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**The World Bank**  
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Report No: ICR00004424

IMPLEMENTATION COMPLETION AND RESULTS REPORT

Ln.79240/Cr.47550

ON A

LOAN

IN THE AMOUNT OF US\$25.21 MILLION

AND A

CREDIT

IN THE AMOUNT OF SDR25.70 MILLION

(US\$ 38.94 MILLION EQUIVALENT)

TO THE

GOVERNMENT OF INDIA

FOR THE

INDIA - CAPACITY BUILDING FOR INDUSTRIAL POLLUTION MANAGEMENT

DECEMBER 27,2018

Environment & Natural Resources Global Practice  
South Asia Region

## CURRENCY EQUIVALENTS

(Exchange Rate Effective DecEMBER 15, 2018)

Currency Unit = Indian Rupee

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INR71.96= US\$1

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US\$1.38 = SDR 1

FISCAL YEAR  
April 1 – March 31

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## ABBREVIATIONS AND ACRONYMS

<b>APPCB</b>	Andhra Pradesh Pollution Control Board
<b>CAS</b>	Country Strategy
<b>CPS</b>	Country Partnership Strategy
<b>CPF</b>	Country Partnership Framework
<b>CBIPMP</b>	Capacity Building for Industrial Pollution Management Project
<b>CPCB</b>	Central Pollution Control Board
<b>ECAC</b>	Environment Compliance Assistance Centre
<b>ESA</b>	Environment and Social Assessment
<b>ESMF</b>	Environmental and Social Management Framework
<b>GAAP</b>	Governance and Accountability Action Plan
<b>GHG</b>	Greenhouse Gas
<b>GoI</b>	Government of India
<b>HSMD</b>	Hazardous and Solid Waste Management Division, MoEF& CC
<b>HWM</b>	Hazardous Waste Management
<b>IBRD</b>	International Bank for Reconstruction and Development
<b>ICR</b>	Implementation Completion and Results Report
<b>IDA</b>	International Development Agency
<b>IEG</b>	Independent Evaluation Group
<b>IRR</b>	Internal Rate of Return
<b>M&amp;E</b>	Monitoring and Evaluation
<b>MoEFCC</b>	Ministry of Environment, Forest, and Climate Change
<b>NGO</b>	Nongovernment Organization
<b>NMK</b>	Noor Mohammad Kunta Lake
<b>NPV</b>	Net Present Value
<b>NPRPS</b>	National Program for Remediation of Polluted Sites
<b>PAD</b>	Project Appraisal Document
<b>PAP</b>	Project Affected People
<b>PDO</b>	Project Development Objective
<b>PIU</b>	Project Implementation Unit
<b>PMC</b>	Project Management Consultant
<b>PMU</b>	Project Management Unit
<b>POC</b>	Project Oversight Committee
<b>SDR</b>	Special Drawing Rights
<b>SMP</b>	Social Management Plan
<b>SPC</b>	Shadow Price of Carbon
<b>SPCB</b>	State Pollution Control Board
<b>TEP</b>	Technical Expert Panel
<b>TEC</b>	Technical Expert Committee
<b>TOC</b>	Theory of Change
<b>TSPCB</b>	Telangana State Pollution Control Board
<b>WBG</b>	World Bank Group
<b>WBPCB</b>	West Bengal Pollution Control Board

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**DATA SHEET**

**BASIC INFORMATION**

**Product Information**

Project ID	Project Name
P091031	India - Capacity Building for Industrial Pollution Management
Country	Financing Instrument
India	Investment Project Financing
Original EA Category	Revised EA Category
Full Assessment (A)	Full Assessment (A)

**Organizations**

Borrower	Implementing Agency
Ministry of Environment, Forests & Climate Change	Andhra Pradesh Pollution Control Board, West Bengal Pollution Control Board, Telangana State Pollution Control Board

**Project Development Objective (PDO)**

Original PDO

The objectives of the Project are: (i) to build tangible human and technical capacity in selected state pollution control agencies of the Borrower for undertaking environmentally sound remediation of polluted sites; and (ii) to support the development of a policy, institutional and methodological framework for the Borrower to establish a National Program for Rehabilitation of Polluted Sites.

Revised PDO

To strengthen the capacity of selected state pollution control agencies in the remediation of polluted sites and to support development of a framework to establish a national program for the remediation of polluted sites.



**FINANCING**

	<b>Original Amount (US\$)</b>	<b>Revised Amount (US\$)</b>	<b>Actual Disbursed (US\$)</b>
<b>World Bank Financing</b>			
IBRD-79240	25,210,000	363,860	363,860
IDA-47550	38,940,000	22,957,890	21,951,253
<b>Total</b>	<b>64,150,000</b>	<b>23,321,750</b>	<b>22,315,113</b>
<b>Non-World Bank Financing</b>			
Borrower/Recipient	11,240,000	4,270,000	4,270,000
Sub-borrower(s)	0	0	0
<b>Total</b>	<b>11,240,000</b>	<b>4,270,000</b>	<b>4,270,000</b>
<b>Total Project Cost</b>	<b>75,390,000</b>	<b>27,591,750</b>	<b>26,585,113</b>

**KEY DATES**

<b>Approval</b>	<b>Effectiveness</b>	<b>MTR Review</b>	<b>Original Closing</b>	<b>Actual Closing</b>
03-Jun-2010	13-Oct-2010	19-Jun-2013	30-Sep-2015	31-Mar-2018



**RESTRUCTURING AND/OR ADDITIONAL FINANCING**

<b>Date(s)</b>	<b>Amount Disbursed (US\$M)</b>	<b>Key Revisions</b>
19-Dec-2013	9.48	Cancellation of Financing Change in Financing Plan Reallocation between Disbursement Categories
25-Aug-2015	9.85	Change in Implementing Agency Change in Results Framework Change in Components and Cost Change in Loan Closing Date(s) Change in Financing Plan Change in Safeguard Policies Triggered Change in Institutional Arrangements Change in Implementation Schedule
17-May-2016	9.95	Change in Implementing Agency Change in Project Development Objectives Change in Results Framework Change in Components and Cost Cancellation of Financing Change in Financing Plan Reallocation between Disbursement Categories Change in Safeguard Policies Triggered Change in Legal Covenants Change in Institutional Arrangements Change in Implementation Schedule
14-Sep-2017	12.19	Change in Results Framework Change in Components and Cost Change in Loan Closing Date(s) Cancellation of Financing Reallocation between Disbursement Categories Change in Implementation Schedule

**KEY RATINGS**

<b>Outcome</b>	<b>Bank Performance</b>	<b>M&amp;E Quality</b>
Moderately Satisfactory	Moderately Satisfactory	Substantial

**RATINGS OF PROJECT PERFORMANCE IN ISRs**

<b>No.</b>	<b>Date ISR Archived</b>	<b>DO Rating</b>	<b>IP Rating</b>	<b>Actual Disbursements (US\$M)</b>
01	01-Dec-2010	Satisfactory	Satisfactory	5.44
02	28-Jun-2011	Satisfactory	Satisfactory	5.55
03	25-Dec-2011	Moderately Satisfactory	Satisfactory	5.85
04	26-May-2012	Satisfactory	Satisfactory	5.85
05	04-Sep-2012	Satisfactory	Satisfactory	6.71
06	03-Apr-2013	Satisfactory	Moderately Unsatisfactory	8.62
07	16-Oct-2013	Moderately Unsatisfactory	Unsatisfactory	9.48
08	19-Apr-2014	Moderately Unsatisfactory	Unsatisfactory	9.58
09	25-Nov-2014	Moderately Unsatisfactory	Unsatisfactory	9.65
10	04-Feb-2015	Moderately Unsatisfactory	Unsatisfactory	9.68
11	30-Jun-2015	Moderately Unsatisfactory	Unsatisfactory	9.85
12	29-Dec-2015	Moderately Unsatisfactory	Unsatisfactory	9.92
13	28-Jun-2016	Moderately Satisfactory	Moderately Satisfactory	10.10
14	29-Dec-2016	Moderately Satisfactory	Moderately Unsatisfactory	10.54
15	30-Jun-2017	Moderately Satisfactory	Moderately Unsatisfactory	11.77
16	07-Dec-2017	Moderately Satisfactory	Moderately Unsatisfactory	13.54
17	29-Mar-2018	Moderately Unsatisfactory	Moderately Unsatisfactory	15.05





**SECTORS AND THEMES**

**Sectors**

Major Sector/Sector (%)

**Water, Sanitation and Waste Management 100**

Public Administration - Water, Sanitation and Waste Management 33

Other Water Supply, Sanitation and Waste Management 67

**Themes**

Major Theme/ Theme (Level 2)/ Theme (Level 3) (%)

**Private Sector Development 100**

Jobs 100

**Environment and Natural Resource Management 99**

Environmental Health and Pollution Management 66

Air quality management 22

Water Pollution 22

Soil Pollution 22

Environmental policies and institutions 33

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## I. PROJECT CONTEXT AND DEVELOPMENT OBJECTIVES

### A. CONTEXT AT APPRAISAL

#### Context

1. India's high Gross Domestic Product rate of around 8–9 percent during 2005–2010 and the growing manufacturing sector increased pressure on environmental resources and demand on compliance to environmental regulations both by the public and the judiciary. In this context, an inventory of the Central Pollution Control Board (CPCB) in 2009 estimated that, over 36,000 industries in India generated about 6.2 million tons of hazardous waste annually. However, with a gap of over 1.2 million tons between the hazardous waste generated and the capacity of the treatment facilities in the country, most of this waste were either dumped in municipal landfills or in open dumps, leading to serious issues of soil and/or ground water contamination.

2. While India had several environmental regulations and institutions to manage issues of environment pollution, rising public demand for better environmental quality and increasing judicial interventions highlighted the limited effectiveness of these institutions in achieving their objectives. In response to a public interest litigation on HWM in the country, the Supreme Court of India in October 2003, issued several directions to the Ministry of Environment, Forest, and Climate Change (MoEFCC), GoI, and the State Pollution Control Boards (SPCBs).<sup>1</sup> In addition to several measures for strengthening the regulatory regime for HWM, these directions included, (i) preparation of a national inventory of illegal hazardous waste dump sites, (ii) policies and plans for their rehabilitation, and (iv) measures for strengthening the regulatory institutions. Responding to the above directions, the GOI prepared a program to address the critical policy and technical issues of remediation, including to learn from international experience in remediation technologies through the demonstration of sustainable models and to develop a framework for a National Program for Remediation of Polluted Sites<sup>2</sup> (NPRPS).

3. The India Capacity Building for Industrial Pollution Management Project responded to recognition by the GoI for better management of hazardous waste and the need for developing a framework for remediating polluted sites in the country. The Project intended to address the need to strengthen the technical, analytical, and regulatory capacities of environmental institutions in India to meet the increasing environmental challenges in the remediation of polluted sites.

4. The project was designed to be a pioneer in a context of no prior experience and of low competence in remediation of polluted sites. Slow learning curve at state levels was seen to be typical of

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<sup>1</sup> Due to the alarming situation created by dumping of hazardous waste and its generation and serious damage to the environment, a nongovernment organization (NGO) - 'Research Foundation for Science Technology National Resource Policy', approached the Supreme Court of India in 1995, complaining about violation of constitutional provisions. In response to the above writ petition, the court sought information from MoEFCC, SPCBs and constituted a high-powered committee to examine all matters relating to hazardous waste. After considering the above information and recommendations of this 12-member expert committee, the court issued directions in October 2003, to the MoEFCC and SPCBs to carry out several activities, which included (a) preparation of a national inventory of hazardous waste and dump sites, (b) formulating a national policy on dump sites and their rehabilitation, and (c) fixing time frames for implementation of rehabilitation plans.

<sup>2</sup> Both terms, 'polluted sites' and 'contaminated Sites' are used conjunctively for the sites affected by the release of hazardous substances.



such projects. The nature, type, spread and scale of contamination was uncertain or not known, technical competence of public institutions and domestic consulting and contracting agencies was non-existent. A direct transfer of knowledge from other countries (typically in Europe and North America) was not preferred as their contexts were dissimilar to India. In this background, the project was designed with equal emphasis on remediation of identified sites and an institutional development program that was realistic and country-owned. The implicit approach was to expand the institutional capacity at state level, ease the regulatory gaps, and limit physical interventions to demonstration of pilot clean-up/remediation techniques.

5. The World Bank's global expertise and experience in pollution management projects and implementation of environment management projects in India provided strong rationale for the World Bank's engagement in this complex and challenging project. Further, the project objectives strongly aligned with the World Bank's Country Strategy (CAS) 2009–12, which emphasized that “sound environmental management and sustainable use of natural resources have the potential to strengthen India's competitiveness”. The project also contributed to the environmental sustainability and human health goals of the Millennium Development Goals.

#### **Theory of Change (Results Chain)**

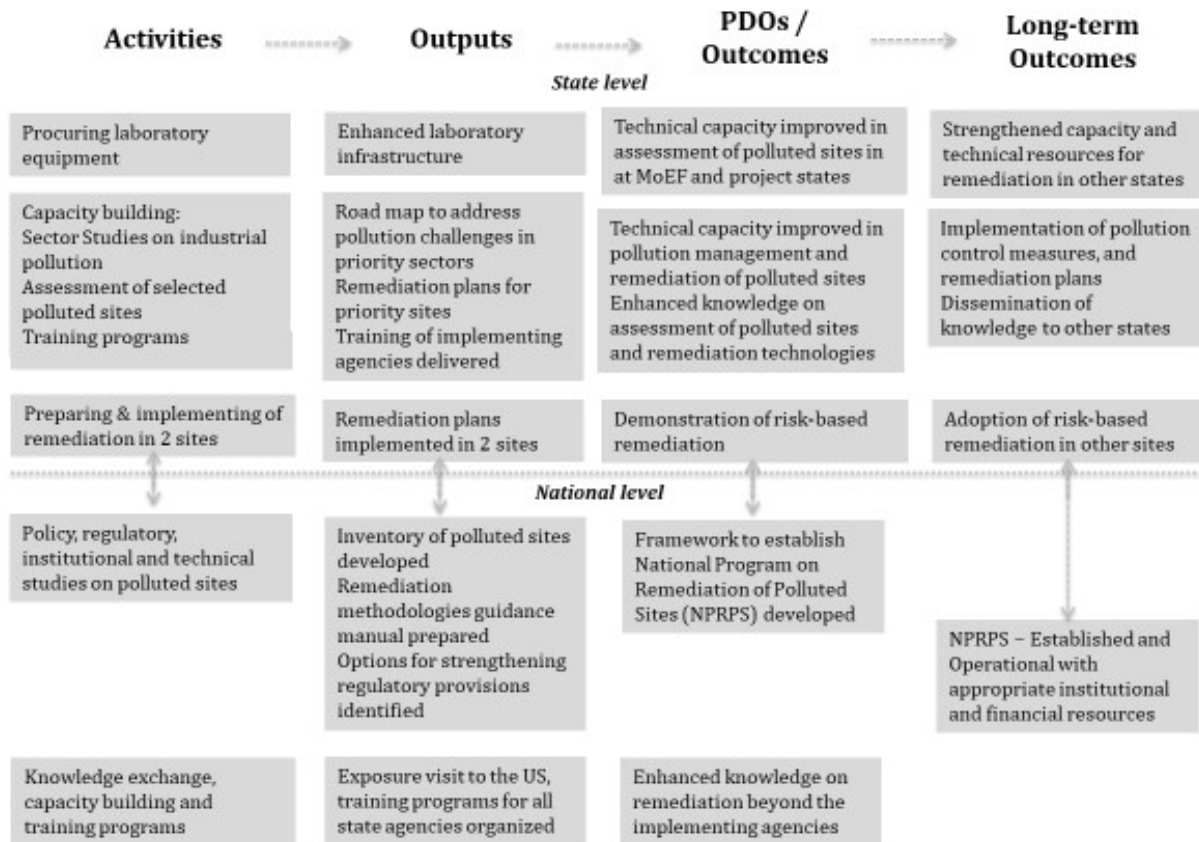
6. The project was designed as a pilot in response to the abundance of contaminated sites in India and limitations of the institutional capacity to address the problem. The approach was to strengthen the institutional capacity and regulatory gaps and demonstrate appropriate cleanup/remediation techniques to facilitate eventual scaling-up of remediation efforts in India. Given the nascent knowledge-base, the project was designed to build remediation capacity of the implementing agencies through the ‘learning-by-doing approach’ including learning from international experiences. This was to be achieved through a project-based learning (a) by undertaking prototypical investments in remediation of polluted sites, (b) supporting the development of a national framework for remediation, and (c) supporting technical and analytical capacity-building programs for implementing agencies.

7. To ensure achievement of capacity building in remediation, the project included (a) strengthening laboratory infrastructure of the implementing agencies to analyze hazardous waste parameters, (b) preparation of remediation plans for priority sites (in addition to the sites being piloted by the project), and (c) specific training programs on remediation. This approach ensured that the analytical, technical, and implementation capacity of the implementing agencies is strengthened in the remediation of polluted sites.

8. Similarly, to ensure that the sites to be remediated by the project are successful and serve the purpose of demonstration, an initial assessment of polluted sites identified by the GoI was carried out. The demonstration pilots and states were then selected based on this assessment and the commitment of the states for remediation. The demonstration pilots and capacity-building activities at the state/city level, were also designed to contribute to the development of a national program/policy on remediation of polluted sites. Similarly, the methodology studies and capacity-building activities at the national level were designed to contribute to the development of risk-based remediation plans for the demonstration pilots at the state level. The SPCBs of states other than the project states were also planned to be included in the training programs, to share the knowledge and learnings from the project.



Figure 1. Theory of Change: CBIPM Project



### Project Development Objectives (PDOs)

9. The objectives of the project<sup>3</sup> were (i) to build tangible human and technical capacity in selected state pollution control agencies of the Borrower for undertaking environmentally sound remediation of polluted sites; and (ii) to support the development of a policy, institutional and methodological framework for the Borrower to establish a National Program for Rehabilitation of Polluted Sites.

### Key Expected Outcomes and Outcome Indicators

10. As stated in the PDO, the project aimed to achieve two outcomes—to build capacity of selected state agencies in remediation of polluted sites, and to support development of a framework for the establishment of the NPRPS. These outcomes were to be assessed through the following indicators:<sup>4</sup>

<sup>3</sup> Through restructuring in May 2016, the PDO was revised to make it clearer and outcome focused.

<sup>4</sup> Annex 3 of the Project Appraisal Document (PAD), presents three different set of indicators in pages from 47–53. Based on key outcome indicators summarized in para 21 of the PAD, indicators in page 47–48 have been considered as the ones agreed at appraisal.



- (a) Cleanup/remediation technologies piloted at orphan hazardous waste sites and municipal dump sites in selected states and a network of state PCBs established by MoEFCC for knowledge dissemination and project-based training;
- (b) Guidelines and standards for remediation developed, and supervisory capacity of technical staff at environment agencies to implement remediation plans and monitor environmental conditions strengthened;
- (c) An Environmental Compliance Assistance Center established and fully functional by the end of Year 2 in West Bengal and by the end of Year 4 in Andhra Pradesh;
- (d) Water quality and soil characteristics at the pilot sites comply with specified standards and mechanisms established to monitor in the long term; and,
- (e) Supporting the NPRPS by developing a methodological framework for inventorying polluted sites, establishing remediation procedures and solutions and engaging multiple stakeholders in the implementation, including cost recovery mechanisms.

### Components

11. The project activities were organized into three components and were implemented by the MoEFCC, the Andhra Pradesh Pollution Control Board (APPCB), the West Bengal Pollution Control Board (WBPCB) and the Telangana State Pollution Control Board<sup>5</sup> (TSPCB). The total cost at approval was US\$75.39 million (US\$38.94 million IDA and US\$25.21 million IBRD; and US\$11.24 million GOI resources). At close, the total project cost was US\$30.71 million (with US\$26.08 million IDA, US\$0.36 million IBRD and US\$4.27 million GOI). Refer Annex 3 for details.

#### **Component 1: Strengthening of Environmental Institutions: Building Capacity for Addressing Pollution Remediation (Original: US\$16.74 million, Revised: US\$13.33 million)**

12. This component included assisting implementing agencies in the development of improved policy and regulatory programs, technical training in targeted skills, and associated institutional infrastructure investments. More specifically, the component aimed to support the development of (a) National Program for the Rehabilitation of Polluted Sites (US\$3.44 million), through technical assistance to the MoEFCC in the preparation of policies and plans to address the remediation of contaminated sites, (b) Environmental Compliance Assistance Centers (ECACs) (US\$5.21 million) in Andhra Pradesh and West Bengal that proactively promote and assist industries with environmental compliance in pollution management, and (c) institutional capacity building of state pollution control boards (US\$8.09 million) through additional laboratory equipment, training, and sectoral studies on pollution management. Subcomponent 1b above on the ECAC was dropped during the Level 1 restructuring carried out in May 2016.

#### **Component 2: Investments in Priority Remediation and Environmental Improvements: Rehabilitation of Orphan Hazardous Waste Sites and Municipal Dump Sites (Original: US\$52.80 million, Revised: US\$14.44 million)**

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<sup>5</sup> Note: The State of Telangana was formed due to bifurcation of Andhra Pradesh, and consequently, the TSPCB was included as an implementing agency through restructuring in May 2016.



13. This component included development and financing of the implementation of area-based remediation plans at orphan polluted sites and/or municipal dump sites, aimed at reducing environment and health risks to acceptable levels. The project, based on severity of environmental and health risks, upstream and downstream pollution impacts, community buy-in, and commitment of local governments at appraisal, identified four pilot sites. This included, Site A: Remediation of Noor Mohammad Kunta (NMK), Katedan Industrial Estate, Ranga Reddy District, Andhra Pradesh (US\$30.93 million), Site B: Remediation of the dump site in Kadapa District, Andhra Pradesh (US\$3.82 million), Site C: Remediation of Dhapa old municipal dump site adjacent to East Kolkata Wet Lands, West Bengal (US\$8.00 million), and Site D: Remediation of a chemically contaminated site in the district of Hooghly, West Bengal (US\$10.06 million). Site D and Site A, however were dropped during restructuring in May 2016 and September 2017, respectively due to technical and implementation challenges, explained in the later sections.

**Component 3: Project Management (Original: US\$5.85 million, Revised: US\$2.94 million)**

14. This component involved financing of expenditure incurred by the MoEFCC and the project states, such as hiring staff/consultants at the Project Management Unit (PMU) and Project Implementation Unit (PIU) at each state and the related incremental operating costs.

**B. SIGNIFICANT CHANGES DURING IMPLEMENTATION (IF APPLICABLE)**

15. The project encountered several challenges during implementation. According to the design, in the first 15 months of implementation, the project was to prepare remediation plans for the four pilot sites, and three basic studies to support the development of a framework for the NPRPS. By design, the main activities of the project were therefore expected to start only in the third year of implementation (considering 6 months of bidding process after the finalization of remediation plans). This however, was delayed due to (a) delays in the appointment of consultants for the preparation of remediation plans and policy/institutional studies for the NPRPS; (b) multiple reviews required by the Technical Expert Panel (TEP) to assess the suitability of remediation plans recommended by the consultants; (c) the innovative nature of remediation plans, that required additional effort to prepare bid documents; (d) multiple rounds of bidding to appoint the contractors, due to limited capacity of the contracting industry in the implementation of remediation plans; and (e) administrative uncertainties for over 15 months in Andhra Pradesh due to the bifurcation of the state. Owing to these delays, the remediation plans for the pilot sites could be finalized only by the end of 2014, whereas the basic studies to develop a framework for the NPRPS could be finalized in 2015.

16. To better understand and to respond to these challenges, an independent technical review of the project was carried out in September 2014. The review concluded that the delays in pollution management projects were known to be quite common due to extended periods of investigations and additional reviews required for informed decision making, including generation of supplementary supporting information. Given that scenario, the review suggested better communication between states and the MoEFCC for faster decision making, to expedite project management decisions such as rebidding, contract award, and so on, and selective cancellation of pilot remediation activities, subjected to awarding contracts by a target date. The project followed the approach recommended by the technical review and expedited decisions on rebidding of contracts for the implementation of remediation plans for the pilot sites and dropped two pilot sites that could not award contracts through two restructurings (May 2016 and September 2017).





17. The project was restructured four times. The first restructuring was carried out in December 2013, to cancel US\$10 million (SDR 6.49 million) IDA savings accrued due to depreciation of the Indian rupee against the U.S. dollar, from INR 44.94 on March 31, 2010 to INR 62.48 on November 30, 2013. Subsequently, a two-stage restructuring was carried out, first in August 2015 to extend the closing date (to September 15, 2017) and later a 'Level 1' restructuring in May 2016. This restructuring involved (a) revision of the PDO and results framework; (b) triggering the safeguard policy on Indigenous Peoples (OP 4.10) due to livelihood impacts on indigenous people involved in rag-picking at Kadapa pilot site (Site B); (c) including the new state of Telangana, formed after the bifurcation of the state of Andhra Pradesh, for the implementation of the NMK pilot (Site A); (d) dropping the Hooghly remediation pilot in West Bengal (Site D), due to delays in the finalization of the remediation plan and initiation of the bid process; (e) dropping Subcomponent 1(b) on ECAC and other sectoral studies, which were not essential to achieving the PDO; and (f) cancelling US\$10.5 million IBRD savings.<sup>6</sup> Also, additional capacity-building actions such as development of soil standards for remediation, preparation of the National Action Plan for Chemicals Management, and capacity building of academic institutions in remediation, were included under Component 1 of the project.

18. Despite the above and extension of the closing date by about 24 months, the project could not complete the remediation of the pilot sites—Kadapa dump site in Andhra Pradesh (Site B) and Dhapa dump site in West Bengal (Site C). In addition, the contract for the NMK pilot in Telangana (Site A) could not be awarded due to a writ petition filed in the High Court regarding ownership of a portion of the lake area to be remediated. Therefore, the project was restructured again in September 2017, by extending the closing date up to March 31, 2018, to provide additional time to complete the two remediation pilots in implementation, dropping the NMK remediation pilot in Telangana (Site A), and cancelling US\$14.67 million and US\$2.89 million in IBRD and IDA savings, respectively.

19. Overall, these above meant that the project, dropped two of the four pilots, cancelled US\$12.89 million of the IDA credit and US\$24.72 million of the IBRD loan and resized the project cost from US\$75.39 million to US\$30.71 million. An overall reduction of about 60 percent of the original cost.

### Revised PDOs and Outcome Targets

20. The PDO of the project was revised during the restructuring in May 2016. The revisions were necessitated, as the original PDO was long with a focus on activities (such as 'to build') and included outcomes that are inherently difficult to define and assess (such as 'tangible', 'environmentally sound,' and 'rehabilitation'). The revisions however, did not result in any material difference to the overall objective envisaged at appraisal.

### Revised PDO Indicators

21. The outcome targets were revised during restructuring in May 2016 and September 2017. The first revision in May 2016 was necessitated, due to the discrepancies in the Results Framework included in Annex 3 of the PAD, the section on 'arrangements for results monitoring and intermediate results indicators'. These discrepancies were addressed, and the Results Framework was streamlined to

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<sup>6</sup> The datasheet (as per portal) indicates that the August 2015 restructuring included all these restructuring actions of May 2016. However, the August 2015 restructuring included extension of the project closing date only.





adequately reflect the project outcomes. The second revision in September 2017, involved reducing the target for the indicators - ‘Contaminated land managed or dump sites closed under the project’, and ‘Direct project beneficiaries’ due to dropping of the NMK Lake remediation pilot (Site A).

**Table 1. Revised PDO Indicators**

S. No	Original Indicators	Revised Indicators
1	Cleanup/remediation technologies have been piloted at orphan hazardous waste sites and municipal dump sites in selected states and a network of state PCBs established by MOEF for knowledge dissemination and project-based training.	Dropped
2	Guidelines and standards for remediation developed and supervisory capacity of technical staff at environment agencies to implement remediation plans and monitor environmental conditions strengthened.	<b>Revised:</b> Capacity of technical staff of the participating agencies strengthened to prepare, implement and monitor remediation plans.
3	An Environmental Compliance Assistance Center has been established and fully functional by the end of Year 2 in West Bengal and by end of Year 4 in Andhra Pradesh.	Dropped
4	Water quality and soil characteristics at the pilot sites comply with specified standards and mechanisms established to monitor in the long term.	Dropped
5	Supporting the NPRPS by developing a methodological framework for inventorying polluted sites, establishing remediation procedures and solutions and engaging multiple stakeholders in the implementation, including cost recovery mechanisms.	<b>Revised:</b> Framework for the establishment of NPRPS comprising inventory of polluted sites, remediation methodologies, and policy and regulatory reviews developed.
6		<b>New<sup>a</sup>:</b> Contaminated Land Managed or dump sites closed under the project (ha).
7		<b>New:</b> Direct project beneficiaries (number) of which female (percent).

*Note:* a. This was an intermediate outcome indicator moved to the PDO indicator, being a core sector indicator.

22. As summarized in Table 1, the revision in May 2016 involved (a) inclusion of two core sector indicators - ‘Contaminated land managed or dump sites closed under the project’ and ‘Direct project beneficiaries’, both of which measured outcomes on the remediation of contaminated sites better; (b) revision of two indicators on capacity building and support to the NPRPS framework (serial numbers 2 and 5 in Table 1) to make them outcome oriented; and (c) dropping of three indicators. The indicator on ‘cleanup/remediation technologies’ was dropped, due to the inclusion of two core sector indicators explained above. The indicator on ‘establishment of the ECAC’ was not critical for the achievement of the PDO and the MoEFCC also decided against establishing such centers. The indicator on ‘water quality and soil characteristics’, was dropped as it was output oriented and a similar indicator was already included as an intermediate indicator.



## Revised Components

23. All three project components were retained during restructuring. However, changes were made to subcomponents and associated costs during restructuring in May 2016 and September 2017. A summary of these changes to components is provided below.

### **Component 1: Strengthening of Environmental Institutions: Building Capacity for Addressing Pollution Remediation (Original: US\$16.74 million, Revised: US\$13.33 million)**

- **Restructuring in May 2016.** Good progress was made in establishing and operationalizing the ECAC in West Bengal and on the business plans for both Andhra Pradesh and West Bengal. However, the MoEFCC did not feel it was appropriate to establish an additional support institution at the state level for environmental compliance and there was no strong commitment by the states for financial support for the ECAC beyond the project period. Considering the above and because this activity was not critical for achieving the PDO, Subcomponent 1b on establishment of the ECAC was dropped.

Further, a review of training activities and sectoral studies on pollution management was carried out and new activities such as development of soil standards for remediation, preparation of the National Action Plan for Chemicals Management and capacity building of academic institutions in remediation were included. These new activities were expected to provide further support to the MoEFCC in developing the framework for the NPRPS.

- **Restructuring in September 2017.** Due to the bifurcation of Andhra Pradesh, the laboratory capacity strengthened by the project was allocated to the newly formed state of Telangana. In view of this, an additional activity to strengthen the laboratory capacity of the APPCB for about US\$3 million, was included through the restructuring in September 2017.

### **Component 2: Investments in Priority Remediation and Environmental Improvements: Rehabilitation of Orphan Hazardous Waste Sites and Municipal Dumpsites (Original: US\$52.80 million, Revised: US\$14.44 million)**

- **Restructuring in May 2016.** Due to complex pollution characteristics and remediation options, the remediation plan for the chemically contaminated sites in Hooghly District, West Bengal (Site D), required multiple reviews and additional information by the TEP, for approval. The bidding process for this site was delayed, thus leaving limited time for the implementation of remediation activities (even in the extended period). Hence, this site was dropped during the restructuring in May 2016 and an IBRD allocation of US\$10.50 million was cancelled.
- **Restructuring in September 2017.** The remediation plan for Site A: Noor Mohammad Kunta Lake, Katedan Industrial Area in Ranga Reddy District, Telangana (erstwhile Andhra Pradesh), was approved by the TEP in 2013 and the bidding process for hiring the contractor was initiated in early 2014. The price offers by the bidders however was very high (about 300 percent over the estimates) and this round of bidding was cancelled. The second round of bidding could be initiated only in 2016, due to the bifurcation of Andhra Pradesh and the



formation of the new state of Telangana, in which the pilot site is located. While the bidding in the second round was successful, the contract could not be awarded due to the writ petition filed in the High Court, on the ownership of a portion of the lake area to be remediated. In view of this, this site was also dropped during restructuring in September 2017 and US\$14.67 million of IBRD and US\$2.89 million of IDA savings were cancelled.

### **Component 3: Project Management (Original: US\$5.85 million, Revised: US\$2.94 million)**

- **Restructuring in May 2016.** Due to the bifurcation of Andhra Pradesh, the new state of Telangana was included in the project and the project management costs were reallocated among all three states and the MoEFCC, with due consideration to the extended project period.
- **Restructuring in September 2017.** Owing to the extension of the project period by an additional 6 months and cancellation of the NMK pilot site, the costs for this component and were further revised during this restructuring.

### **Other Changes**

24. In addition to the revisions to the PDO, outcome indicators, and project components, the restructuring in May 2016, updated the social analysis of the project, based on the specific environmental and social assessments (ESAs) carried out for the remediation plans of the pilot sites. This highlighted the social management and livelihood support programs developed for the project-affected peoples (PAPs) including the indigenous people at the Kadapa dump site pilot (Site A) in Andhra Pradesh.

25. In addition, the economic analysis of the project was updated during the restructuring in September 2017. At the time of appraisal, the project carried out a sample analysis of two of the four pilot investments (Site A - NMK site, Telangana and Site B - Kadapa dump site, Andhra Pradesh) to provide an indication of potential economic benefits of the remediation projects. Following this approach and considering that the NMK site was dropped in the September 2017 restructuring, the economic analysis was updated by using the actual remediation costs for Site A - Kadapa dump site, Andhra Pradesh, and Site C - Dhapa dump site.

26. By March 31, 2018, all Project activities were completed except the two contracts for site remediation (in Sites B and C), where the physical progress was only 85 percent. All payments for these two contracts after the Project Closing Date would be made by respective implementing agencies. At the request of GoI, the Bank agreed in August 2018 to amend the Financing Agreement allowing retroactive increase in the financing percentage for all expenditure made from April 2016 to March 2018. This amendment allowed a part of the counterpart contribution during the project period to be maintained during the remainder of the contract periods.

### **Rationale for Changes and Their Implication on the Original Theory of Change**

27. As summarized above, several changes were made to the project through four restructurings. All these changes, including revisions to the PDO, dropping two pilot sites, and changes to the Results Framework, were made to provide better clarity on outcomes and outputs; and to adapt to changing



administrative landscape. However, the original 'Theory of Change (TOC)' that envisaged strengthening institutional capacity at the state level, easing regulatory gaps, demonstrating appropriate cleanup/remediation techniques, and facilitating scaling-up the remediation efforts in India, was maintained. Key changes made to the project and how they still fitted into the approach of the original TOC is summarized in the following paragraphs.

**28. Revisions to the PDO (restructuring in May 2016) and changes to outcome indicators and Results Framework (restructuring in May 2016 and September 2017).** As explained earlier, these changes were needed to ensure that the PDO is outcome oriented, to include core sector indicators, and align the Results Framework with project activities. These changes contributed positively to the project and the TOC. Through these two restructurings, two pilot sites for remediation were dropped and the target for the outcome indicator on 'contaminated sites managed, or dump sites closed' was reduced to 16.30 ha, and consequent target for the related indicator on project beneficiaries was reduced. This reduced the demonstration effect from four to two sites. However, since preparation of remediation plans, stakeholder consultation/engagement and biddings were carried out for all sites and implementation was done for two sites, the project did retain the approach of 'learning by doing' envisaged in the original TOC.

**29. Changes in the safeguard policies (restructuring in May 2016).** The detailed ESA for the remediation works at the Kadapa municipal disposal site in Andhra Pradesh (Site B) identified that the ragpickers and pig rearing families at the site belong to the Scheduled Tribes category as classified by the Government of Andhra Pradesh and qualify to be indigenous people according to OP 4.10 of the World Bank. This aspect was flagged at appraisal, but the policy was not triggered. By addressing this aspect through the restructuring, the project demonstrated a positive impact for the Project Affected People (PAP) and learning for the World Bank in terms of social development issues associated with remediation of polluted sites in India. This also helped build capacity of the implementing agencies to address tribal/indigenous people issues in remediation projects. The entire process provided learning for both the World Bank and the implementing agencies, thereby meeting the TOC approach.

**30. Changes in the institutional arrangements (restructuring in May 2016).** In June 2014, the state of Andhra Pradesh was bifurcated, and a new state of Telangana was formed. After this change, the NMK pilot (Site A) and the laboratory developed by the project moved to the administrative control of Telangana, whereas the Kadapa Dump Site (Site B) remained in Andhra Pradesh. This necessitated inclusion of a new implementing agency, the Telangana State Pollution Control Board (TSPCB), into the project. This change, though not in the control of the project, had an unplanned positive impact, as the capacity building for remediation and laboratory capacity expanded to one additional state.

**31. Changes in financing and allocation (restructuring in December 2013, May 2016, and September 2017).** These changes were required due to exchange rate fluctuations, dropping two remediation pilots, actual remediation costs of pilot sites, addition of new capacity-building activities, and extension of the project closing date by about 30 months compared to the original closing date. These changes had limited impact on the TOC as all the capacity-building and policy actions for the feasible demonstration pilots have been achieved, with only 40 percent of the originally envisaged financial resources.



## II. OUTCOME

### A. RELEVANCE OF PDOs

#### Assessment of Relevance of PDOs and Rating

##### Rating: High

32. The original and revised PDOs were relevant to the World Bank's CAS for India (2009–12). More specifically the project was linked to the pillar on “ensuring development is sustainable” which aimed to help India better manage its natural resources and reduce the burden that environmental degradation imposes on population. Similarly, the project was aligned with the GoI's 11th five-year plan (2007–12) objectives of ‘environmental sustainability by addressing issues of environmental governance and pollution control’. To achieve these objectives and encouraged by the initial progress of the project, the GoI initiated scale-up efforts for remediation through the CPCB in 2012. This involved preparation of remediation plans for 10 contaminated sites in the country, to be implemented in collaboration with the respective state governments and the private sector.

33. The relevance of the project continued in the next Country Partnership Strategy (CPS) 2013–17 of the World Bank and the 12th five-year plan (2012–17) of the GoI. In addition to being linked to the ‘transformation pillar’ of the CPS that envisaged improved environment and natural resources management through support to the efforts of national, state, and city governments to improve the livability of urban areas, the Results Framework of the CPS included specific indicators on piloting remediation technologies. The 12th five-year plan of the GoI aimed at ‘faster, sustainable, and inclusive growth’ and envisaged setting up the National Environment Restoration Fund, to be used for restoration of environmental resources and cleanup of sites contaminated with toxic and hazardous waste. These directly aligned with the PDO of the project, which is to support ‘establishment of framework for the remediation of polluted sites’.

34. The relevance of the project continued in the current Country Partnership Framework (CPF) 2018–22. The objective of improving living conditions and sustainability of the cities linked to ‘Focus Area 1: Promoting resource efficient growth’, of the CPF, confirms the continued relevance of the project.

35. The importance of the project and its objectives was further confirmed, through the recommendations of the Independent Evaluation Group (IEG) in its report, ‘Towards a clean world for all—an evaluation of the World Bank Group (WBG)'s support to pollution management projects, 2017’, to scale up the World Bank's efforts in pollution management. The WBG's environment strategy (2012–2022) also lays out an ambitious agenda for ‘Clean, Green and Resilient Growth’ for developing countries and makes a specific commitment to support legacy pollution projects. Establishment of a trust fund for Pollution Management and Environmental Health with a specific pillar on soil pollution is a concrete step in this direction.

36. **Rating.** Based on the commitments in the above strategies and specific actions of the GoI and the WBG for pollution management, the overall relevance of PDO of the project is rated ‘High’.



## **B. ACHIEVEMENT OF PDOs (EFFICACY)**

### **Assessment of Achievement of Each Objective/Outcome**

#### **Original PDO**

Rating: Modest

37. The original PDO envisaged two major outcomes: (a) to build tangible human and technical capacity in selected state pollution control agencies of the Borrower for undertaking environmentally sound remediation of polluted sites; and (b) to support the development of a policy, institutional and methodological framework for the Borrower to establish a NPRPS. Even if these outcome statements were revised to make the text clearer, definitive and measurable, but in spirit, there was no substantial change (and the revised indicators could also be a basis of measuring achievements). Achievements included: (a) remediation of 2 of the 4 originally planned remediation sites; network of SPCBs established for knowledge dissemination and project-based training; (b) guidelines and standards for remediation developed, supervisory capacity of environmental agencies to implement remediation plans and monitor environmental conditions strengthened; (c) methodological framework, procedures and solutions and stakeholder engagement in implementation completed to support NPRPS. Mechanisms to monitor water and soil characteristics at pilot sites were also established, but confirmation of compliance to standards would be possible only after a few years post-remediation. The ECAC was not expected to become fully functional. Therefore, if original indicators were to be used, the project achieved or likely to achieve four of those (two fully achieved, one partly achieved, one on track to be achieved) and did not achieve the fifth one. Consequently, achievements against the two outcomes in the original PDO are considered modest.

#### **Revised PDO**

Rating: Substantial

38. The revised PDO envisaged two major outcomes: (a) Strengthen capacity of selected pollution control agencies in the remediation of polluted sites; and (b) Support the development of a framework to establish a national program for remediation of polluted sites.

#### **Outcome 1: Strengthen capacity of selected pollution control agencies in the remediation of polluted sites**

39. The project has achieved the outcome of strengthening the capacity of pollution control agencies in remediation of polluted sites. This was designed to be achieved through a combination of softer activities such as training, sectoral studies, and strengthening laboratory infrastructure, and implementation of remediation plans for four pilot sites (revised to two sites through restructuring) in the project states. While all softer activities were completed within the closing date, the two remediation pilots were completed after closing date. The Results Framework of the project consisted of three outcome indicators and four indicators to measure the achievement of this outcome.



**PDO Indicators: Contaminated land managed, or dump sites closed under the project (Target: 16.3 ha) and Direct Project Beneficiaries (Target: 157,362). Achieved.**

40. The project involved closure of two municipal dumpsites - at Kadapa in the state of Andhra Pradesh and at Dhapa, Kolkata in West Bengal. The dump site at Kadapa is in Ukkayapalli village in the north eastern part of the city and is spread over an area of 4.2 hectares. The site has an accumulated solid waste of about 200,000 m<sup>3</sup> dumped over many years and surrounded by residential and agriculture areas. Due to the unscientific disposal of waste, elevated concentrations of metal in the surrounding soils, contamination of ground water, nuisance of odor and unhygienic conditions were created for over 25,000 people living within 5 km of the dump site.

41. The second site - Dhapa municipal dump site at Kolkata in West Bengal, is spread over an area of 12.10 hectares that was closed in the 2009. The site is in south east Kolkata with an accumulated sold waste of about 2.3 million m<sup>3</sup>. The site surround by residential area and east Kolkata wet lands. The large volume leachate and waste disposal has impacted the quality of soil, water channel and surrounding population of about 131,693 people.

42. As highlighted earlier, about 85 percent of remediation works at these two pilots were completed at project closing (March 31, 2018). The implementing agencies continued the activities thereafter through Gol financing. The progress report shared by the implementing agencies for the finalization of the ICR indicated that remediation works at both these sites have been completed and the dump sites were closed. Some small activities on the compound wall and illumination for landscaped areas, etc., would continue. As a result of these closures, 17,238 people around these these sites now have reduced direct exposure to pollution from contaminated sites, and overall 157,362 people surrounding these sites will have direct economic benefits. These two PDO indicators and the intermediate indicator of 'people with reduced direct exposure to pollution from remediated sites' are achieved, albeit a few months after project closure.

43. In addition, these two remediation pilots, have enhanced the capacity of the implementing agencies in preparing and implementing site remediation works. The agencies gained experience in assessment and remediation plan preparation for the other two hazardous waste remediation pilots, which were dropped due to implementation challenges. For all the four pilot sites, the implementing agencies closely worked with the international consultants in field investigations and in identifying options of suitable remediation technologies and through review of international good practices. The underlying principle of 'learning-by-doing' approach is to go through all steps of the remediation process and is not linked to a specific number of sites. Hence, the achievement of strengthened capacity is measured in the context of capacity and not in terms of number/area of sites remediated.

**PDO Indicator: Capacity of technical staff of the participating agencies strengthened to prepare, implement and monitor remediation plans. Achieved.**

44. Activities carried out to achieve this indicator involved, (a) supporting the agencies in the preparation of the remediation plans; (b) ensuring that the staff of SPCBs work jointly with the remediation consultants and contractors in the preparation and implementation of these plans; (c) organizing exposure visits and training programs; and (d) enhancing the laboratory infrastructure for monitoring post-remediation results and hazardous waste pollution. At project closure, the three state





implementing agencies (SPCBs) have prepared remediation plans for 15 polluted sites (7 by WBPCB, 5 by TSPCB, and 3 by APPCB), implemented two remediation plans in Andhra Pradesh and West Bengal, and initiated regular monitoring of hazardous waste pollution through the equipment purchased under the project. Based on the data shared by the implementing agencies, on average over 1,000 samples per year have been analyzed by the Telangana and West Bengal laboratories so far. which they were previously unable to undertake before the project. The number of parameters to be implemented by these laboratories increased from a baseline of 26 to 76 (intermediate indicator). In addition, these two agencies have also analyzed over 500 samples for external research institutions. A similar trend of enhanced sampling of hazardous waste substances by the APPCB laboratory has been reported, which completed procurement of equipment in March 2018. The laboratory strengthening, hence, has substantially helped the agencies in monitoring HWM issues. All intermediate indicators are either achieved or exceeded.

45. Beyond the project, the MoEFCC through the CPCB has developed remediation plans for another eight polluted sites, with GoI financing. These studies followed the 'risk-based' approach and the same methodology of remediation plan preparation piloted through the project. All these plans are awaiting initiation of bidding process. This demonstrates the capacity built in GoI institutions on remediation and the commitment to scale-up remediation initiatives in India.

46. To build capacity on international best practices, a two-week exposure visit to the United States, six technical training programs on remediation methodologies and techniques, solid waste management, and environmental compliance; and four industry-specific programs on pollution management were conducted. Cross-learning visits among the implementing agencies were also organized, so that the experience of the pilot sites was disseminated among all the agencies.

47. Further to strengthen compliance monitoring, (a) the MoEFCC has developed a National Waste Management Information System, (b) all the three states have prepared an inventory of hazardous waste generated in their respective states, (c) Telangana and Andhra Pradesh have prepared an inventory of electronic waste, and (d) the WBPCB has carried out studies to understand pollution management issues in sponge iron and tannery industries.

48. As originally envisaged, activities to establish the ECAC were carried out until the restructuring of the project in May 2016. Because of these efforts, the ECAC at the WBPCB was fully established and was functional in 2012 and business plans for the ECACs both at the WBPCB and APPCB were also developed. Despite good progress, this component was dropped during restructuring in May 2016, due to the MoEFCC's decision not to establish such centers.

49. The above assessment and evidences indicates that all three PDO indicators and four intermediate indicators related to Outcome 1 have been achieved.

**Outcome 2: Support to development of a framework for the establishment of a national program for the remediation of polluted sites**

50. The project has exceeded in achieving the outcomes for this area. Activities under this component were implemented by the MoEFCC, and the ministry hired three international consulting firms to (a) prepare an inventory of polluted sites; (b) develop national guidelines and methodologies for the remediation of sites; and (c) review and recommend policy, institutional, and regulatory options for





remediation in India. Considering interlinkages among the above activities, the three consulting firms closely coordinated among themselves and ensured that information was shared with each other. More specifically, the methodology team relied on the information on typical characteristics of polluted sites in India to develop a definition of 'probably contaminated sites' and 'contaminated sites' and identify a menu of technology options relevant to the Indian context. Similarly, the inventory team adopted the initial site assessment protocol developed by the methodology consultants to prepare the inventory of polluted sites.

51. A TEP comprising experts from industry, academia, research institutions, and the CPCB reviewed the outputs of these activities, before approval by the MoEFCC. Due to the above coordinated approach, the project was able to (a) prepare an inventory of 320 contaminated sites and develop a database of these sites on the 'Geo Environ' software for future updating; (b) develop methodologies for remediation of typical polluted sites in India; (c) develop detailed guidelines and a manual including a 14-step process for carrying out remediation; (d) identify policy, institutional, and regulatory options for establishing a remediation program, and (e) establish an online network of SPCBs for remediation. These five outputs confirm the achievement of all five intermediate indicators.

52. During implementation, the CPCB issued the 'Guidelines on implementing liabilities for environmental damages to handling and disposal of hazardous waste and penalty' in January 2016. Using the framework developed by the project, the MoEFCC has drafted the 'Remediation of Contaminated Sites Rules, 2017'. The rules are being reviewed by competent authorities and will be notified for public comments, upon approval. Once, notified, this action can be termed as a huge step toward remediation of contaminated sites in India.

53. Realizing the importance of the remediation program and the need for additional activities in the area, the MoEFCC requested for inclusion of activities to (a) support studies for the development of 'soil standards in India', (b) engage academic institutions for research and capacity-building activities on remediation, (c) develop a management plan for use of industrial chemicals, and (d) expand the waste management information system. As a result, these activities were included in the capacity-building component of the project through the restructuring in May 2016, and the MoEFCC drafted a national action plan for chemicals management, and soil standards by March 2018. The first phase of the waste management information system that facilitates monitoring on authorizations issued for solid waste, electronic waste, hazardous waste, and biomedical waste has been developed. The Indian Institute of Technology, Delhi, has also been hired by the MoEFCC, to establish a network of national and international experts on remediation, conduct research on soil contamination, and provide training to various stakeholders on remediation. All these activities, are related to the implementation of aspects of the NPRPS, which are beyond the PDO target of just developing a framework for the NPRPS.

54. In addition to the framework for establishment of NPRPS, the project supported drafting of the rules for remediation of contaminated sites, a national action plan for chemicals management, and the soil standards for remediation were drafted. Consequently, the achievements under Outcome 2 exceeded targets set forth by the project.



### Justification of Overall Efficacy Rating

55. Foregoing analysis indicate that the efficacy of the original PDO is 'Modest. However, the assessment of the two outcomes of the project after restructuring indicate that one has been achieved, while the other has exceeded its objectives. In terms of outcome indicators, two indicators have exceeded the targets, while the other two indicators on remediation pilots were achieved after the project closure. The overall efficacy of the revised PDO is rated as 'Substantial'.

### C. EFFICIENCY

#### Assessment of Efficiency and Rating

56. **Economic analysis.** The ICR examined economic analysis at two levels. At appraisal, the economic analysis estimated possible benefits due to two of four pilot investments on a sample basis to provide an indication of economic benefits due to remediation projects. The net present value (NPV) of these benefits was estimated at INR186.7 million for Site A and INR28 million for Site B. The ICR re-examined this analysis. As only works for Site B and C were completed in the project, the ICR could establish NPV for these sites only (INR152 million for Site B and INR 158 million for Site C), using the same elements and assumptions used at appraisal. However, if benefits and costs unforeseen at appraisal are taken into consideration, the NPV of these sites B and C are found to be further increased. During restructuring in September 2017, an estimate of benefit cost ratio for the investment component was made, which indicate that the ratios were 2.84 for Site B: Kadapa and 4.89 for Site C: Dhapa. These were found to be 2.94 and 1.81 respectively at ICR. The substantial variation for Site C, is due to high employment generation and GHG emission reduction considered at appraisal, whereas the ICR considered the actual employment data and GHG emission calculations.

57. A second level of economic analysis was carried out at ICR for the overall project. This could not be compared with any similar analysis at appraisal (as an overall economic analysis was not undertaken at that stage). To avoid overestimation of benefits, the economic analysis, undertook a conservative approach. While the capacity building and subsequent improvements in pollution management in the project states could generate long-term environmental and health benefits, quantification of these benefits in economic terms is difficult at project closure and are therefore not included in the analysis. The economic analysis also excluded future benefits of remediation plans which were prepared, or future benefits of policy actions. However, some immediate benefits in terms of cost savings in the laboratory sample analyses, additional employment generation, and reduction in the cost of preparation of remediation plans were reported by the project, and these were considered.

58. The ICR economic analysis also considered the actual costs of contracts, GHG reduction estimates calculated by the remediation consultants, results of the independent social audit, data from the Social Management Plan, laboratory equipment utilization reports from the TSPCB and WBPCB and information on cost of remediation plan preparation for eight CPCB sites. Based on this analysis and as presented in Table 2, with an IRR of 26.12 for the overall project and 36.78 for the investment component, the efficiency of the project is 'Substantial'. A detailed description of the economic analysis and its assumptions are presented in Annex 4.



**Table 2. Economic Analysis at Completion**

<b>Item</b>	<b>Benefits (US\$, millions)</b>
Increase in rental values	1.880
Employment benefits	0.650
Agricultural benefits	0.017
Increased income at Makaltala	0.220
Reduction in greenhouse gases (GHGs)	1.540
Savings and income from laboratory analysis	0.370
Employment generation from laboratories	0.340
Savings in preparation of remediation plans	4.340
Total benefits (net present value [NPV])	9.380
Total cost (NPV)	5.680
<b>Benefit-cost ratio (overall project)</b>	<b>1.650</b>
<b>Benefit-cost ratio (investment component)</b>	<b>1.900</b>
<b>Internal rate of return (IRR) (overall project)</b>	<b>26.120</b>
<b>IRR (investment component)</b>	<b>36.780</b>

59. **Design efficiency.** The project financed capacity-building and demonstration pilots in remediation of polluted sites. This resulted in preparation of draft rules for remediation and soil standards, strengthened analytical and monitoring capacity of all the three participating states for HWM, and demonstration of remediation of polluted sites at two of the four sites envisaged at approval. Based on these outputs, the ministry is considering strengthening the public liability and associated acts. All these have encouraged the MoEFCC to scale up remediation activities in India through the CPCB and states to enhance their monitoring of HWM issues. It is also important to note that many of these outcomes are beyond the planned PDO outcomes but were achieved over a seven-and-half-year period, as against five years envisaged at approval. In retrospect, implementation challenges were underestimated at approval.

60. **Implementation efficiency.** The section on ‘key implementation issues’, describes the challenges faced throughout the project, which included delays in decision making, approval of remediation plans, bifurcation of Andhra Pradesh state, procurement delays, and other implementation challenges. These caused delays that affected the efficiency with which the project was implemented, requiring a cumulative extension of the closing date by about 30 months. The first extension of the project (up to September 15, 2017) was due to procurement delays and bifurcation of Andhra Pradesh state and the second extension (up to March 31, 2018) was due to the delays in the implementation of remediation plans. However, these extensions facilitated additional capacity-building outcomes and completion of remediation works of the pilot sites.

61. Based on the above analysis (design, implementation, and economic analysis), the efficiency of the project is rated ‘Substantial’.

**D. JUSTIFICATION OF OVERALL OUTCOME RATING**

62. Because the project was restructured substantially in May 2016, the overall outcome is assessed before and after restructuring. Based on this assessment and as summarized in Table 3, the overall outcome of the project has been rated ‘Moderately Satisfactory’.

**Table 3. Overall Outcome Rating**

	Before Restructuring	After Restructuring
<b>Relevance of the Objective</b>		High
<b>PDO Efficacy</b>	Modest	Substantial
Outcome 1: Strengthen capacity of state pollution control agencies	Modest	Substantial
Outcome 2: Support for the development of a framework for the NPRPS	Modest	High
<b>Efficiency</b>		Substantial
1. Outcome rating	Moderately Unsatisfactory	Satisfactory
2. Numerical value of the outcome ratings	3	5
3. Disbursement	US\$9.98 million	US\$12.33 million <sup>a</sup>
4. Share of disbursement	0.44	0.56
5. Weighted value of the outcome rating	1.32	2.80
6. Final outcome rating	Moderately Satisfactory (1.32+2.80 = 4.12)	

Note: a. Considering actual disbursements of US\$22.31, which includes claims approved during the grace period.

**E. OTHER OUTCOMES AND IMPACTS (IF ANY)****Gender**

63. As identified by the ESAs for the pilot investments, about 45 percent of 157,362 direct beneficiaries of the project are women. Counselling and awareness programs, conducted as a part of the SMP implementation for three remediation sites (including NMK Lake in Hyderabad that was dropped in 2017), indirectly contributed to the improvement in health, hygiene, and routine occupational practices of pig rearing and rag-picking communities around project sites, which included women. The social audit conducted for Kadapa dump site remediation project indicates that about 72 percent of the women among the PAPs, reported improvement in health status of mothers and children. Though this social audit was based on a random sample survey, it provides an indication of the benefits from remediation projects to women from rag- picking and pig rearing communities. The Grievance Redressal Committee established for the pilot investments also addressed any gender concerns of the people around the project area.

**Institutional Strengthening**

64. The capacity-building focus of the project contributed to the strengthening of the Hazardous and Solid Waste Management Division (HSMD) of the MoEFCC, the APPCB, WBPCB, and TSPCB, and their laboratories. More specifically, the waste management information system developed through the project helped, the HSMD in better monitoring of authorizations issued for hazardous waste, e-waste, solid waste, and biomedical wastes. In addition, drafting of the contaminated site rules, augurs well for



the long-term institutional development of the MoEFCC, in addressing this complex and perhaps most challenging topic of HWM.

### **Mobilizing Private Sector Financing**

65. There was no direct and immediate mobilization of private sector financing by the project. The project however triggered two initiatives aimed at mobilizing private sector investments. The first being an MoEFCC-supported, CPCB-implemented program on remediation of 10 contaminated sites across in India. This activity was initiated in 2012 with an objective of developing remediation plans for 10 priority contaminated sites and implementing them with 60 percent contribution from state and private sector contribution. An amount of US\$120 million was allocated by the GoI for this activity at approval. So far, the project has completed remediation plans for eight sites and is in the process of initiating bidding, for the implementation of these plans.

66. In the second initiative, learning from the experience of site remediation work in the project, the Ministry of Housing and Urban Affairs has sought the transaction advisory services of International Finance Corporation for 2–3 dump site remediation projects. This activity (#602342) was initiated in November 2017 and is currently considering remediation of two municipal dump sites in Chennai.

### **Poverty Reduction and Shared Prosperity**

67. The project had limited opportunities to directly address poverty reduction and shared prosperity outcomes. The SMP for the two remediation pilots in Kadapa, Andhra Pradesh, and Dhapa, Kolkata, West Bengal, however included livelihood support programs for the rag-picking and pig rearing communities, which are recognized to be poor communities. The results of the social audit, that evaluated the implementation of the SMP in Kadapa and Dhapa indicate a marginal increase in the household income of these communities due to the project interventions. These included some members of these communities shifting to other occupations, improvements in health status, and so on. There was however no evidence of significant direct benefits to poverty reduction.

### **Other Unintended Outcomes and Impacts**

68. The project had two unintended, but direct outcomes. In addition to supporting monitoring functions, the laboratories of the TSPCB and WBPCB, after commissioning new and advanced equipment, are providing analytical services to external agencies for their research and consultancy services. This is providing additional revenue to the agency and is an acknowledgement of the strong analytical capacity of the agencies. The apex environmental regulator of India, the CPCB, considers the laboratory of the TSPCB as a regional resource for training and capacity-building activities.

69. Based on the 'National Action Plan for Chemicals Management' prepared through the project, the MoEFCC is considering amendments/improvements to related rules of the GoI. These include (a) merging the Manufacture, Storage, and Import of Hazardous Chemicals Rules, 1989, Chemical Accidents (Emergency Planning, Preparedness, and Response) Rules, 1996 and developing the Hazardous Chemicals Management Rules; (b) developing the Hazardous Substances and Dangerous Goods (Classification, Packaging and Labelling) Rules; and (c) amendments to the Public Liability Insurance Act. This initiative of



the MoEFCC, aligns well with the project's broader objective of better compliance and management of hazardous substances.

### III. KEY FACTORS THAT AFFECTED IMPLEMENTATION AND OUTCOME

#### A. KEY FACTORS DURING PREPARATION

70. **Complexity of the sector.** The Gol's initiative on remediation of polluted sites was very timely. However, given the complexity of the sector and its nascent stage in India, information on contaminated sites and the level of pollution was difficult to assess during the project preparation phase. Support from various stakeholders both at the local and national level was also a challenge. This needed sensitization of key players such as regulators, local governments, contractors, industry, and academia, on health and economic benefits of remediated sites, beyond environmental improvements.

71. **Project design.** Technical complexity of the project and capacity of implementing agencies were the important factors that guided the design of the project. The concept of 'learning-by-doing approach' was appropriate and found to be an effective capacity-building approach, where the implementing agencies worked with the remediation consultants and contractors to gain practical experience on remediation. The design of two distinct components, one focused on pilot investments, guiding the component on policy and development of the national program was realistic to the sectoral context. However, considering the challenges in terms of procurement and delays in implementation of remediation plans, the underlying theme of cross learning beyond the implementing agencies and at the national level was a bit less prominent.

72. **Selection of pilot sites.** The selection of pilot sites for remediation was based on an initial assessment of a long list of polluted sites and the interest and commitment of respective state governments and agencies. These assessments looked at the significance of contamination, remediation options, and broader commitment of state governments. However, implementation issues such as land ownership and support/role of local governments was not adequately factored into the selection of the pilot sites. The two hazardous waste contaminated sites identified for remediation were large and complex orphan contaminated sites in India. The project being a first initiative in the sector and policy framework still being developed, the option of selecting smaller but manageable sites could also have been considered.

73. **Readiness of pilot investments.** Two hazardous waste and two municipal solid waste sites were identified as pilot investments during project preparation, and the detailed remediation plans were expected to be developed during implementation. The project design underestimated the time and effort that is needed for carrying out detailed assessments and the bidding process involved in the selection of contractor. Given that the project was provided with a preparation advance and was prepared over four years, development of remediation plans for at least two pilots sites during the preparation phase would have helped save significant time and effort in the implementation phase. This would have also helped in fine tuning the design appropriately.

74. **Selection of implementing agencies for pilot investments.** Being a pollution management project, the MoEFCC and SPCBs of the project states were obvious choices for being implementing agencies. However, these regulatory agencies had no experience in implementing investment projects



and, more importantly, have no administrative control on the polluted sites that are in the domain of other state agencies or local governments. This had a significant impact, in terms of actions such as handover of sites to the implementing agencies, development of alternate waste disposal sites in lieu of remediated sites, ownership of the remediation activities. Consideration to this aspect during the preparation phase and envisioning an appropriate role for these local agencies would have helped better implementation of the demonstration pilots.

75. **Risk assessment and mitigation.** The overall project risk was rated Substantial and the implementation risk was rated Moderate. Considering the capacity constraints both these risks could have been higher and the mitigation measures stronger. One such key mitigation measure being strengthening the implementation capacity through a fully staffed PMU at the MoEFCC and PIUs at SPCBs with relevant expertise in construction/project management.

76. **Objectives and Results Framework:** The objectives and result indicators designed were relevant. However, the text describing those were broader and were not very clear. Some of the indicators were related to the implementation responsibilities of the agencies and were not linked to outputs or outcomes. The Results Framework, needed major revisions during the restructuring in May 2016, involving inclusions of two new outcome indicators, revision of two indicators, and dropping three indicators.

## B. KEY FACTORS DURING IMPLEMENTATION

### Factors Subject to Government and/or Implementing Entities Control

77. **Leadership and commitment.** The MoEFCC and the implementing agencies were very keen and committed to the project activities. This commitment, however, did not reflect on implementation and decision-making. The process of hiring consultants and preparation and approval of remediation plans for the pilot investments needed much longer time than originally envisaged. The consultants could be hired only after 15 months into implementation and plans could be approved in the fourth year of the project (2014). This delay was primarily due to slow decision making in hiring of consultants by the SPCBs and approval of plans by the TEP at the MoEFCC. Subsequently, the low capacity of the construction industry in remediation projects, administration uncertainties due to the bifurcation of Andhra Pradesh, and general elections at the national level, contributed to further delays in appointing contractors for the execution of the remedial plans. This essentially meant that the actual implementation of the pilot investments could be initiated only in 2016 (in the extended period of the project).

78. Similar delays occurred in capacity-building activities such as procurement of laboratory equipment, sectoral studies, training programs, and majority of these could be completed only in 2016. Agile and faster decision making by the project agencies could have minimized these delays and helped better performance of the project.

79. **Manpower and staffing.** The project implementing agencies are regulatory agencies with little or no expertise/orientation in executing construction projects. To mitigate this inability, the MoEFCC was required to hire program management consultants (PMCs) to coordinate and manage the project. The procurement process to hire this agency was unsuccessful, due to high financial bids from the bidders. As an alternative and to save time with another round of procurement, it was agreed to hire individual





experts at the PMU of the MoEFCC. However, neither the PMC nor individual experts could be hired. This significantly affected the ability of the MoEFCC to monitor the project implementation. In the PIUs, at the state level, there was a frequent turnaround of project directors and project coordinators. Both these aspects, substantially affected the overall capacity of the project agencies in performing the project activities.

80. **Project management.** Overall management of the project was also inadequate. There were frequent changes of project directors at the MoEFCC and at the state level. The project was managed by four project directors and six project coordinators at the MoEFCC, and changes happened at a regular frequency during early stages of the project at the state level. Contract management and implementation of remediation pilots was also weak. To address this issue, the SPCBs brought on board experienced civil engineers from relevant state departments. While this helped to some extent, the overall management of remediation activities was inadequate. Weakness in project management resulted in delays in finalization of NPRPS studies (from the originally envisaged 12 months to over 24 months) and the completion of pilot remediation activities (from 9 months in Kadapa to over 24 months, and from 15 months in Dhapa to about 30 months).

81. According to the agreed management arrangements, the Project Oversight Committee (POC), a multi-ministerial committee, chaired by the Secretary, MoEFCC, was to meet annually to review the project and provide overall guidance on the future directions. However, the POC met only twice during seven-year project period. In addition, decisions on hiring the PMC, restructuring of the project, and other changes to the project did not happen until September 2015 (despite agreeing during the mid-term review in August 2013). This resulted in delays in making midcourse corrections to the project design based on the implementation experience and institutional arrangements.

#### **Factors Subject to World Bank Control**

82. World Bank implementation support review missions were carried out regularly and issues were identified early during implementation (in 2012). These included identifying the need for changing the Results Framework, agreeing for hiring individual experts at the PMU of the MoEFCC instead of the PMC, bringing in the World Bank's international experts to provide guidance in the preparation of remediation plans, and so on. Though the issues and necessary actions were highlighted during the midterm review in 2013, an affirmative push for major changes to the project could not be done, due to internal process delays both within the GoI and the World Bank.

83. As a follow up to the findings of the midterm review, Bank team, initiated discussions with the GoI and the first restructuring was done to cancel US\$10 million IDA savings accrued due to fluctuation of Indian rupee against the US dollar. The discussions continued further on restructuring, and agreements were reached to carry out a two-stage restructuring of the project, first by extending the closing date by two years, and subsequently carrying out a Level 1 restructuring to make substantial changes to the project. This restructuring contributed to some improvements to the performance of the project.

84. Despite these actions, the progress of two other pilots (Kadapa, Andhra Pradesh and Dhapa, Kolkata) was very slow. Next and issues of land ownership emerged in the NMK Lake pilot investment in Hyderabad, leading to judicial intervention. Considering the critical construction stage of remediation pilots, a six-month extension was provided to the project and the NMK Lake pilot was dropped, along with





cancellation of the balance of IBRD funds. Further extension of the project was not agreed by the Bank, despite continuing work of the two pilot investments.

### **Factors outside the Control of Government and/or Implementing Entities**

85. During 2013–14, one of the implementing states—Andhra Pradesh—went through a process of bifurcation leading to administrative uncertainties. The state was bifurcated into two states—Telangana and Andhra Pradesh, which affected project implementation for about 18 months. This was clearly outside the realm of control of the Government and the implementing agencies. The bifurcation also resulted in the splitting of expertise and assets between the two newly formed states, including allocation of laboratory equipment procured through the project, to the new state of Telangana. This also affected the agreed Level 1 restructuring of the project, as it required inclusion of third implementing state of Telangana, which needed a request from the government of newly formed state of Telangana.

## **IV. BANK PERFORMANCE, COMPLIANCE ISSUES, AND RISK TO DEVELOPMENT OUTCOME**

### **A. QUALITY OF MONITORING AND EVALUATION (M&E)**

#### **M&E Design**

86. The M&E design for the project had some weaknesses, and the Results Framework. The PDO indicators and the intermediate results indicators tended to be activity oriented, including some reference to project implementation arrangements. This necessitated a revision of the Results Framework during implementation. The theory of change of the project on the other hand was clear and logical and included activities that would lead to outputs that were needed to ensure the achievement of outcomes.

#### **M&E Implementation**

87. According to the institutional arrangements, the project included a dedicated M&E specialist in the PIU team. This helped in monitoring, analyzing, and reporting on various capacity-building activities of the project. The broader weaknesses in the Results Framework contributed to the overall lack of specificity of M&E in the project. This drawback was noted early during the implementation. Changes to it, however, could be made only during the third restructuring of the project in May 2016. The revised Result Framework helped in better management of project outcomes, that eventually helped in tracking benefits due to capacity-building activities in the project. The environmental and social assessment, the detailed design reports for remediation and NGOs implementing the social management plans were creatively used to generate baseline and data on outcomes and results. A social audit conducted at completion collected impact data for the remediated sites. Overall, the M&E implementation for the project was adequately maintained.

#### **M&E Utilization**

88. The project provided the M&E relevant to the Results Framework as evidenced in the periodic Aide Memoires. M&E data was used in decision making such as revising the Results Framework itself and in the periodic cancellations that were required for the restructurings in the context of achieving the project outcomes.



### Justification of Overall Rating of Quality of M&E

89. Considering the ability of the implementing agencies in providing information related to the outcome indicators, especially on the number of capacity-building activities, laboratory strengthening, and so on, improvements made to the shortcomings in the M&E system's design, and utilization of a variety of tools at the disposal of the project, the overall quality of M&E was generally sufficient to assess the achievement of the objectives and test the links in the results chain and is rated 'Substantial'

### B. ENVIRONMENTAL, SOCIAL, AND FIDUCIARY COMPLIANCE

90. **Environmental and social safeguards.** The project at approval triggered four safeguard policies—Environmental Assessment (OP 4.01), Natural Habitats (OP 4.04), Physical Cultural Resources (OP 4.11), and Involuntary Resettlement (OP 4.12). Later, during the implementation, due to anticipated livelihood impacts on indigenous people around the Kadapa demonstration pilot site, OP 4.10 on Indigenous Peoples was triggered through the restructuring in May 2016.

91. The project was assigned 'Category A', due to significant environmental and social issues associated with remediation of contaminated sites, and the safeguards implementation was guided by the 'Environmental and Social Management Framework (ESMF)' agreed during preparation. According to the agreed ESMF, ESAs for all the four pilot investments were carried out and relevant Environmental and Social Management Plans were included in the contract documents of the pilot investments for implementation by the contractor. Issues of construction site management and safety were encountered during World Bank team visits and these were rectified through regular follow-up and monitoring.

92. While no land acquisition and resettlement issues were identified during implementation of two pilot investments of the projects, issues of livelihood losses to rag pick and pig rearing communities dependent on the two sites were identified. SMPs to address these issues were prepared in line with the safeguard policies of the World Bank and implemented.

93. More specifically, ragpickers dependent on the Kadapa waste disposal site belong to the Scheduled Tribes category as classified by the Government of Andhra Pradesh. They can be categorized as indigenous peoples as per OP 4.10. Because this policy was not triggered during the project preparation, the award of contract for this pilot investment was kept on hold until the restructuring of the project was completed and OP 4.10 was triggered. Due process of OP 4.10, including conducting Free, Prior, and Informed Consultations with the indigenous people was followed, as a part of the ESA, and an acceptable livelihood support program for the affected families' dependent on the landfill site was developed and thereafter implemented.

94. The SMPs were implemented satisfactorily with the help of local NGOs engaged for the respective pilot projects. The social audit report upon completion reported that PAPs found the counselling and awareness sessions on health, hygiene, alternate vocations, and sending children to school very useful. A majority of the PAPs benefitted from the efforts in securing formal identities, enrollment under social security programs of the Governments, and formal links with financial institutions. These efforts have also translated into better access to food and betterment in health status. However, the vocational training in alternate activities rendered under the project could not ensure sustainable income due to poor market linkages of the products. The surrounding communities also benefited from the remediation of both pilot



sites in terms of cleaner surroundings and improved health conditions. Onsite presence of NGOs and the grievance system set up under the project enabled the PAPs and other stakeholders to voice their concerns to the civic authorities and project team. Overall, the environmental and social safeguards performance of the project is rated as 'Satisfactory'.

95. **Financial management and corporate governance.** The financial management performance had largely remained Satisfactory throughout project implementation. At the MoEFCC level, the mainstream government systems were used for project budgeting, accounting, payment, and audit. The project budgets for 85 percent of the project cost were adequately provided in the ministry's overall budget and funds were released to the SPCBs based on physical and financial progress. There were fund flow delays noted from the ministry to the SPCBs but such delays did not affect project implementation and the issues were subsequently resolved. The state's contribution of 15 percent was regularly provided by the state government (in case of west Bengal) and by the SPCBs (for Andhra Pradesh and Telangana). The position of financial management consultant at the MoEFCC was vacant for about three years of project implementation and it resulted in the lack of effective coordination between the MoEFCC and SPCBs on financial management aspects. The financial reports were submitted quarterly by the MoEFCC to the World Bank. The audits were annually conducted by the Comptroller and Auditor General of India. There were marginal delays noted in the submission of audit reports by the MoEFCC to the World Bank. The audit reports were mostly unqualified, barring minor audit observations that were addressed subsequently.

96. The staffing arrangements in the SPCBs were always adequate. The finance positions were headed by the chief accounts officer and they provided regular oversight on the use of project funds. The accounts were maintained in an off-the-shelf accounting system. Adequate supporting documents such as contractor bills, supplier invoices, measurement books for civil work transactions, and vouchers were maintained to support payments and these accounting records were preserved for future audit verification. The PCBs were timely and regular in the submission of interim financial reports and audit reports. The external audit of the SPCBs was carried by a firm of chartered accountants and these audit reports were unqualified. The PCBs also had an effective internal audit system in place. The internal auditors reviewed the project transactions on an annual basis and there were no major accounting and internal control issues reported in these audit reports.

97. **Procurement.** The procurement performance of the project was 'Moderately Unsatisfactory' for most part of the implementation. One of the key issues at the national level was hiring the PMC by the MoEFCC for overall management. However, the selection of a PMC failed during the first round of procurement and hiring of individual experts as an alternative to the PMC was also not done. Thus, the issue of project management by the MoEFCC remained a gap throughout the project.

98. At the state level, the implementing agencies were staffed with procurement specialists supported by procurement assistants. However, the procurement staff did not have experience in civil works. Considering this, though the civil works were below the prior review threshold, the World Bank team provided guidance and handholding at each stage of procurement. Despite this support, the procurement process of civil works took considerable time. Further, the staff at the implementing agencies were mostly scientists with no civil works background. Therefore, the World Bank advised the implementing agencies to include civil work experts on deputation from other departments. In addition, a quality assurance firm was hired by each agency for supervision of the civil works. The project could



have benefitted if the readiness of the remediation projects in terms of design and civil works procurement capacity had been developed during preparation.

99. **Governance and Accountability Action Plan (GAAP).** According to World Bank policies, during preparation, a GAAP was established and agreed with the implementing agencies and the GoI. This aided in developing a framework for better governance of the project. This plan was monitored and reported throughout the life of the project and was broadly complied with. Despite the GAAP and mitigation measures, some complaints related to contract management were received by the World Bank<sup>7</sup>.

### **C. BANK PERFORMANCE**

#### **Quality at Entry**

100. Given the complexity of the structure and because it is a first remediation project in India, project design was challenging. However, as analyzed in the earlier sections, the project at entry had issues related to readiness of activities for implementation, role of local institutions, Results Framework, and risk identification and mitigation. Given the weak institutional capacity, the implementation risks should have been considered more carefully and the implementation aspects pertaining to the pilot investments should have been planned better. About 70 percent of project financing was allocated to four pilot investments on remediating polluted sites. These sites, however, were not ready for implementation at approval. Having one or two contracts ready for implementation could have helped with better project implementation. However, the capacity building activities were very well-thought, and scoping was appropriate.

101. The Results Framework required substantial changes and refinement during restructuring later during implementation. This was another aspect that could have been designed better.

#### **Quality of Supervision**

102. Considering the implementation pattern of the project, the supervision phase of the project can be categorized into two phases. The first phase of implementation was really an extended preparation period, which focused on the preparation of remediation plans for four pilot investments. The task team and the implementing agencies invested time and effort in developing these plans and procurement strategies. This extended for about four years of the project implementation phase (until 2014). The subsequent part of the implementation can be considered as the actual implementation phase wherein the bid/contract documents were prepared, the bidding process was undertaken, and then the contract management commenced. In parallel and all through, the capacity-building initiatives both at the state and at the national levels were being carried out.

103. Responding to the project requirements, the Bank sourced technical expertise (internal and external) to support the clients and provide handholding support. In the context of the pilot remediation activities, the project also needed to be facilitated with implementation expertise, through a bid/contract management specialist who could integrate the technical requirements with the procurement process and who understood the intricacies of the remediation activities. The Bank mobilized such a professional

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<sup>7</sup> These were referred to the Integrity Vice Presidency (INT)



right from the procurement phase and continued to support even during implementation of the remediation plans. This support contributed to the improvements in the quality of bid documents and eventually award of contracts.

104. Throughout the supervision period, the Bank reported project issues and implementation challenges with candor both to the GoI and World Bank management. The Bank proactively engaged with the clients and carried out all feasible improvements and midcourse corrections, to ensure that the project outcomes were achieved. These actions reflected in four restructurings. The Bank was also proactive in safeguard management and triggered OP 4.10 (Indigenous Peoples) to address the livelihood impacts on the affected communities and to ensure compliance with World Bank safeguard policies.

105. To further facilitate completion of project activities, the grace period for the submission of eligible expenditure was extended in July 2018, from four months to six months. Subsequently at the request of the GoI, the disbursement percentage of Bank financing to the project activities was retroactively increased in August 2018, from 85 percent to 100 percent (for the period between April 2016 and March 31, 2018). These two actions, even after project closure, demonstrate the Bank's best efforts to support the project in achieving project outcomes.

106. During the project period, three team leaders from the World Bank managed the project and the Bank ensured that each of such transitions were smooth. Overall, the Bank's focus on development impact, fiduciary and safeguards, performance reporting, and the quality of supervision was satisfactory.

#### **Justification of Overall Rating of Bank Performance**

107. Based on the above analysis, it is assessed that there were shortcomings regarding the 'quality at entry'. However, the supervision by the Bank did not have significant shortcomings and addressed the issues at entry proactively. Overall, the World Bank's performance is rated 'Moderately Satisfactory'.

#### **D. RISK TO DEVELOPMENT OUTCOME**

108. The development outcomes of the project focused on capacity building in the realm of policy and institutional framework (at national level) and expertise in implementing remediating polluted sites. While there have been challenges in achieving development outcomes to the extent/level that was intended, there has nevertheless been significant capacity-building outcomes. First, the Contaminated Site Rules are drafted and proposed as regulations in India. The likelihood of these draft rules being abandoned is rather low. This, as highlighted earlier, is due to ongoing program of the MoEFCC through the CPCB to remediate 10 other polluted sites in the country and the considerable pressure from the public and Supreme Court on the regulatory bodies to strengthen legal and enforcement regime. Second, the expertise developed in terms of developing and implementing remediation of polluted sites and related laboratory capacity is well established in the state agencies. As evidenced in the efficiency analysis, the project agencies have already initiated the monitoring of hazardous waste issues, and with a stronger regulatory regime, remediation initiatives are likely to gain momentum. With the implementation expertise gained through the project and laboratory infrastructure, state agencies are expected to initiate similar activities on their own. Hence, the overall risk to development outcomes achieved is 'Moderate'.



## V. LESSONS AND RECOMMENDATIONS

109. **Lesson 1: Detailed assessment of the Site Contamination and Remediation Plan is an essential element of readiness for remediation projects.** Pollution management projects, especially remediating polluted sites, are complex and challenging. Even though this fact is known at the very outset, the extent and magnitude of these challenges are unique to specific sites and situations. It is difficult to predict a priori what these challenges would be and whether these can be resolved within a stipulated time frame. An IEG evaluation conducted in 2017, on the Bank's support to pollution management projects also concluded that 70 percent of the projects failed to achieve their targets.

110. Considering these factors, remediation projects should be designed based on (a) detailed assessment of site contamination to identify, delineate, characterize, and quantify pollution patterns for a given area or site and (b) remediation plan prepared based on a risk analysis that sets risk-based targets for the post-remediation use of the site and identifies methods, clear material flows and disposal pathways, and a detailed time table and budget. While the level of granularity and accuracy of the information depends on the time and effort invested in these assessments, the information should provide adequate confidence to proceed with the remediation activities or development of bidding documents. There certainly needs to be a balance between time, effort, and cost of site investigations and remediation planning. International experience indicates that sites with high contamination and exposure usually leads to cost over runs, long delays and even failure at a rate higher than estimated during project preparation. Therefore, remediation projects in future must allow for such uncertainties in their designs.

111. **Lesson 2: Remediation projects require new/innovative financing approaches.** Detailed investigations, assessments, and remediation planning of polluted sites require substantial financial and technical resources. Even in countries with highly developed pollution management sectors, this process commonly takes years and is broken into several phases or locations or pollutants and tackling problems sequentially. Hence, addressing such technically complex problems and achieving outcomes in the 5–7-year life span of a World Bank project is ambitious. This gets even complicated if the borrower's regulatory and institutional capacities are low, as found in the current project. Site remediation projects, hence, would require longer time and a different approach rather than a traditional investment finance approach. Possible options can be the following:

- (a) A multi-tranche/multi-phase program that focuses on the capacity-building and remediation planning activities in the first phase and then moving to investment financing for sites that are ready for implementation; or
- (b) Performance-based remediation contracts that carry out remediation planning and then implement plans to achieve predetermined risk-based standards; or
- (c) Development Policy Loans, where regulatory and capacity-building actions are preconditions for the implementation of pollution management projects.

112. Relevance/suitability/acceptability of each of these options shall be evaluated for each country/project context and an appropriate option may be chosen.





**113. Lesson 3: Creation of enabling administrative structures for site remediation/pollution management projects will help address institutional challenges.** Depending on the nature and type of the site (lake, orphan dump site, etc.), remediation and pollution management projects will require involvement of multiple agencies such as local municipalities, development authorities, and other state/district administration. Implementation of such projects by regulatory agencies that are technically competent but with limited administrative control is difficult. As experienced in the current project, this factor significantly contributed to the slow decision making in procuring services, works, and other project-related activities. It is hence important to include an ‘empowered authority’ with representation from all the relevant stakeholders in remediation projects to facilitate faster decision making.

**114. Lesson 5: Thorough due diligence of land ownership and liability issues shall be carried out as part of remediation planning.** Lack of clarity on land ownership, multiple ownership (public and private), and liability issues regarding land are very common for contaminated sites or orphan hazardous waste dump sites. Despite conducting detailed stakeholder consultations and community interactions, both the hazardous waste-contaminated sites in the project were dropped due to such issues—one of them just before awarding the contract to the successful bidder. It is hence important to carry out a thorough due diligence of the land owner with respective revenue and district authorities. If needed, a review of judicial/legal issues also shall be carried out.

**115. Lesson 6: Social development and livelihood support to communities around contaminated sites should be an integral part of remediation plans.** Livelihoods of rag-picking and pig rearing communities are closely linked to contaminated sites and municipal dump sites. Hence, it is important to analyze livelihood impacts of remediation of contaminated sites and appropriate livelihood support program shall be implemented along with the remediation activities. In addition to minimizing implementation risks, this also provides an opportunity to improve the livelihoods of these underprivileged communities.

**116. Lesson 7: Development of an alternate waste disposal facility shall be an integral part of closure and containment programs of municipal solid waste sites.** Both the pilot investments of the project involved remediation of municipal solid waste disposal sites at Kadapa, Andhra Pradesh, and Dhapa, Kolkata. In the case of Kadapa, this meant that the city must develop a new facility for the disposal of solid waste. Development of such a site, however, did not progress with desirable speed. To address these concerns, the project included prior actions to develop new landfill site. The progress of these actions, however, has not been particularly good. This is basically due to the limited financial and technical capabilities of municipalities. Considering the above scenario, any project on remediation of municipal waste disposal site should essentially integrate development of alternate landfill sites for the cities/ town.



ANNEX 1. RESULTS FRAMEWORK AND KEY OUTPUTS

A. RESULTS INDICATORS

A.1 PDO Indicators

Objective/Outcome: To Strengthen the capacity of selected state pollution control agencies in the remediation of polluted sites and to support development of a framework to establish a national program for the remediation

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Frame work for the establishment of NPRPS comprising inventory of polluted sites, remediation methodologies and policy and regulatory reviews developed	Text	No Framework for Remediation of polluted sites  03-Jun-2010	Submission of NPRPS to Planning Commission  30-Sep-2015	Yes - Final Framework Developed  31-Mar-2018	Yes - Final Framework Developed and the Technical Review Committee has recommended 'Rules for Remediation of Contaminated Sites' for MoEF& CC's Approval  31-Mar-2018

Comments (achievements against targets): Indicator exceeded target. As reported in Borrower's ICR of August, 2018, framework for remediation of polluted sites has been developed. Based on this framework, additional activities to develop Draft Rules for Remediation of Contaminated Sites, National Action Plan for Chemicals Management, Soil Standards for remediation have also been completed.





Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Contaminated land managed or dump sites closed under the project	Hectare(Ha)	0.00 03-Jun-2010	16.30 15-Sep-2017	16.30 31-Mar-2018	16.30 31-Mar-2018

**Comments (achievements against targets):** Indicator achieved. At the submission of final ISR, the project has completed about 85 percent of the remediation works. The latest progress reports submitted by the implementing agencies as an input to the finalization of the ICR confirm that the closure and containment works at both the dump sites (16.30 hectares) have been completed. However, minor support activities such as compound wall, electrical works, etc. are underway.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Capacity of technical staff of the participating agencies strengthened to prepare, implement and monitor remediation plans	Text	No Capacity on remediation of polluted sites 03-Jun-2010	capacity on remediation 30-Sep-2015	3-Implementation and Monitoring Capacity Developed 31-Mar-2018	3 - Implementation and Monitoring capacity developed 31-Mar-2018

**Comments (achievements against targets):** Indicator exceeded target. As reported in borrower's completion report 23 remediation plans (15 through project financing and 8 through GOI funds) have been developed, implementation of two remediation plans is completed, post remediation plans have been developed and laboratory capacity in three project states has been strengthened. This indicates preparation of 8 additional remediation plans, development of monitoring capacity in one additional state of Telangana and capacity development at Central Pollution Control Board.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
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Direct project beneficiaries	Number	0.00	183362.00	157362.00	157362.00
		03-Jun-2010	15-Sep-2017	31-Mar-2018	31-Mar-2018
Female beneficiaries	Percentage	0.00	45.34	45.34	45.34
		03-Jun-2010	15-Sep-2017	31-Mar-2018	31-Mar-2018

**Comments (achievements against targets):** Indicator achieved. Latest progress report of the implementing agencies indicate completion of closure and containment works at both the pilot sites. This confirms achievement of pollution improvement benefits (both economic and environmental) to the targeted beneficiaries, within 5km of the pilot sites.

## A.2 Intermediate Results Indicators

**Component:** Component 1: Strengthening of Environmental Institutions - Building capacity for addressing pollution remediation

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Inventory of Polluted Sites in India developed	Text	No	Yes- Inventory Developed	Yes- Inventory Developed	Yes - Inventory Developed
		03-Jun-2010	15-Sep-2017	15-Sep-2017	31-Mar-2018

**Comments (achievements against targets):** Indicator achieved. As reported in the borrower's completion report, inventory of polluted sites has been developed and the data base has been installed at MoEF& CC for future updation.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
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Methodologies for remediation of polluted Sites in India developed	Text	No  03-Jun-2010	Yes- Methodology Developed  30-Sep-2015	Yes-Methodology Developed  31-Mar-2018	Yes - Methodologies Developed  31-Mar-2018
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**Comments (achievements against targets):** Indicator achieved. As reported in Borrower's completion report, methodologies for the remediation of polluted sites have been developed, which will serve as basic technical guidance document for the development of remediation plans for future remediation activities by MoEFCC / states.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
National guidelines for the remediation of polluted sites developed	Text	No  03-Jun-2010	Yes  30-Sep-2015	Yes - Guidelines integrated in the remediation framework  31-Mar-2018	Yes - Guidelines integrated in the remediation framework  31-Mar-2018

**Comments (achievements against targets):** Indicator achieved. As reported in borrower's completion report, national guidelines for the remediation of polluted sites has been developed.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Policy options for remediation of polluted sites developed based on a review of existing legislations and	Text	No  03-Jun-2010	Yes  30-Sep-2015	Yes- Policy options report finalized  31-Mar-2018	Yes - Policy options report finalized  31-Mar-2018



international experiences

**Comments (achievements against targets):** Indicator exceeded target. As per borrower's completion report, policy options report has been finalized. Going beyond the target drat rules for remediation of contaminated sites have been developed.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of parameters that can be analyzed by the laboratories of Andhra Pradesh, Telangana and West Bengal Pollution Control Boards, increased	Number	26.00 03-Jun-2010	76.00 15-Sep-2017	76.00 31-Mar-2018	76.00 31-Mar-2018

**Comments (achievements against targets):** Indicator exceeded appraisal target. Laboratory capacity of three states (Andhra Pradesh, Telangana and West Bengal) ha.s been developed, as against the two states (Andhra Pradesh and West Bengal) originally envisaged at appraisal.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Online network of State Pollution Control Boards for remediation established	Text	No Network 03-Jun-2010	Online network established 30-Sep-2015	Online network established 31-Mar-2018	Online network establishment 31-Mar-2018

**Comments (achievements against targets):** Indicator achieved. As reported in borrower's completion report, online network of pollution control boards is established at the project web site. This helped building knowledge of other pollution control boards in the area of remediation.



**Component:** Component 2: Investments in Priority Remediation and Environmental Improvements

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Remediation plans prepared based on risk based approach and ready for implementation in all the three participating states	Percentage	0.00 03-Jun-2010	100.00 30-Sep-2015	100.00 15-Sep-2017	100.00 31-Mar-2018

**Comments (achievements against targets):** Indicator achieved. Remediation plans prepared for 15 sites and are ready for implementation in all the three participating states.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Post-remediation monitoring system with appropriate infrastructure and approved indicators established for all the three remediation sites by the completion of remediation works	Text	No 03-Jun-2010	Post remediation monitoring initiated 30-Sep-2015	Post remediation monitoring infrastructure established 31-Mar-2018	Post remediation monitoring infrastructure established 31-Mar-2018

**Comments (achievements against targets):** Indicator achieved. Post remediation monitoring infrastructure established. Monitoring for approved indicators will be initiated through skills developed through laboratory strengthening.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised	Actual Achieved at
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				Target	Completion
People with reduced direct exposure to pollution from sites remediated by the project	Number	0.00	28238.00	17238.00	17238.00
		03-Jun-2010	15-Sep-2017	31-Mar-2018	31-Mar-2018
<b>Comments (achievements against targets):</b> Indicator achieved, there by reducing the direct exposure to pollution for 17,238 people within 3 km of the pilot sites. The progress reports received from the implementing agencies for the finalization of ICR indicate that all closure and containment works have been completed at both the sites. Minor support activities such as compound wall, illumination works, etc. are currently being carried out.					



**B. KEY OUTPUTS BY COMPONENT**

Objective/Outcome 1: Strengthen capacity of selected pollution control agencies in the remediation of polluted sites	
Outcome Indicators	<ol style="list-style-type: none"> <li>1. Contaminated land managed or dump sites closed under the project (Target - 16.30 ha)</li> <li>2. Capacity of technical staff of the participating agencies strengthened to prepare, implement and monitor remediation plans</li> <li>3. Direct project beneficiaries (number) of which female (%): Target - 157,362 and 45.34%</li> </ol>
Intermediate Results Indicators	<ol style="list-style-type: none"> <li>1. Number of parameters that can be analyzed by the laboratories of Andhra Pradesh, Telangana and West Bengal Pollution Control Boards increased (Target - 26 to 76)</li> <li>2. Remediation plans prepared based on risk-based approach and ready for implementation in all the three participating states (Target 100 percent)</li> <li>3. Post remediation monitoring system with appropriate infrastructure and approved indicators established for all the three pilot sites by the completion of remediation works (Target - Yes)</li> <li>4. People with reduced direct exposure to pollution from sites remediated by the project (Target – 17,238)</li> </ol>
Key Outputs by Component (linked to the achievement of the Objective/Outcome 1)	<ol style="list-style-type: none"> <li>1. Remediation plans for all the four pilot sites (envisaged at appraisal) prepared and ready for implementation</li> <li>2. Laboratory infrastructure for all the three SPCBs is upgraded to monitor 76 parameters and are in operation since 2012/13</li> <li>3. Remediation works in two demonstration sites (Site B and Site C) completed, few months after project closure</li> </ol>



	<ol style="list-style-type: none"> <li>4. Training laboratory staff, SPCB staff beyond the implementing states, international exposure visits, and knowledge dissemination workshops organized</li> </ol>
<b>Objective/Outcome 2: Support to the Development of framework for the establishment of national program for the remediation of polluted sites</b>	
<b>Outcome Indicators</b>	<ol style="list-style-type: none"> <li>1. Framework for the establishment of NPRPS comprising inventory of polluted sites, remediation methodologies and policy and regulatory reviews developed.</li> </ol>
<b>Intermediate Results Indicators</b>	<ol style="list-style-type: none"> <li>1. Inventory of pollutes sites in India developed</li> <li>2. Methodologies for remediation of polluted sites in India developed</li> <li>3. National Guidelines for remediation of polluted sites developed</li> <li>4. Policy options for remediation of polluted sites developed based on a review of existing legislations and international experiences</li> <li>5. Online network of State Pollution Control Boards for remediation established</li> </ol>
<b>Key Outputs by Component</b> (linked to the achievement of the Objective/Outcome 2)	<ol style="list-style-type: none"> <li>1. Report on inventory of polluted sites prepared and data base installed at the MoEFCC for future updating</li> <li>2. Report on methodologies for remediation of polluted sites developed and disseminated to SPCBs through workshops and websites</li> <li>3. National guidelines for remediation of polluted sites developed and disseminated to SPCBs through workshops and website.</li> <li>4. Policy options for remediation have been developed</li> </ol> <p><b>Additional outputs</b></p> <ol style="list-style-type: none"> <li>1. Draft rules for the remediation of polluted sites developed</li> </ol>





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|  | <ol style="list-style-type: none"><li>2. Soil standards for remediation developed</li><li>3. National Action Plan on Chemicals Management developed</li><li>4. Strengthening/streamlining public liability and other rules being considered</li><li>5. Remediation plans for eight polluted sites developed by the CPCB and ready for implementation</li><li>6. Capacity building of academic institutions initiated</li></ol> |
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**ANNEX 2. BANK LENDING AND IMPLEMENTATION SUPPORT/SUPERVISION****A. TASK TEAM MEMBERS**

Name	Role
<b>Preparation</b>	
Charles J. Cormier	Task Team Leader
Ruma Tavorath	Co-Task Team Leader
Adriana Damianova	Environment Specialist
Maria Sarraf	Environmental Economist
Sanjay Srivastava	Environmental Specialist
Tapas Paul	Environmental Specialist
Priti Kumar	Environmental Specialist
K. Sankaravadivelu	Procurement Specialist
Arun Manuja	Financial Management Specialist
Jennifer Solotaroff	Social Specialist
Vikram Raghavan	Legal Counsel
Bela Varma	Team Member
Cecilia Belita	Team Member
John Prakash Badda	Team Member
Kumudni Choudhary	Team Member
<b>Supervision/ICR</b>	
Harinath Sesha Appalarajugari	Task Team Leader
Swayamsiddha Mohanty	Procurement Specialist(s)
Arvind Prasad Mantha	Financial Management Specialist
Sangeeta Kumari	Social Specialist
Sampath Natarajan Kumar	Team Member
Sandhya Krishnan	Team Member
Charu Jain	Environmental Specialist



**B. STAFF TIME AND COST**

Stage of Project Cycle	Staff Time and Cost	
	No. of staff weeks	US\$ (including travel and consultant costs)
<b>Preparation</b>		
FY05	33.099	220,811.87
FY06	57.832	263,086.38
FY07	40.906	214,749.27
FY08	35.170	256,892.53
FY09	37.900	312,469.84
FY10	2.175	8,600.00
FY11	0	0.00
FY13	0	842.62
FY14	0	- 136.38
<b>Total</b>	<b>207.08</b>	<b>1,277,316.13</b>
<b>Supervision/ICR</b>		
FY11	22.910	85,621.23
FY12	29.132	110,678.38
FY13	38.490	140,918.34
FY14	10.742	42,589.51
FY15	12.202	48,089.78
FY16	20.907	70,316.12
FY17	11.375	38,891.25
FY18	14.075	70,717.83
FY19	4.813	24,216.49
<b>Total</b>	<b>164.65</b>	<b>632,038.93</b>



**ANNEX 3. PROJECT COST BY COMPONENT**

Components	Amount at Approval (US\$ million)	Actual at Project Closing (US\$ million)	Percentage of Approval
Strengthening of Environmental Institutions: Building capacity for addressing pollution remediation	16.74	13.33	79.63
Investments in Priority Remediation and Environmental Improvements: Rehabilitation of orphan hazardous waste sites and municipal dumpsites	52.80	14.44	27.35
Project Management	5.85	2.94	0
<b>Total</b>	<b>75.39</b>	<b>30.71</b>	<b>40.73</b>

**Project Costs by Financing Source**

Source	Amount at Approval (US\$ million)	Actual at Project Closing (US\$ million)	Percentage of Approval
IBRD	25.21	0.36	1.43
IDA	38.94	26.08	66.97
Borrower	11.24	4.27	37.98
<b>Total</b>	<b>75.39</b>	<b>30.71</b>	<b>40.73</b>

Note: Total Project cost indicated is the cost at closure (March 31, 2018), which varies from the cost in the data sheet, as it considers actual disbursements.



## ANNEX 4. EFFICIENCY ANALYSIS

### A. Overview

1. The project included capacity building as well as demonstration investment. These activities generate long-term environmental, health, and economic benefits. Some of the long-term benefits accrue after closure of projects, and quantification is difficult. In view of this, economic analysis was carried out for two demonstration investments (one hazardous waste site at NMK Lake, Telangana, and a municipal dump site at Kadapa, Andhra Pradesh) at appraisal. Overall economic analysis for the project as a whole was not attempted; and it was assumed that (a) all four demonstration investments would generate at least the average benefits estimated for the two sample demonstration investments and (b) the benefits from demonstration investments will be sufficient to make the overall project benefits to exceed cost, even if the benefits generated by the capacity-building activities were to be low.

2. The above assumptions seem to be valid. At appraisal, the benefit streams were calculated for 35 years, but the health and recreational benefits were not quantified. Therefore, these were conservative estimates. The average benefit/cost return from demonstration investments was 3.28, which was sufficient to generate a net present value (NPV of benefit worth US\$69.8 million. Consequently, the project as a whole was viable if the capacity-building activities costing US\$16.7 million were to generate a NPV of benefits worth US\$5.6 million only (or 33 percent of the cost).

3. However, at ICR, the economic analysis conducted at appraisal cannot be directly subjected to reconfirmation. At the close of the project, the expenditure on capacity building (US\$13.4 million) and demonstration investments (US\$14.4 million) is nearly equal. Therefore, benefits from demonstration investments alone might not alone be able to make the overall project beneficial if the capacity-building activities did not generate adequate benefits. Secondly, the implementing agencies monitored benefits accruing from the capacity-building activities, such that these could be used in economic analysis at ICR. Third, during implementation, actual remediation of two larger demonstration investments were dropped, and works were completed only for two of the four such investments originally proposed. Fourth, the health and recreation benefits and the streams of benefits related to improved water supply and fisheries have not started to flow, and there is a level of uncertainty in estimating future benefit flows in these regards. Therefore, the ICR economic analysis covers both demonstration investments and the capacity-building activities.

4. The expenditure/cost of the project is fully known at ICR. However, on the benefit side, the actual accrual until close of the project is based on actual and on surveys, and the future benefits are considered only for sub-streams where evidence of such benefits already exist.

5. During ICR preparation, the implementing agencies were able to demonstrate certain quantifiable benefits due to capacity-building activities, such as cost savings, in analysis of samples due to the purchase of laboratory equipment, revenue for carrying out analysis for external research agencies, additional employment generation in the laboratories, savings in the cost of preparing remediation plans, and details of some immediate economic benefits due to remediation of the demonstration pilots. Considering the availability of this information and the fact that the share of project costs for Components 1 and 2 are almost equal after restructuring in September 2017, a combined economic analysis of the project was



carried out for the ICR. In addition, a separate economic analysis of the two demonstration investments is also presented, to provide a comparison of with the economic analysis at appraisal.

## **B. Assumptions**

6. The assumptions used in the project economic analysis are as follows:
  - (a) The duration of the analysis is calculated in accordance with the post remediation monitoring requirements of similar projects, which is 15 years, and covers the period from 2018 to 2032.
  - (b) The exchange rate of Indian rupee to U. S. dollar (INR/US\$) from 2010 to 2018 is determined based on actual disbursements by the project.
  - (c) A discount rate of 12 percent is applied based on the 'Technical Note on Discounting Costs and Benefits in Economic Analysis of World Bank Projects'<sup>8</sup>
  - (d) Benefits are projected for a period of 35 years

## **C. Project Costs**

7. The following costs were considered for the economic analysis and two scenarios with and without taxes were generated:
  - (a) Actual annual expenditure by the project, based on the approved interim unaudited financial reports
  - (b) An expenditure of US\$3 million by the GoI for completing project activities after project closure
  - (c) Projected monitoring and aftercare costs based on estimates provided in detailed remediation plans for the two demonstration pilots and from maintenance contracts for laboratory equipment

## **D. Project Benefits**

8. The following benefits were considered for the analysis.

### *Component 1: Strengthening of Environmental Institutions*

- (a) **Benefits from procurement of laboratory equipment.** As part of the capacity-building activities of the project, the APPCB, TSPCB, and WBPCB (implementing agencies) procured several equipment for better monitoring of hazardous waste pollution. This resulted in savings from the analysis charges paid by these agencies to external laboratories. In addition,

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<sup>8</sup>

[https://worldbankgroup.sharepoint.com/sites/ggs/SitePages/Detail.aspx/Blogs/mode=view?\\_Id=2892&SiteURL=/sites/ggs](https://worldbankgroup.sharepoint.com/sites/ggs/SitePages/Detail.aspx/Blogs/mode=view?_Id=2892&SiteURL=/sites/ggs)



the upgraded laboratories have also been able to offer analytical services to a few research agencies. These estimates were assessed based on the 'instrument utilization reports' shared by the WBPCB and TSPCB and actual commissioning dates of each equipment. In the case of Andhra Pradesh, the laboratory equipment was commissioned in March 2018. Hence, the benefits were calculated based on the average annual benefits observed in the TSPCB and WBPCB and included in the analysis from the year 2018. In absolute terms, these benefits ranged from US\$59,000 per year in 2013 to US\$164,000 per year in 2018. Deflation and discounting factors were applied to these benefits and to be on the conservative side, no projections for annual increase of benefits were calculated for the 15-year analysis period. Based on this analysis, the NPV of these benefits of procuring laboratory equipment is calculated as US\$377,299 (INR 27.09 million).

- (b) **Additional employment from laboratories.** With the procurement of additional laboratory equipment, each of the three SPCBs have hired five middle-level scientists for operating and managing the additional equipment/workload. While these benefits were considered for Telangana and West Bengal from the year 2013, such benefits were considered for Andhra Pradesh from 2018. Based on this analysis, the NPV of additional employment generated due to the procurement of laboratory equipment is calculated as US\$343,707 (INR 24.68 million).
- (c) **Savings in the preparation of remediation plans.** One of the main objectives of the project is to build capacity in India for the preparation and implementation of remediation plans. In line with these objectives, plans for 15 polluted sites were prepared by the project implementing agencies. The average cost of preparing these plans by the project works out to US\$552,000 (INR 39,643,500). Based on the experience gained from the project, clarity on various surveys/investigations to be carried out, and the Gol's commitment on a long-term remediation program, the cost of the remediation plans prepared by the CPCB as part of the Gol initiative reduced to about US\$300,000 (INR 21,250,000). This indicates a substantial savings of about US\$252,000 (INR 18,393,500) for each remediation plan. Based on this estimate of savings, total savings accrued due to the remediation approach established by the project was calculated for the 75 percent of the remaining 112 sites in the analysis period of 15 years (after considering 15 plans prepared by the project and 8 sites prepared by the CPCB of the total inventory of 135 sites developed by the project). The NPV of these savings is estimated at US\$4.34 million (INR 311.66 million).

*Component 2: Investments in Priority Remediation.*

9. The key benefits due to the demonstration pilots are the following:

- (a) **Agriculture benefits due to the Kadapa dump site remediation (Site B).** Based on the discussions with farmers and the community members around the project site, the Social Monitoring and Audit Report (2018) for the Kadapa remediation pilot, indicates an increase of 50 acres agricultural land. This is lower than the 100 acres estimated in the economic analysis at appraisal. The net income per year (with a cropping intensity of 1.16 crops a year) from each acre of paddy (the most common crop in the project area) production of this agriculture land has been estimated based on (i) the average minimum wholesale price of



paddy in 2017 in Kadapa district from [www.agmarknet.gov.in](http://www.agmarknet.gov.in), (ii) the projected cost of production (actual paid-out cost) of paddy in Andhra Pradesh during marketing season 2018–19,<sup>9</sup> and (iii) the average paddy yield over 2016–17 and 2015–16 in the kharif season in Y.S.R. Kadapa district.<sup>10</sup> This benefit has been considered starting from 2018, for a period of 15 years and the NPV is estimated at US\$17,280 (INR 1.24 million).

- (b) **Increase in income to communities due to the Dhapa dump site remediation (Site C).** The ESA report for Dhapa remediation works highlights that Makaltala village, which is adjacent to the site, is the most affected habitation. The report indicates that, after the closure of the dump site in 2009, there has been an increase in dependency on own farming and non-agricultural wage labor with significant increase in opportunity in government and private services. It was also found that there had been an increase in the variety of secondary livelihood options due to the availability of opportunities outside the area. A reassessment of income levels in Makaltala in 2018 indicated that beautician training and training on driving, jute bag making, and tailoring provided as part of the SMP, may have contributed to increased income levels in the village. The benefit in terms of the overall increase in income in the village since the closure of the dump site has been estimated at US\$68,000 (INR 4.87 million) by 2013 and US\$76,000 (INR 5.45 million) by 2018 (the year in which remediation works are to be completed). The NPV of these benefits over the analysis period is estimated at US\$224,650 (INR 16.13 million)
- (c) **Increase in rental values around remediated sites.** Based on the hedonic prices approach followed at appraisal, changes in rental values have been used to capture health and aesthetic benefits due to remediation of dump sites.
- **Site B: Kadapa Dump Site.** The ESA estimates that the dump site impacts the 2,723 households located within 0–3 km of the site. Remediation hence is expected to directly benefit these households. The Social Monitoring and Audit Report (2018) for this remediation pilot reports an increase in rental values in the areas of Ukkayyapalli, Sankarapuram, and Kondayyapalli to INR 5,000–5,500 (after works completed in 2018) from INR 2,500–3,000 (before works began in 2015) per month, depending on the type of housing. The inference is based on data collected through a survey of 46 of the 55 Project Affected Families (PAF), Focus Group Discussions (FGDs), interviews conducted with various stakeholders of the project, and secondary data provided by the APPCB. This benefit has been considered from 2018, for 15 years. While it is noted that part of the increase in rental values may be attributable to other economic factors, the no/low level of development in the area during the project preparation period, indicates that it is plausible to attribute the increase in rental values to the improvements contributed by the project. Further to be conservative, no annual increase in rental valued during

<sup>9</sup> Commission for Agricultural Costs and Prices, Ministry of Agriculture and Farmers Welfare, Government of India, 2018. *Price Policy for Kharif Crops - The Marketing Season 2018–19*, New Delhi: s.n.

<sup>10</sup> Directorate of Economics and Statistics, Government of Andhra Pradesh, 2017. *Agricultural Statistics at a Glance - Andhra Pradesh: 2016–17*, Vijayawada: s.n.





the 15-year analysis period is considered. The NPV of these benefit for Kadapa is estimated at US\$1.71 million (INR 123.12 million).

- **Site C: Dhapa Dump Site:** The ESA estimates that the dump site affects 1,025 households located within 0–2 km of the project area. The data collected by the WBPCB in 2018 indicates that that the average rent ranges from INR 1,000 to INR 1,200 per month in Makaltala, Unchupota, Khanaberia, Dhapa Durgapur, and Anantabadal villages within the 0–2 km influence area of the project. Based on similar data collected in 2017, the weighted average increase in rental value in these areas was estimated at INR 446.83 per month. This benefit has been considered starting from 2018, for 15 years of the analysis period. While it is possible that the increase in rental values could be due to various economic factors in the area, the low level of development in the area and various activities implemented as part of the SMP (access road, renovation of connecting bridge, and so on) indicates that the increase can be attributed to the project. The NPV of these benefit for Dhapa is estimated at US\$0.168 million (INR 12.10 million).
- (d) **Employment benefits due to remediation activities.** Dump site remediation activities predominantly involve handling of solid waste, which is akin to earth work operations and involves large number of local unskilled/semiskilled labor. Based on the discussions with the remediation contractors, it is estimated that (i) the Kadapa dump site remediation involved a total of 135,360 worker days contributed by about 450 workers and (ii) the Dhapa dump site remediation involved a total of 305,450 worker days contributed by about 1,200 workers. Based on average wage rate of INR 550 per day, the total benefits to the local workers due to the remediation activities is estimated to be about US\$3.06 million (INR 220.40 million) for both the sites. The NPV of these benefits after deflation and discounting factors is estimated at US\$650,600 (INR 46.72 million).
- (e) **Reduction in GHG emissions.** Reduction in GHG emissions is an important benefit associated with municipal dump sites. These benefits of this GHG emission reductions for both the sites have been estimated at the midpoint of the low and high shadow price of carbon (SPC) specified in the World Bank Guidance Note on the Shadow Price of Carbon in Economic Analysis (November 2017). The benefits of both the sites is summarized below.
- **Kadapa.** The final Containment and Closure Plan for Kadapa dump site remediation (January 2013) estimates GHG reduction of 8,613 tCO<sub>2</sub> equivalent from the period 2018–32. The lower emission reduction can be attributed to the old and decomposed status of waste at the dump site. The cumulative benefits of this emission reduction for Kadapa till 2032, based on the SPC is estimated at US\$61,676 (INR 4.43 million).
  - **Dhapa.** GHG emission reductions in the with-project scenario when compared to the without-project scenario (which is assumed to be the same as the baseline scenario) through the oxidation of methane through bio-filters used in the reduced infiltration and passive gas venting system at Dhapa have been estimated<sup>11</sup> at 176,621.76 tCO<sub>2</sub>

<sup>11</sup> Dhapa Dump Site - Landfill gas generation and methane reduction (2018) by remediation consultants (M/S COWI).



equivalent from 2018 to 2027 (with methane generation higher than the methane reduction potential for the first 4 years). An additional reduction in GHG emissions of 58,463.82 tCO<sub>2</sub> equivalent over 2028–32 was estimated based on the declining trend in GHG emission reduction from 2022-27. In total, it is estimated that GHG emissions will reduce because of the project by 235,085.57 tCO<sub>2</sub> equivalent from 2018–32. The cumulative benefits of this emission reduction for Dhapa till 2032, based on the SPC is estimated at US\$1.49 million (INR 106.73 million).

**E. Overall Economic Analysis**

10. Based on the above analysis and as summarized in Table 4.1, the overall IRR of the project is estimated at 26.12 for the overall project and 36.78 for the investment component. A comparison of cost-benefit ratio estimated for the investment component at appraisal and at ICR indicate that the ratios ranged around 2.84 for Site B: Kadapa and 4.89 for Site C: Dhapa as compared to 1.90 estimated at ICR. This variation is due to high employment generation and GHG emission reduction considered at appraisal, whereas the ICR considered the actual employment data and GHG emission calculations.

**Table 4.1. Economic Analysis at Completion (Summary)**

<b>Item</b>	<b>Benefits, US\$ million</b>
Increase in rental values	1.880
Employment benefits	0.650
Agricultural benefits	0.017
Increased income at Makaltala	0.220
Reduction in GHGs	1.540
Savings and income from laboratory analysis	0.370
Employment generation from laboratories	0.340
Savings in preparation of remediation plans	4.340
Total benefits (NPV)	9.380
Total cost (NPV)	5.680
<b>Benefit-cost ratio (overall project)</b>	<b>1.650</b>
<b>Benefit-cost ratio (investment component)</b>	<b>1.90</b>
<b>IRR (overall project)</b>	<b>26.120</b>
<b>IRR (investment component)</b>	<b>36.780</b>



Table 4.2. Projection of Flow of Benefits (In INR)

12	Project Cost (Actual) & O&M Costs	Total Economic Cost (Total cost less taxes at 15%)	Agricultural Benefits in Kadapa	Increase in Rental value at Kadappa	Increase of Rental value at Dhapa	Employment Benefits (K+D)	Increased Income at Makaltala	Reduction in GHG (Kadapa)	Reduction in GHG (Dhapa)	Return from Labs	Employment generation at Labs	Remediation Plan - Savings in Preparation	TOTAL BENEFIT
2,009	-	-	-	-	-	-	-	-	-	-	-	-	-
2,010	15,339,177	13,038,300	-	-	-	-	-	-	-	-	-	-	-
2,011	-	-	-	-	-	-	-	-	-	-	-	-	-
2,012	45,730,769	38,871,154	-	-	-	-	-	-	-	-	-	-	-
2,013	76,297,810	64,853,138	-	-	-	-	2,149,738	-	-	1,868,051	2,649,092	-	6,666,880
2,014	55,445,938	47,129,048	-	-	-	-	1,803,539	-	-	1,567,215	2,222,475	-	5,593,229
2,015	28,251,333	24,013,633	-	-	-	-	1,535,083	-	-	1,941,995	1,891,661	-	5,368,740
2,016	26,165,679	22,240,827	-	-	-	2,749,376	1,305,977	-	-	2,104,061	1,609,337	148,866,115	156,634,867
2,017	41,816,821	35,544,298	-	-	-	16,642,405	1,128,418	-	-	1,823,835	1,390,534	34,102,373	55,087,564
2,018	128,801,048	109,480,891	162,694	16,141,280	1,587,453	27,335,322	1,076,480	815,735	14,562,811	2,332,468	1,956,159	-	65,970,403
2,019	44,431,304	37,766,608	145,262	14,411,857	1,417,369	-	961,143	800,968	13,302,688	2,082,561	1,746,571	-	34,868,419
2,020	2,966,196	2,521,267	129,698	12,867,729	1,265,508	-	858,164	629,682	12,151,603	1,859,429	1,559,438	28,973,262	60,294,514
2,021	2,259,796	1,920,826	115,802	11,489,044	1,129,918	-	766,218	494,697	11,094,470	1,660,205	1,392,356	15,521,390	43,664,099
2,022	1,487,756	1,264,592	103,395	10,258,075	1,008,855	-	684,123	389,186	9,627,232	1,482,326	1,243,175	-	24,796,366
2,023	2,111,280	1,794,588	92,317	9,158,996	900,763	-	610,824	305,770	8,275,416	1,323,505	1,109,977	-	21,777,568
2,024	1,608,478	1,367,206	82,426	8,177,675	804,253	-	545,379	240,324	7,085,943	1,181,701	991,051	-	19,108,751
2,025	1,058,955	900,112	73,594	7,301,495	718,083	-	486,945	188,629	6,118,742	1,055,090	884,867	39,456,497	56,283,943
2,026	1,502,767	1,277,352	65,709	6,519,192	641,146	-	434,772	148,379	5,266,198	942,045	790,060	-	14,807,501
2,027	1,144,883	973,150	58,669	5,820,707	572,451	-	388,190	116,628	4,515,681	841,111	705,411	-	13,018,849
2,028	753,743	640,682	52,383	5,197,060	511,117	-	346,598	91,652	3,887,440	750,992	629,831	28,084,355	39,551,428
2,029	1,069,640	909,194	46,771	4,640,232	456,355	-	309,462	72,034	3,346,603	670,529	562,349	-	10,104,334
2,030	814,905	692,669	41,759	4,143,064	407,460	-	276,306	56,619	2,881,009	598,687	502,097	-	8,907,001
2,031	536,500	456,025	37,285	3,699,165	363,803	-	246,702	44,470	2,480,191	534,542	448,301	16,658,241	24,512,699
2,032	761,349	647,146	33,290	3,302,826	324,824	-	220,269	34,831	2,135,136	477,269	400,269	-	6,928,714
<b>Sum</b>	<b>480,356,127</b>	<b>408,302,708</b>	<b>1,241,055</b>	<b>123,128,396</b>	<b>12,109,359</b>	<b>46,727,103</b>	<b>16,134,329</b>	<b>4,429,603</b>	<b>106,731,162</b>	<b>27,097,618</b>	<b>24,685,013</b>	<b>311,662,233</b>	<b>673,945,871</b>
<b>NPV (INR)</b>	<b>480,356,127</b>	<b>408,302,708</b>	<b>1,241,055</b>	<b>123,128,396</b>	<b>12,109,359</b>	<b>46,727,103</b>	<b>16,134,329</b>	<b>4,429,603</b>	<b>106,731,162</b>	<b>27,097,618</b>	<b>24,685,013</b>	<b>311,662,233</b>	<b>673,945,871</b>
NPV (USD)	6,675,321	5,674,023	17,246	1,711,067	168,279	649,348	224,212	61,556	1,483,201	376,565	343,038	4,331,048	9,365,562

Benefit-cost ratio (overall project) 1.65  
 Benefit-cost ratio (investment component) 1.90  
 IRR (overall project) 26.12  
 IRR (investment component) 36.78



## **ANNEX 5. BORROWER, CO-FINANCIER AND OTHER PARTNER/STAKEHOLDER COMMENTS**

### **Comments of MoEFCC, Government of India on the World Bank Prepared Implementation Completion and Results (ICR) Report for the Bank-aided Capacity Building for Industrial Pollution Management (CBIPM) Project.**

#### **A. Datasheet - Ratings of project performance in ISRs (page 4 of 59, CBIPMP ICR report)**

1. In the 'Ratings of project performance in ISRs' at page 4 of 59 of the CBIPMP Implementation Completion and Results (ICR) report prepared by World Bank, with the effective commencement date of 13.10.2010, the CBIPM project has received a Development Objective (DO) Rating of 'Satisfactory' and an Implementation Progress (IP) Rating of 'Satisfactory' with Actual Disbursements of US\$M 5.50 based on project Implementation Status Report (ISR) archived on 01.12.2010.
2. With scheduled closing date of 31.03.2018, the CBIPM project has received a DO Rating of 'Moderately Unsatisfactory' and an IP Rating of 'Moderately Unsatisfactory' with Actual Disbursements of US\$M 15.12 based on project ISR archived on 29.03.2018.
3. It is submitted that the compiled ICR project report of the Ministry of Environment, Forest and Climate Change (MoEFCC), Andhra Pradesh Pollution Control Board (APPCB), Telangana State Pollution Control Board (TSPCB) and West Bengal Pollution Control Board (WBPCB) is at Annexure. Majority of the project activities at Central and State level have already been completed and the remaining activities are likely to be completed by December 2018.
4. As per records available with MoEFCC and the State implementing agencies of Andhra Pradesh, Telangana and West Bengal, the total disbursement under the CBIPM project from October 2010 to March 2018 was Rs. 142.1186 crores (US\$M 31.58) out of total expenditure of 160.57 crores (US\$M 24.62). Majority of the fund disbursement was in the last two years of the project i.e., Rs. 44.1129 crores (US\$M 9.8) during financial years 2016-17 and 2017-18.
5. In view of above, it is submitted that the CBIPMP implementing agencies i.e., MoEFCC and States of Andhra Pradesh, Telangana and West Bengal have made full efforts under the project, especially in the last two years, to achieve the envisaged project objectives/outcomes in a time bound manner. Additionally, the Ministry has taken the initiative to fund some of the remaining project activities at Central and State level after discontinuation of World Bank financial aid with the closure of CBIPMP in March 2018. It has, therefore, gone beyond achieving of the objectives/outcomes under the project and exhibited its commitment towards supporting the activities of remediation and rehabilitation of polluted sites in the country.
6. Accordingly, the Ministry is of the opinion that the CBIPM project's DO Rating of 'Moderately Unsatisfactory' and the IP Rating of 'Moderately Unsatisfactory' with Actual Disbursements of US\$M 15.12 based on project ISR archived on 29.03.2018 (page 4 of 59, CBIPMP ICR report) is unmerited and should clearly reflect a rating of 'Satisfactory'.

#### **B. Outcome - D. Justification of Overall Outcome Rating (Paragraph 60, Table 3, page 23 of 59, CBIPMP ICR report).**



7. The final overall outcome rating of the CBIPM project has been given by World Bank as 'Moderately Satisfactory' in their project ICR report. In this regard, it is submitted that MoEFCC, Government of India received financial aid from World Bank in 2010 to implement the "Capacity Building for Industrial Pollution Management (CBIPM) Project". The project was being implemented through World Bank funds by MoEFCC from 13.10.2010 to 31.03.2018. Post-March 2018, some of the remaining project activities at Central and State levels are being implemented through MoEFCC, Government of India funding. Majority of the project activities at Central and State level have already been completed and the remaining activities are likely to be completed by December 2018. The compiled ICR project report of MoEFCC, APPCB, TSPCB and WBPCB is at Annexure. The status of the activities completed/on-going at Central & State level under the CBIPM project is as given below:

*MoEFCC:*

8. Three studies i.e., (i) Inventory and mapping of probably contaminated sites in India (M/s COWI); (ii) Development of methodologies for national programme (M/s Grontmij); and (iii) Development of legal, institutional and financial framework of national programme (M/s PWC) have been completed through three different consultants by MoEFCC through World Bank funding. Reports of these three studies have been uploaded on the website of MoEFCC for public viewing ([http://envfor.nic.in/sites/default/files/ilovepdf\\_merged.pdf](http://envfor.nic.in/sites/default/files/ilovepdf_merged.pdf), <http://envfor.nic.in/sites/default/files/Task.pdf> and <http://envfor.nic.in/sites/default/files/Development%20of%20legal,%20Institutional%20and%20Financial%20Framework%20of%20National%20Program.pdf>) and have also been shared with the three project implementing States of Andhra Pradesh, Telangana and West Bengal.
9. The Ministry has gone beyond achieving the target of completing these studies by disseminating the studies' reports across 110 participants from academic institutions (12 IITs, 12 NITs, 6 Private), research and government institutions (10), industries (9), SPCBs (12 states), CPCB and MoEFCC during the national level Networking Workshop on "Contaminated Sites: Subsurface Investigations and Remediation" funded by the Ministry & organized by IIT Delhi on 12th and 13th July, 2018 at India Habitat Centre, New Delhi.
10. Information on the three reports as well as the overall project will be further disseminated across various stakeholders during the international workshop on contaminated sites that is to be organized by IIT Delhi.
11. Draft Remediation of Contaminated Sites Rules have been prepared and recommended by the Technical Review Committee of the Ministry. These rules are undergoing review in MoEFCC for finalization and notification.
12. A National Coordination Committee (NCC) for preparation of National Action Plan on Industrial Chemicals Management in India (NAPC) has been constituted by MoEFCC. Further, the Ministry has gone beyond achieving the target of preparing the NAPC by expanding the ToR of NCC to include (i) finalization of Draft Hazardous Chemicals Management Rules by merging Manufacture, Storage, and Import of Hazardous Chemicals (MSIHC) Rules, 1989 and Chemical Accidents (Emergency Planning, Preparedness and Response) (CAEPPR) Rules, 1996; and (ii) Draft Hazardous Substances and Dangerous Goods (Classification, Packaging and Labelling) (CLP) Rules.



13. Finalization of the NAPC as well as draft HCM and draft CLP rules is being done through MoEFCC funding under the HSM Scheme after World Bank-aid ended with closure of CBIPMP in March 2018. Six meetings of the NCC have been convened and field visits of team of NCC members/CBIPMP staff to 10 chemical industrial clusters and ports handling chemicals in India have been completed for interaction with concerned industry associations and port authorities to collect data for the preparation of NAPC. Initial draft report of NAPC has been prepared, which is undergoing finalization by the NCC. Reinforcing the Ministry's commitment to support contaminated sites management in the country, the draft NAPC report recommends to amend the Public Liability Insurance (PLI) Act/Rules to enable utilization of funds available under the Environment Relief Fund (ERF) for meeting the cost of remediation of contaminated sites, strengthening of Emergency Response Centers (ERCs), establishment of burn wards, etc.
14. A Technical Expert Committee (TEC) for development of Soil Standards has been constituted by MoEFCC. Three meetings of TEC have been convened. The TEC has recommended protocol for soil sampling and draft soil standards for remediation. For validation of the soil sampling protocol recommended by TEC, a soil field study at 10 contaminated sites has been awarded by MoEFCC to CSIR-NEERI. Soil sampling has been completed and interim report has been submitted to MoEFCC by CSIR-NEERI. Analysis of soil samples is in process, after completion of which, final report will be submitted by the institute to MoEFCC. The study is being completed through MoEFCC funding under the HSM Scheme. On validation, the soil sampling protocol and soil standards for remediation will be finalized and notified by MoEFCC, which will be a first for India as there is no such soil sampling protocol & soil standard for remediation of contaminated sites in the country.
15. The Ministry has awarded a project titled "Capacity building of academic institutions to support remediation initiatives" to IIT Delhi through MoEFCC funding under the HSM Scheme. The project has the following five components: (i) Establish National Network of Resource Persons; (ii) Establish International Network of Resource Persons; (iii) Procurement of Advanced Field Equipment; (iv) Demonstration Project; and (v) Research Activities. Under the project, a national-level Networking Workshop on "Contaminated Sites: Subsurface Investigations and Remediation" funded by MoEFCC was organized by IIT Delhi on 12th and 13th July, 2018 at India Habitat Centre, New Delhi. The summary and outcome of the national workshop, brief write-ups, presentations, and photographs have been uploaded on the website: [http://nercs.in/workshop\\_index.html](http://nercs.in/workshop_index.html). The workshop was attended by 110 participants from academic institutions (12 IITs, 12 NITs, 6 Private), research and government institutions (10), industries (9), SPCBs (12 states), CPCB and MoEFCC. During the workshop, the steps were identified for establishing a Network of Experts & Resources for Subsurface Investigations and Remediation of Contaminated Sites (NERCS) in the near future (<http://www.nercs.in>). This network is currently under development.
16. As another component of the project, the Ministry has released Rs. 7 crores to IIT Delhi for the procurement of advanced field equipment. Further, an international workshop with demonstration of the procured equipment is to be organized by IIT Delhi.



*B) Andhra Pradesh*

- (a) Studies on inventorisation & characterization of hazardous waste categories, impact of municipal solid waste (MSW) dumpsites on environment, business strategy for establishment of environmental compliance assistant centers (ECAC), and incentivization of electronic waste have been completed.
- (b) Two domestic training programmes at Hyderabad and Tirupati have been completed.
- (c) Upgradation of Zonal Laboratory to Advanced Instrumentation Laboratory at Visakhapatnam along with procurement, installation and commissioning of 20 types of various laboratory instruments/equipment have been completed. iv. Closure & containment (excavation & related works, stabilization & closure) works of Kadapa MSW site is at advanced stage and expected to be completed by October, 2018.
- (d) Social safeguards initiatives as well as Social monitoring and social audit of MSW project site at Kadapa have been completed.

*C) West Bengal*

- (a) Studies on inventorisation & characterization of hazardous waste categories, and business strategy for establishment of environmental compliance assistant centers (ECAC) have been completed.
- (b) Assessment of contamination and design of remediation plan of priority five contaminated sites has been completed.
- (c) Advanced lab equipment have been procured, installed and commissioned.
- (d) Laboratory infrastructure has been strengthened. Analytical capacity of laboratory personnel of Central Laboratory and Regional Laboratories has been improved. The Central Laboratory is now analyzing samples of reputed organizations like ARAI, CSIR-NEERI.
- (e) Preparation of detailed business strategy and Environment Compliance Assistance Centre (ECAC) has been completed.
- (f) Study tours/trainings have been completed.
- (g) Closure and Containment works at Dhapa MSW Site: Execution of remediation works is at full pace & expected to be completed by November 2018. Construction of Leachate Treatment Plan at Dhapa MSW sites is under progress & expected to be completed by November 2018.
- (h) Upgradation & Repairing of existing approach road in and around Dhapa MSW site is expected to be completed by November 2018.





*D) Telangana*

- (a) Studies on inventorisation & characterisation of hazardous waste categories, impact of MSW dumpsite on environment, business strategy for ECAC, and inventorisation of e-waste have been completed.
  - (b) A domestic training programme at Hyderabad has been completed.
  - (c) Refurbishment of Central Laboratory has been completed.
  - (d) Laboratory instruments/equipment have been procured, installed and commissioned.
17. Taking above into consideration, it is clear that the MoEFCC and the State implementing agencies of Andhra Pradesh, Telangana and West Bengal have achieved majority of expected outcomes of the CBIPM project i.e., to build tangible human and technical capacity in selected state pollution control agencies for undertaking environmentally sound remediation of polluted sites; and to support the development of a policy, institutional and methodological framework to establish a National Program for Rehabilitation of Polluted Sites. Furthermore, by funding some of the remaining project activities at Central and State level after discontinuation of World Bank financial aid with the closure of CBIPMP in March 2018, the MoEFCC, Government of India has gone beyond achieving of the objectives/outcomes envisaged under the project and demonstrated its commitment towards long term support of remediation and rehabilitation initiatives of polluted sites in the country. The Ministry, therefore, is of the firm opinion that the CBIPM project's final overall outcome rating of 'Moderately Satisfactory' (Table 3, page 23 of 59, CBIPMP ICR report) is unmerited and should clearly reflect a rating of 'Satisfactory'.





#### **ANNEX 6. SUPPORTING DOCUMENTS (IF ANY)**

1. Project Appraisal Document
2. Restructuring Papers (December 2013, August 2015, May 2016, and September 2017)
3. Project Operations Manual
4. Aide Memoires of Implementation Support Missions (2010–18)
5. Implementation Status Reports (2010–18)
6. Consultants Reports on project activities
7. Social Monitoring and Audit Report for Kadapa dump site remediation, 2018
8. Laboratory Utilization Reports of TSPCB and WBPCB
9. Borrower’s Completion Report (MoEFCC and SPCBs)
10. Towards a Clean World for All – An IEG Evaluation of the World Bank Group’s Support to Pollution Management, 2017
11. India CAS 2009–12, CPS 2013–17, and CPF 2018–22