives?	Has the project been effective in achieving its expected outcomes?	Review indicators in project document results framework and log frame.	Project documents. Project team and relevant stakeholders. Data reported in project reports	Document analysis Interviews with project team Interview with relevant stakeholder

Evaluation Criteria	Questions	Indicators	Sources	Methodology
How is risk and risk mitigation being managed?	How well are risks, assumptions and impact drivers being managed? What is the quality of risk mitigation strategies developed? Were these sufficient? Are there clear strategies for risk mitigation related with long term sustainability of the project?	Completeness of risk identification and assumptions during project planning and design. Quality of existing information system in place to identify emerging risks and other issues. Quality of risk mitigation strategies developed and followed.	Project documents. UNDP project team and relevant stakeholder.	Document analysis interviews
What lessons can be drawn regarding effectiveness for other similar projects in the future?	What lessons have been learned from the project regarding achievement of outcomes? What changes could have been made (if any) to the design of the project in order to improve the achievement of the projects expected results?		Data collected throughout evaluation	Data analysis
Sustainability: to what extent are there financials, instructional social, economic and /or environmental risk to sustainability long term project results?				
Is the project financially sustainability?	Are their financial risks that may jeopardize the sustainability of project outcomes? What is the like hood of financial and economic resources not being available once GEF grant assistance ends?	The likely ability of an intervention to continue to deliver benefit for an extended period of time after completion	UNDP, Project team and relevant stakeholders	Document analysis Interviews
Is the project environmentally and socially sustainable?	Are there ongoing activities that may pose an environmental threat to the sustainability or project out comes?		UNDP, project team and relevant stakeholder	Document analysis Interviews
To what extent the stakeholder will sustain the project?	Are there social or political risks that may threaten the sustainability of project outcomes? What is the risk of instance that the level of stakeholder ownership by government and other stakeholders will be insufficient		UNDP, project team and relevant stakeholders	Document analysis Interviews

Evaluation Criteria	Questions	Indicators	Sources	Methodology
	to allow for the project outcomes/ benefits to be sustained? Do the various key stakeholders see that it is in their interest that project benefits continue to flow? Is their sufficient public/stakeholder awareness in support of project long term objectives? What was the level of efficiency of cooperation and collaboration arrangements? Which methods were successful or not and why?			
Did the project efficiently utilize local capacity in implementation?	Was an appropriate balance struck between utilization of international expertise as well as local capacity? Did the project take into account local capacity in design and implementation of the project? Was there an effective collaboration between institutions responsible for implementation the project?	Proportion of expertise utilized from international experts compared to national experts. Number /quality of analysis done to assess capacity.	Project documents and evaluation, UNDP Beneficiaries	Document analysis Interviews
What lessons can be drawn regarding efficiency for other similar projects the future?	What lessons can be learnt from the project regarding efficiency? How could the project have more efficiently carried out implementation (in terms of management structure and procedure, partnership arrangements? What changes could have been made (if any) to the project in order to improve efficiency?		Data collected in the course of evaluation.	Data analysis
Has the project been effective in achieving the expected outcomes and objectives?	Has the project been effective in achieving its expected outcomes?	Review indicators in project document Result framework and log frame.		

Evaluation Criteria	Questions	Indicators	Sources	Methodology
How is risk and risk mitigation being managed?	How well are risk, assumption and impact drivers being managed? What is the quality of risk mitigation strategies developed? Were these sufficient?	Completeness of risk identification assumption during project planning, and design. Quality of existing information system in place to identify emerging risks and other issues.		
Impact: Are there indications that the project has contributed to the enabled to word reduced environmental stress and/or improved ecological status?				
Assess the likely permanence (long lasting nature) of impacts.	Clarify based on extent (a) verifiable improvement(b) Through specified indicators that progress is being made toward achievement of project objectives and (c) regulatory and policy changes at provincial levels.	The positive and negative, foreseen and unforeseen changes to and effects produced by the intervention	Project documents UNDP, project team and relevant stakeholder	Document analysis interviews

Annex 6. Questionnaire Used

1. Have policy makers in the relevant ministries of the Govt. adopted any of the recommendations made in the National Profile of Chemicals Management?
2. What is the current estimate of remaining POPs pesticides stockpiles in total and by Provincial estimates?
3. Please provide us an assessment of POPs contaminated sites, by location, amount and category if available.
4. GCMS equipment was provided under the project, is they is use, by whom and was training provided? Was the equipment used to identify POPs?
5. Capacity building efforts were undertaken in Islamabad and provincial capitals and a training manual was prepared providing best management practices for POPs, designed to cater to the training needs of various actors among others: (i) workers/laborers dealing with POPs at field sites and pesticide stores; PCB reclamation workshops and disposal sites and (ii) farmer communities including women linked with Agriculture extension and Plant Protection Dept. Were any specific training or information dissemination provided to women and farmers?
6. The following recommendations were made in the MTR report: Were consultants engaged to work on the development of inventories of POPs, PCBs at national level?
7. Have contaminated soils by POPs been evaluated and disposed of by environmentally sound practice?
8. Were TORs developed to engage international experts for backstopping the project?
9. Was an international consultant engaged for development of technical guidelines for POPs in accordance with BAT and BEP?
10. Was a legal consultant engaged to complete the legal process and amendments to existing legislation and whether it was enacted?
11. Was training provided to the PMU unit to enhance PMU skills in relation to M&E, BAT/BEP?
12. Was an effort undertaken to identify POPs treatment facility in Pakistan or a feasibility study undertaken to import PCBs treatment facility in Pakistan.
13. Has M&E project level work been undertaken and what activities been undertaken?
14. Please list all legal documents, policy, guidelines and procedures developed under the project by category:
15. Limited awareness on POPs pesticides issue. Although efforts have been carried out, awareness on the safe use of pesticides is lacking.
16. Under the project, guidelines were prepared to support National Regulations on safe handling, transport, storage and disposal of POPs and PCBs, how has it been put in practice ?
17. The MTR recommended to reverify assumed POPs pesticides that are mixed with non-POPs and establish location and quantities of PCBs by laboratory analysis. Was this done?
18. What was the result of the MOU signed with NEPRA to collect the data regarding PCB contaminated oil in the country?
19. Did the Project develop appropriate partnerships that facilitated project implementation, whether national stakeholders including the MOCC, supported the project and its objectives and the roles they played in decision-making processes in project implementation.
20. Is there a legal provincial legislation for the control of utilization and management of PCBs?
21. How are you monitoring compliance with environmental quality standards?
22. Has the GCMS equipment provided, enhanced the capacity to analyze chemicals including POPs?
23. How have you used it?
24. Have you consolidated inventory of POPs stockpiles in your province? Has the capacity and methodology been built under the project to validate the data on POPs stockpiles?
25. Did the provincial government enact development of POPs legislation prepared by consultant engaged by MOCC at provincial level?

26. NEPRA: does have the NEPRA the authority to monitor or inspect the handling and disposal of PCBs in the power sector entities?
27. Please inform us the status of the Statutory Regulatory Order Notification related to PCBs Management Plan for Pakistan, prepared in September 2020, has it come into force?
28. What is the status of the draft regulation on POPs prepared by the Project?
29. Non-Availability of the Project staff
    Reason:
30. Delay in the progress of project
31. Was it due to the above issue?
32. List of stockpiles for POPs Pesticide not consistent
    Why?
33. List of PCB Contaminated oil and Equipment not available
    Why?
34. No characterization was done for the material before collection, Non-POPs pesticide were disposed under the project activity.
35. Standard Operating Procedures (SOPs) were not available for Change of Custody (collection, packaging, transportation, unloading for POPs and PCBs
36. Standard Operating Procedures (SOPs) were not available for quantification with the feed for Disposal through Incineration in a cement kiln.
37. No SOP for the disposal of packing drums and contaminated transformers.
38. How many National Project Director were engaged during the life of the project?

Annex 7. Progress toward Results Matrix

As discussed in the text, the term Component referred in ProDoc refers to Outcome and Outcome referred in ProDoc refers to Outputs. This terminology was followed in the quarterly reports, but in PIRs again it was as per ProDoc.

Project Strategy	Indicator	2015 Baseline Level	End of Project Target	Project End Progress (2020)	Achievement Rating	Justification
Project Objective: **Reducing human health and environmental risks by enhancing management capacities and disposal of POPs in Pakistan**	Extent to which provisions on POPs comprehensively integrated into the regulation on chemicals, waste, environmental targets.	The integration of SC requirement on POPs in the existing regulation is very limited.	Existing regulation on chemical management updated and enforced with provisions related to POPs	Draft regulation on POPs management has been developed at the federal level. MOCC will be following it up with the federal entities to get these approved. Getting the rules approved from the government is not the mandate of the project.	Overall Project Rating 5 Satisfactory	The project has prepared a comprehensive PCBs management plan in 2020. It has also produced comprehensive guidelines for the environmentally sound management plan in 2020. It has also prepared the rules for the manufacturing, handling, transportation, storage, sale, purchase, management, usage, import, export, trade and disposal of Persistent Organic Pollutants
	Comprehensive regulation, clean up targets, and guidance on POPs contaminated sites in place and tested on a number of contaminated sites.	A harmonized regulatory system aimed at reducing release of, and exposure to POPs and hazardous chemicals is still missing.	An integrated system for enforcing and controlling proper management of POPs, both ad administration and industrial sectors adopted	The POPs inventory was updated in the entire country, samples from contaminated sites were collected and analyzed; arrangements were made to collect the POPs from all over the country and their disposal at Geolinks Karachi and the Bestway cement (786 tons POPs disposed).		The project has published a POPs chemical profile and their management. The inventories for POPs and PCBs were updated, and these were disposed

Project Strategy	Indicator	2015 Baseline Level	End of Project Target	Project End Progress (2020)	Achievement Rating	Justification
				Likewise, the oils in the transformers with public power companies was tested, and an inventory was prepared.		according to BAT/BE Practices.
	Extent to which awareness on POPs of relevant stakeholders measurably enhanced.	Awareness of institutional and industrial stakeholders, as well as the general public is low.	A comprehensive package of regulations and guidance for POPs reduction and disposal, permitting of disposal facilities, PCB inventory and treatment established.	A standardized training manual on POPs was prepared. The project organized 610 training/ awareness events and trained 610 (including 52 females) persons in handling and managing pesticides. POPs and PCB inventory (in public sector was updated); xx manuals/training workshops prepared; and project website was developed which is in operation having all the policies.		The project prepared standardized training manuals, and organized training sessions in all the provincial headquarters with the key stakeholders. However, no post-training assessment or survey was made to gauge the level of awareness before and after the trainings.
	Extent to which capacity of local communities and public and private sector stakeholders to reduce exposure to POPs and their releases enhanced	POPs pesticide stockpile and PCB contaminated equipment are unsafely stored and often dispersed in the environment as a result of floods.	Management capacity of governmental and industrial stakeholders increased. Awareness of relevant stakeholders at all level is significantly enhanced.	13 onsite trainings on POPs were carried out using Trainer of Trainers (ToT) approach. These workers/management staff will further replicate the training in their workstations and cities using the training material and standard training manual provided to them by the project.	Rating 6 f or the indicator	13 on-site training sessions were organized for the public and private sectors regarding the exposure and risks of badly handling POPs and PCBs.
	Percentage increase in tons of POPs pesticide stockpiles and PCBs properly managed and disposed of.	Capacity and infrastructures for the management and disposal of POPs stockpiles and PCBs is missing.	At least 1200 tons of POPs pesticide and 300 tons of PCBs contaminated equipment safely collected, stored and disposed of.	The disposal firms were supposed to complete the tasks by June 2020 but the task of POPs pesticides collection and transportation from all remote locations was quite impossible due to the current COVID-19 lockdown situation and travel restrictions in country. However, the work is near completion now.		786 MT of POPs pesticides collected and disposed (443 MT at Bestway Cement and 343 at the Geolinks). 52 MT of POPs PCBS collected and disposed at Bestway Cement and

Project Strategy	Indicator	2015 Baseline Level	End of Project Target	Project End Progress (2020)	Achievement Rating	Justification
				For PCBs remaining target, project has made arrangement to dispose 5,000 PCB contaminated oil from the power sector. It has been agreed that the project will provide PCB free oil to the power companies, in lieu of the PCB contaminated oil. Arrangements have been already made to replace the oil and dispose the PCB contaminated oil at the Bestway Cement Ltd. At the completion of project 786 MT on POPs pesticides and 352 MT (52 MT already disposed and contracts for disposal of 300,243 liters have been awarded.		10 MT at Geolinks (total 52 MT PCB oil contaminated oil). Another lot of 300,243 liters of contaminated oil will be replaced with the PCB free oil. Al the POPs were disposed by following BAT/BEP technologies.
Component 1. Development and implementation of a Regulatory, Policy and enforcement system to reduce POPs releases. Component Rating 5 Satisfactory						
Outcome 1, (Outcome 1 in PIR 2020) strengthened POPs regulatory and policy instruments adopted and POPs management systems for controlling and reducing releases of POPs functional	Number of regulatory tools relevant to the management of POPs including PCBs, hazardous waste pesticides, release and emission limits for disposal facilities, analyzed, revised and amended to consistently take into account SC provisions on POPs.	The initial POPs pesticides as included in the Stockholm Convention before 2009 are banned in Pakistan, through the Agricultural Pesticides Ordinance, 1971. New POPs like PFOs and brominated flame retardants are not regulated in Pakistan A PCBs regulation is completely missing.	Key POPs related national legislation developed. National Technical POPs management Guidelines developed.	Key POPs related draft national level regulations on POPs have been developed to be implemented at federal government level. The MOCC in coordination with the law ministry will take up these in the parliament for enactment and advise the provincial governments for enforcement. National technical POPs management guidelines (sector-specific) have been developed and shared with all the departments. Currently, the adoption and implementation of national technical guidelines on POPs management and control at provincial	Outcome Rating 6 Highly Satisfactory	As mentioned in the progress and justification against the indicators against objective, the project has updated the profile, and prepared the comprehensive chemical management plan and drafted rules to manage the POPs and PCBs as per BAT/BEP practices. The approval of rules and legislation and its implementation is the domain of MOCC, Law

Project Strategy	Indicator	2015 Baseline Level	End of Project Target	Project End Progress (2020)	Achievement Rating	Justification
		Regulation on U-POPs emission is not compliant with the SC BAT/BEP		and federal level is under consideration to be referred in mainstream legislation, which is the domain of the MOCC and the Law Ministry.		Ministry, EPAs and the provincial and district governments, which have a weak implementation capacity. However, as far the project is concerned, it has fully achieved the target.
Outcome 1.2 (Outcome 2 in PIR) Government enforcement agencies and other Number of national in regulating POPs management are able to use tools developed for POPs management and network with/regulate main agencies handling POPs.	Number of national Technical POPs management Guidelines compliant and effectively implemented.	Inadequate specialized skills, financial resources, equipment and working tools by respective institutions dealing with POPs; Lack of dedicated administrative structure.	60 staff from central and provincial level administration trained on enforcement of POPs related provisions	The national technical guidelines on POPs management for all sectors have been developed and shared with all the stakeholders. So far, more than 60 people have been trained; however, to further strengthen their role, a round of workshops for all relevant departments at 07 locations were conducted. Around 150 people, 30 females and 120 males are expected to participate in workshops. These workshops/trainings will be on the enforcement of the draft regulation and national technical guidelines developed by the project POPs.	Outcome Rating 6 Highly Satisfactory	The guidelines to dispose POPs and PCBs have been developed and the relevant staff from all the stakeholders trained. In the private sector K-electric staff was trained but no other private power company small entrepreneurs engaged in overhauling and repairs were not trained.
	Number of management and enforcement staff at national and provincial level in at least 4 provinces have enhanced skills/capacities on POPs management and enforcement.	Not set or not applicable	Guidance / circulars on PCB identification, inventory labelling and disposal issued; Guidance / circulars on obsolete pesticides including POPs identification, inventory and disposal issued; Guidance for import / export of POPs	For PCBs and Pesticides, Project has provided 07 Gas Chromatograph Mass Spectrometers to all the EPAs for identification of POPs. Guidelines have been shared with all 07 provinces. Further, Project has collected and assessed 5,000 PCBs samples from all provinces. For POPs pesticides, project developed reports on obsolete pesticides including POPs identification, inventory and disposal.		The GCMS were provided to all the EPAs, and their staff were trained in operation of GCMS. But none of the EPA is using the equipment due to missing sampling assembly and/or standard chemicals and incompetent staff.

Project Strategy	Indicator	2015 Baseline Level	End of Project Target	Project End Progress (2020)	Achievement Rating	Justification
			containing materials and goods.	The data collected through these reports was also validated by parallel team working on National Implementation Plan update 2019 for Ministry of Climate Change. The National Implementation plan (NIP) of Pakistan (developed in 2009) has been updated using this data collected by project and shared with the Stockholm secretariat. This NIP report is also available online on Stockholm convention site. The SOPs to ensure safety precautions as per the international standards for the transportation, and disposal of POPs pesticides and PCBs were developed and shared with the transport/disposal companies with their contracts. The guidelines for the import and export of POPs as part of National technical guidelines have been developed and shared with relevant stakeholders.		
Outcome 1.3.(Outcome 3 in 2020 PIR) Governance and enforcement particularly on illegal imports framework for controlling POPs improved.	Number of main custom offices out of the total number which have adopted procedures and circulars establishing POPs management.	Inadequate awareness of importers and custom officers on imports requirements;	Procedures, responsibilities and offices for the enforcement of provisions related to import/exports of POPs substances or POPs containing or contaminated articles established.	The roles and responsibilities and policy framework for enforcement provisions related to import/export of POPs are provided in rules on POPs and one section of technical guidance also gives the relevant information, which will be made effective by November 2020. The technical guidelines documents have been shared with all the relevant stakeholders including concerned	Indicator Rating 5 Satisfactory	The concerned officers and staff of the customs and relevant were trained. However, the project did not conduct any study on the availability of POPs and PCBs in the private sector. The POPs are still available in the

Project Strategy	Indicator	2015 Baseline Level	End of Project Target	Project End Progress (2020)	Achievement Rating	Justification
				custom departments for compliance. This National Technical Guidelines documents were developed under legislation component of the project which is a very important document to be developed under Stockholm convention for the preparation of sector-specific technical guidelines. For this task, project engaged the services of an international consultant, Mr. Carlo Lupi and consultation meetings were conducted with all sectors. The following guidelines have been developed as part of this document: Guidance on POPs Legislation Guidance on POPs Pesticides, Guidance on POPs PCBs Guidance on Industrial and Unintentional POPs, Guidance on Imports and Exports of POPs Guidance on Contaminated Sites.		market due to poor enforcement.
	Number of officers from all the main customs successfully trained.	Inadequate POPs inspectorate services Lack of control on the export of PCB content of end of life electrical equipment	Custom officers and managers trained on POPs issues and strategies. All the main customs in Pakistan have adopted procedures and circulars establishing POPs management.	The project has trained 57 officials from Custom departments at two main locations i.e., Islamabad and Karachi. Out of these 57 officials, 6 were females as the ratio of female officials in custom control department is very low. The onsite trainings at thirteen locations were conducted in 2019 to build the capacity of agriculture/Energy/Import & Export/Industrial sectors on POPs management. Overall, 610 (558 were	Indicator Rating 6 Highly Satisfactory	The concerned officers and staff of the customs and relevant were trained. However, the project did not conduct any study on the availability of POPs and PCBs in the private sector. The POPs are still available in the market due to poor enforcement.

Project Strategy	Indicator	2015 Baseline Level	End of Project Target	Project End Progress (2020)	Achievement Rating	Justification
				male and 52 were females) participants were trained. The upcoming meetings will be on the enforcement of the draft regulation and national technical guidelines developed by the project.		
Outcome 1.4. (Outcome 4 in PIR2020) Comprehensive National Chemicals Profile improved and updated with enhanced steps taken for better response	Availability of an updated chemical profile report for Pakistan.	A chemical profile for the country was completed in 2009 by the International Cooperation Wing of the former Ministry of Environment. The chemical profile includes description of the chemical management in the country, including regulatory framework and management of hazardous waste, which will obviously need to be updated as a result of the activity of the project	Data compilation and elaboration of an updated Chemicals Profile for Pakistan with special reference to 1) priority concerns related to chemicals in all stages of their Life Cycles 2) Legal Instruments and institutional framework 3) Chemical Emergency preparedness 4) Management of POPs 5) Disposal capacity for PCBs and POPs.	Project has updated the National Chemical Profile of Pakistan with the aggregate quantum of all chemicals in each sector. The Profile includes the legal instruments, chemical emergency preparedness response and institutional arrangements as part of the document. Final draft of this national chemical profile has been shared with the implementing partner (Ministry of Climate Change). This is an official reference document which aims at assessing the overall situation of chemicals including their import, export, management status, infrastructure, relevant national capacity, disposal and safe destruction, where required, in line with the concerned global conventions on chemicals. Pakistan's first national chemical profile was prepared in 2009 and now currently, it's the second updated version finalized in May 2020	Outcome Rating 6 Highly Satisfactory	The updated National Chemical profile was prepared and submitted to the MOCC.
Component 2. Capacity building of local communities and public and private sector stakeholders to reduce exposure to and releases of POPs. Component overall Rating 5 (Satisfactory)						
Outcome 2.1. (5) Stakeholder groups aware of sources and prepared to mitigate POPs exposure and	Number of institutes and communities receiving effective Training on POPs exposure	Poor information exchange and data Keeping. Inadequate resources	Development of awareness and training programs of sources and	Based on the standard training manual developed by the project, 13 onsite trainings on awareness and training programs of sources and cost-effective POPs exposure and release	Outcome Rating 6 Highly Satisfactory	The project has trained 1,295 persons in handling of POPs. Of these, 263 from Agriculture (Plant

Project Strategy	Indicator	2015 Baseline Level	End of Project Target	Project End Progress (2020)	Achievement Rating	Justification
releases.		for dissemination of information on the viable POPs alternatives.	cost-effective POPs exposure and release reduction steps as well as alternatives to POPs. Professional and community level training sessions on POPs exposure mainly for PCBs and release undertaken as well as risks with unauthorized products reduction covering 30 institutes and 50 communities. Training of PCB holders in safe PCB handling during maintenance	reduction steps as well as alternatives to POPs were conducted in all provinces The project has conducted 35 total trainings including 13 onsite training. Around 1,295 participants were part of these trainings coming from academia (Students, Professors & Lecturers from Universities & Colleges), relevant government stakeholders (Agriculture, environment, customs, industrial and power sector), Representatives of community groups, electronic & print media, Chamber of Commerce, and Private Sector including industries associations out of which around 300 were female participants. The details of the participants who were trained during onsite trainings is as follows: 263 from Agriculture (Plant Protection and Agriculture Extension Departments), 110 from Energy Sector departments, 40 from Environment Protection Departments, 31 from industries, 25 from Customs, 37 from academia and 104 community representatives mainly farmers and chemicals associations and villagers.		Protection and Agriculture Extension Departments), 110 from Energy Sector departments, 40 from Environment Protection Departments, 31 from industries, 25 from Customs, 37 from academia and 104 community representatives mainly farmers and chemicals associations and villagers
	Percentage increase in the level of awareness of main private and public stakeholders, on cost effective POPs	Lacking information and procedures for preventing exposure to and release of POPs	No target was set	No survey was conducted to measure the level of awareness about POPs, its exposure levels, protective measures and alternatives to POPs.		No data is available on this indicator, as no KAP survey was conducted. Indicator not rated

Project Strategy	Indicator	2015 Baseline Level	End of Project Target	Project End Progress (2020)	Achievement Rating	Justification
	exposure, POPs release reduction and alternative to POPs					
Outcome 2.2 (6) Cost effective POPs exposure mitigation undertaken focusing mainly on PCBs.	Number of people successfully trained for each relevant sector.	Lack of guidelines on risk minimization procedures for handling, transportation, storage and disposal of PCB contaminated equipment. Lack of adequate legal provision for monitoring of POPs release and their effects to human environment; There are no legal provisions focusing on PCBs	Specific guidance documents developed and training for PCB holders in safe PCB handling during maintenance undertaken.	The national technical guidelines and National PCBs Management Plan were developed and shared with all the relevant stakeholders. 13 onsite trainings were organized for PCB holders around safe PCB handling during maintenance and best management practices on PCBs.	Rating 6 Highly Satisfactory	350 persons have been trained, of which 110 received onsite training.
	Percentage of people have enhanced post training skills for safe PCB handling during maintenance.	Not available	At least 50 people from the power generating and distribution sectors and 50 people from large electricity consumption factories which are owners of potentially PCB contaminated equipment trained	The energy sector or PCBs Holders have received trainings in three rounds i.e., general awareness training in 2017, PCBs BAT/BEP in 2018, onsite trainings using training of trainers (TOT) approach using standard training manual in 2019. Around 350 people from energy have been trained so far, out of which, 110 were trained during onsite trainings. After attending trainings in all three rounds, power sector is now sensitized and have supported project to carry out sampling and testing of 5000 samples of POPs PCBs from power sector, and are now willing to		350 persons have been trained, of which 110 received onsite training

Project Strategy	Indicator	2015 Baseline Level	End of Project Target	Project End Progress (2020)	Achievement Rating	Justification
				dispose of the contaminated oil or equipment.		
Outcome 2.3. (Outcome 7 in PIR 2020) Awareness on POPs pesticides among key target groups, such as decision makers, high/risk occupations etc. raised.	Number of institutes and communities effectively trained.	Lack of awareness, both for the public at large, decision makers or farmers, on public awareness on health and environmental risks associated with POP pesticides.	At least 30 institutes and 50 communities in relevant areas (agriculture intensive, manufacturing districts, power sector, and waste management) trained on pesticidal POPs and their toxicology features, POPs exposure scenario, alternatives to POPs and POPs-free technologies including a specific training activity for addressing gender issues, carried out.	The energy sector or PCBs Holders have received trainings in three rounds i.e. general awareness training in 2017, PCBs BAT/BEP in 2018, onsite trainings using training of trainers (TOT) approach using standard training manual in 2019. Around 350 people from energy sector have been trained so far, out of which, 110 were trained during onsite trainings. After attending trainings in all three rounds, power sector is now sensitized and have supported project to carry out sampling and testing of 5,000 samples of POPs PCBs from power sector, and are now willing to dispose of the contaminated oil or equipment.	Outcome Rating 6 Satisfactory	The project has provided training to the key staff of all the public sector power distribution companies and K-electric. However, it ignored the private sector, such as Heavy Electrical Commission, PEL, telecom companies and small entrepreneurs engaged in the repair and maintenance of transformers and other equipment having PCB contaminated oil.
	Percentage of women with enhanced awareness on POPs	Baseline not set	Target not set	The number of females engaged in dealing with POPs and PCBs are very low. However, out of a total of 151 persons trained in this subject 13 were females.		The number of females engaged in dealing with POPs and PCBs are very low. Out of 151 persons trained in handling PCBS, 13 were females. Overall 300 women were trained, out of 1,295 trainees.
Outcome 2.4 (8) Reduced POPs exposure in occupational setting	Number of specific industrial sector for which training on POPs has been effectively delivered.	Inadequate resources to support preparation and execution of training and awareness	Guidance for exposure reduction to POPs in priority areas, including	51 operators) from 22 different industrial sectors including scrap metal, waste management, paper recycling, textile manufacturing, agriculture, iron and steel, ship-	Indicator Rating 4 Moderately Satisfactory	The project developed all the necessary guidelines but as per the indicator and end-of-project target, it did

Project Strategy	Indicator	2015 Baseline Level	End of Project Target	Project End Progress (2020)	Achievement Rating	Justification
		raising program. Lack of knowledge on safety at workplace, risk reduction, use of PPE in most industries.	non-occupational exposure and gender-related exposure developed. Operators from at least 5 specific industrial sectors (waste management and recycling, textile manufacturing, electric power sector, agriculture, iron and steel, ship-breaking, plastic) and control authorities trained on POPs reduction, BAT/BEP, PPE At least 5 industries and control authorities have integrated POPs issues into their management and supervision structures A specific training activity for women addressing POPs issue implementation	breaking and control authorities were trained on POPs reduction, best available technologies and best management practices. Apart from these trainings, the industrial associations, waste management companies and other industries were also invited in various consultative meetings around project activities mainly around chemical profile and national technical guidelines. The government level POPs stakeholders in agriculture and power sector including Agriculture/plant protection departments at all level (6 provincial and one at federal) and power supply companies in 11 main locations across Pakistan have integrated POPs issues into their management and supervision structures. To build capacity and provide equal opportunity, the Project introduced internship program and encouraged female participation which increased to 24% in 2019. To ensure Gender balance and women participation, the project hired 4 female consultants (33%) for different project activities. - Due to the constant efforts of project, the counterparts and stakeholders ensured female participation in Trainings/workshops/seminars.		not collect any information from the waste management, textile manufacturing, iron/steel and ship-breaking industry about POPs/PCBs but made an effort to train 51 operators from 22 different industrial sectors.

Project Strategy	Indicator	2015 Baseline Level	End of Project Target	Project End Progress (2020)	Achievement Rating	Justification
	Extent to which industries have integrated POPs issues adopted into their management and supervision structure.		Operators from at least 5 specific industrial sectors (waste management and recycling, textile manufacturing, electric power sector, agriculture, iron and steel, ship-breaking, plastic) and control authorities trained on Pop's reduction, BAT/BEP, PPE At least 5 industries and control authorities have integrated POPs issues into their management and supervision structures A specific training activity for women addressing POPs issue implemented	Operators from waste management and recycling, electric power sector, agriculture, steel and ship-breaking industry were trained. The progress to completion of this task is 100% as project has already organized PCBs trainings for power generation/distribution companies on PCBs management. Four trainings on PCBs for the staff of the power generation companies in Lahore, Islamabad, Multan and Karachi were conducted. 151 officials attended these trainings out of which 138 were men and 13 were women. Participants were mostly from the Energy (electric power) sector, other relevant stakeholders including Environment Protection Agencies and National Electric Power Regulatory Authority (NEPRA).		Training to handle and manage PCBs was provided to the operators of private industries. However, no information is available about the extent to which these practices are being adopted in the industry.
Component 3. Collection, Transport and Disposal of PCBS and POPs Pesticides. Overall component rating 6 (Highly satisfactory)						
Outcome 3.1. (outcome 9 in PIR 2020) Capacity to undertake POPs disposal projects at provincial level established	Percentage of inventory of POPs stockpiles mapped and digitized.	The National Implementation Plan (NIP) for POPs, inventories approximately 6,031 MT of obsolete stocks of POPs pesticides in 430identified sites. Of these 3,800 MT are in Punjab, 2,016 MT in Sindh, 48 MT in	National Inventory of POPs stockpile upgraded, including map for identifying priority sites	This national level inventory of POPs was completed in 2009 with only POPs pesticides and the figures were not updated till 2019 when project worked on the reconfirmation of stockpiles and found huge differences in earlier submitted document. The same inventory was also verified by a team of Ministry of Climate change and now the update national implementation plan 2019 has been	Outcome rating 6 Satisfactory	Updated inventory of POPs and National Chemical Profile has been developed by the project.

Project Strategy	Indicator	2015 Baseline Level	End of Project Target	Project End Progress (2020)	Achievement Rating	Justification
		KPK, 135 MT in Balochistan, 31.5 MT in AJK and 0.5 MT in Northern Areas of Pakistan.		uploaded on the Stockholm convention secretariat website. Inventory of POPs PCBs was missing as part of NIP 2009 which has now been completed by extensive sampling and testing of 5000 samples from power sector. These 5000 PCBs oil samples were collected and analyzed in 2019 and 2020. Around 2000 oil samples were collected from Punjab and Islamabad, 1400 were collected from Khyber Pakhtunkhwa, 1400 from Sindh and 200 from Balochistan		
	Number of electrical equipment tested for PCB.	A PCB inventory is missing. Storage facilities are not safe and POPs may be easily released in the environment.	Storages upgraded and logistic plan developed	The project has completed PCBs inventory of 5,000 samples. The project engaged four national level testing facilities and developed SOP for labeling, sampling and testing to be carried out in all provinces. These four firms collected & analyzed 5,000 samples from all provinces. Based on this testing project has compiled the information required for the development of the PCBs inventory. . 1,400 samples were collected and tested from Sindh Province 2. 2,000 samples were collected and tested from Punjab and Islamabad Province 3. 200 samples were collected and tested from Balochistan Province 4. 1,400 samples were collected and tested from Azad Jammu Kashmir, Gilgit and Khyber Pakhtunkhwa Province		The project has tested 4,184 transformers with the power companies. Of these 3.8% (161) where having PCB levels above the standard limit of 50 ppm. No information is available on the upgradation of the storage.

Project Strategy	Indicator	2015 Baseline Level	End of Project Target	Project End Progress (2020)	Achievement Rating	Justification
				The project has also developed feasibility report of proposed mobile/static technology for PCBs treatment by engaging an international expert. Based on this feasibility report, and considering the limited time remaining with enforced travel restrictions, the project is providing PCB free oil to the companies and collecting PCB contaminated oil for disposal. Further, a National PCBs Management Plan has also been developed and shared with all the stakeholders.		
	Extent to which training on sampling, analysis and labelling of PCB contaminated equipment has been effective.	Storage facilities are not safe and POPs may be easily released in the environment.	Pilot inventory of PCBs (testing of at least 5,000 equipment) carried out in one Province	Project engaged four national level testing facilities and developed SOP for labeling, sampling and testing to be carried out not only in one province as per the end target but in all provinces of Pakistan since this was important to finalize the PCB inventory.		Four trainings on PCBs for the staff of the power generation companies in Lahore, Islamabad, Multan and Karachi were conducted. 151 officials attended these trainings out of which 138 were men and 13 were women. Participants were mostly from the Energy (electric power) sector, other relevant stakeholders including Environment Protection Agencies and National Electric Power Regulatory Authority (NEPRA).5,000

Project Strategy	Indicator	2015 Baseline Level	End of Project Target	Project End Progress (2020)	Achievement Rating	Justification
						transformers with the power companies. The testing was done by the private companies; therefore, it cannot be gauged the testing knowledge gained by the trainees.
	Number of PCB storage and dismantling facilities effectively upgraded.	Dismantling facilities for PCBs do not currently envisage any procedure or equipment for the safe dismantling and decontamination of PCB contaminated equipment	At least 2 PCB storage and dismantling facility upgraded	The project developed feasibility report of proposed mobile/static technology for PCBs treatment by engaging an international expert. Based on this feasibility report findings, and considering the budget, COVID situation, travel restrictions and time limitation, the project did not work on the up-gradation of existing PCBs dismantling facilities and did not procure any onsite treatment technology.		The technology procurement option was dropped due to COVID-19 pandemic, and an alternate mechanism was introduced which was to procure the PCB free oil and supply to respective power departments. The tenders for this procurement have been awarded.
Outcome 3.2. (outcome 10 in PIR 2020) Environmentally safe disposal of particularly risky POPs stockpiles and the sound disposal of up to 1,500 tons of POPs Pesticides and PCBs	Amount of POPs pesticide disposed off in an environmentally safe way.	Currently the greatest part of POPs stockpiles and PCBs are not managed in an environmentally safe way. No disposal facility in Pakistan has been officially tested for disposing POPs	Identification, procurement and testing of disposal facilities or services. Up to 1200 tons of obsolete POPs stockpile from Punjab and Sindh province safely disposed.	This activity is delayed due to travel restrictions because of COVID-19 and also due to handing over of the pesticides by the provincial governments to the disposal firm. The project transported and disposed of 443.77 MT out of 729 MT available POPs pesticides.	Outcome rating 6 Satisfactory	The project has disposed 786MT.

Project Strategy	Indicator	2015 Baseline Level	End of Project Target	Project End Progress (2020)	Achievement Rating	Justification
		waste.				
	Amount of PCBs disposed of in an environmentally safe way	Disposal of obsolete pesticides has been carried out in compliance with EU BAT/BEP regulation by cement kiln incineration at Lafarge cement plan	Up to 300 tons PCB equipment safely disposed.	This activity is behind schedule due to travel related restrictions due to COVID-19 as well as the reluctance of power companies to off-load transformers (particularly the big ones) to avoid power breakdowns. The cumulative progress is at 15% to completion as the project has disposed 52 MT out of 300 MT of POPs PCBs contaminated oil. For PCBs remaining target i.e., 258 MT of PCBs oil, the project has made arrangements to procure PCB free oil which will be given to the government for replacement with the PCB contaminated oil.		The project has disposed 52 MT of PCB contaminated oil, and the arrangements are on the way to collect remaining 300 MT oil for disposal during 2021. However, as of March 2021, the project has already replace 249,000 liters have been replaced, and the processing of remainder quantity is in progress.
Outcome 3.3. (Outcome 11) National POPs management and disposal scheme and replication plan developed.	Existence of National POPs management and Disposal Plan with detailed plans on: 1. National scheme for POPs pesticide disposal 2. Management plan for PCBs	The action plans for pesticidal POPs disposal and PCBs management established in the NIP have not been implemented yet.	National scheme for POPs disposal as a part of hazardous waste management scheme developed. Nationwide PCB management strategy developed	The project has updated the hazardous substance rules of 2016 and shared the updated version with the Pakistan Environment Protection Agency at Federal level who is the custodian of these rules. The Project has also developed the PCBs management plan by engaging an international expert. The plan contains measures to prevent and respond to accidents during the life cycle of PCBs, the maintenance and repair of equipment containing or contaminated with PCBs and the execution of PCB inventories. The management plan will help energy sector and industrial sector to phase	Outcome rating 6 Highly Satisfactory	The POPs rules have been updated, National Chemical Plan, and PCB Management Plan prepared.

Project Strategy	Indicator	2015 Baseline Level	End of Project Target	Project End Progress (2020)	Achievement Rating	Justification
				out and further control PCBs in their systems.		

Annex 8. Evaluation Ratings

Highly Satisfactory (HS)	Project is expected to achieve or exceed all its major global environmental objectives, and yield substantial global environmental benefits, without major shortcomings. The project can be presented as "good practice".
Satisfactory (S)	Project is expected to achieve most of its major global environmental objectives, and yield satisfactory global environmental benefits, with only minor shortcomings.
Moderately Satisfactory (MS)	Project is expected to achieve most of its major relevant objectives but with either significant shortcomings or modest overall relevance. Project is expected not to achieve some of its major global environmental objectives or yield some of the expected global environment benefits.
Moderately Unsatisfactory (MU)	Project is expected to achieve its major global environmental objectives with major shortcomings or is expected to achieve only some of its major global environmental objectives.
Unsatisfactory (U)	Project is expected not to achieve most of its major global environment objectives or to yield any satisfactory global environmental benefits.
Highly Unsatisfactory (HU)	The project has failed to achieve, and is not expected to achieve, any of its major global environment objectives with no worthwhile benefits.

Annex 9. Status of the Management Actions on the Proposed MTR Recommendations

S. No.	Management Actions on the Proposed MTR Recommendations	Status at TE
1	First draft of revised work plan with the adjustment of activities and remaining budget.	Completed
2	PMU will call Project Board meeting to discuss the planning for 2019 and get this approved.	Completed
3	PMU will introduce advanced technologies & strategies for the disposal or treatment of POPs (PCBs mainly).	Completed
4	Another review of Project to check the progress of activities will be done.	Completed
5	Consultants will be engaged to work on development of inventories of POPs PCBs at national level.	Completed
6	Testing of POPs pesticides stockpiles to identify non-POPs from POPs samples will be done.	Completed
7	Sampling and analysis of PCBs by a certified national laboratory.	Completed
8	International consultant to work on feasibility, procurement & installations of PCBs treatment technology at national level.	Completed
9	International consultant for developing PCBs management plan.	Completed
10	International consultant to work on formulation of national technical guidelines on POPs management and control.	Completed
11	Legal Consultant for completion of legal process and amendments in existing legislation.	Completed
12	International consultant will be engaged to develop PCBs management plan at national level and to assess the feasibility of any such alternate PCB treatment facility/technology.	Completed
13	SOPs to be followed by the transport and disposal vendors to avoid exposure of POPs to environment and human hazards and ensuring that each step is followed as per the SOPs and report generated after every consignment is taken.	Completed
14	Strict monitoring of all transport and disposal activities by PMU and regulatory bodies to ensure compliance of safety measures.	Completed
15	Development of SOPs and incorporating in the revised contracts of the vendors.	Completed
16	PMU will get trainings on PMP & Prince2.	Completed
17	Reports to be aligned for consistency.	Completed
18	Quarterly reporting to be initiated.	Completed
19	Develop budget vs expenditure sheet as per budget line of Prodoc.	Completed
20	Development of POPs Pesticides Treatment Facility & import of PCBs Treatment Technology in Pakistan.	Completed

Annex 10. Signed UNEG Code of Conduct Evaluation Form

6.9. SIGNED UNEG CODE OF CONDDCT EVALUATION FORM

Evaluators/Consultants:

1. Must present information that is complete and fair in its assessment of strengths and weaknesses so that decisions or actions taken are well founded.
2. Must disclose the full set of evaluation findings along with information on their limitations and have this accessible to all affected by the evaluation with expressed legal rights to receive results.
3. Should protect the anonymity and confidentiality of individual informants. They should provide maximum notice, minimize demands on time, and respect people's right not to engage. Evaluators must respect people's right to provide information in confidence and must ensure that sensitive information cannot be traced to its source. Evaluators are not expected to evaluate individuals and must balance an evaluation of management functions with this general principle.
4. Sometimes uncover evidence of wrongdoing while conducting evaluations. Such cases must be reported discreetly to the appropriate investigative body. Evaluators should consult with other relevant oversight entities when there is any doubt about if and how issues should be reported.
5. Should be sensitive to beliefs, manners and customs and act with integrity and honesty in their relations with all stakeholders. In line with the UN Universal Declaration of Human Rights, evaluators must be sensitive to and address issues of discrimination and gender equality. They should avoid offending the dignity and self-respect of those persons with whom they come in contact in the course of the evaluation. Knowing that evaluation might negatively affect the interests of some stakeholders, evaluators should conduct the evaluation and communicate its purpose and results in a way that clearly respects the stakeholders' dignity and self-worth.
6. Are responsible for their performance and their product(s). They are responsible for the clear, accurate and fair written and/or oral presentation of study limitations, findings and recommendations.
7. Should reflect sound accounting procedures and be prudent in using the resources of the evaluation.

TE Consultant Agreement Form

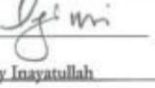
Agreement to abide by the Code of Conduct for Evaluation in the UN System:

Name of Consultant Dr. Ali Azimi

Name of Consultancy Organization (where relevant0: N/A

I confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation.

Signed at *Santa Fe, New Mexico, USA* *(Place)* on 14 November 2020 *(Date)*

Signature: 

Name of Consultant: Dr. Chaudhry Inayatullah

Name of Consultancy Organization (where relevant):
n/a

I confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation.

Signed at *Islamabad* *(Place)* on 14 November 2020 *(Date)*

Signature:

Annex 11. Audit Trail (annexed separately)

Annex 12. TE Report Clearance Form

Terminal Evaluation Report for *Comprehensive Reduction and Elimination of Persistent Organic Pollutants in Pakistan (PIMs 4600)* Reviewed and Cleared By:

Commissioning Unit (M&E Focal Point)

Name: Syed Sabeeh

Signature: Sabeeh _____ Date: 27-May-2021

Regional Technical Advisor (Nature, Climate and Energy)

Name: Manisha Sanghani

Signature: Manisha Sanghani _____ Date: 02-Jun-2021