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Report No: ICR00005614

IMPLEMENTATION COMPLETION AND RESULTS REPORT

IDA-56860

ON A

CREDIT

IN THE AMOUNT OF SDR 88.9 MILLION

US$125 MILLION EQUIVALENT

TO THE

ISLAMIC REPUBLIC OF PAKISTAN

FOR A

DISASTER AND CLIMATE RESILIENCE IMPROVEMENT PROJECT

MAY 18, 2022

Urban, Resilience And Land Global Practice
South Asia Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective November 30, 2021)

Currency Unit =	PKR
PKR 175.15 =	US$1
US$1.40 =	SDR 1

FISCAL YEAR
July 1 - June 30

Regional Vice President:	Hartwig Schafer
Country Director:	Najy Benhassine
Regional Director:	John A. Roome
Practice Manager:	Abhas Kumar Jha
Task Team Leader(s):	Ahsan Tehsin, Hyunjee Oh
ICR Main Contributor:	Syed Muhammad Bilal Khalid

ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
ARAP	Abbreviated Resettlement Action Plan
CoI	Corridor of Impact
CPS	Country Partnership Strategy
DCRIP	Disaster and Climate Resilience Improvement Project
DDMC	District Disaster Management Center
DEOC(s)	District Emergency Operation Center(s)
DMA	Disaster Management Authority
DRFS	Disaster Risk Finance Strategy
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DSNG	Digital Satellite News Gathering
DSS	Decision Support System
EOC(s)	Emergency Operation Center(s)
ESMF	Environmental and Social Management Framework
ESMP(s)	Environmental and Social Management Plans
FAO	Food and Agriculture Organization
FM	Financial Management
FRAU	Flood Risk Assessment Unit
GDP	Gross Domestic Product
GRC	Grievance Redressal Committee
IA	Implementation Agency
ICR	Implementation Completion and Results Report
ISR	Implementation Status and Results Report
IRI	Intermediate Results Indicator
ISM(s)	Implementation Support Mission(s)
LUP	Land Use Plan
MHVRA	Multi-hazard Vulnerability and Risk Assessment
MTR	Mid Term Review
NDM	National Disaster Management
NDMA	National Disaster Management Authority
O&M	Operations and Maintenance
P&D	Planning & Development
PAD	Project Appraisal Document
PDMF	Punjab Disaster Management Fund
PDO	Project Development Objective
PID	Punjab Irrigation Department
PIU(s)	Project Implementation Unit(s)
PPE	Personal Protective Equipment
RAP(s)	Resettlement Action Plans
RPF	Resettlement Policy Framework
SDG(s)	Sustainable Development Goal(s)
SDR	Special Drawing Right

SMS	Short Messaging Service
SOPs	Standard Operating Procedures
SRP	Sindh Resilience Project
TPV	Third-Party Monitoring & Validation
TTL(s)	Task Team Leader(s)
VERFC(s)	Village Emergency Reporting and Facilitation Center(s)

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DATA SHEET

BASIC INFORMATION

Product Information

Project ID	Project Name
P154036	Disaster and Climate Resilience Improvement Project
Country	**Financing Instrument**
Pakistan	Investment Project Financing
Original EA Category	**Revised EA Category**
Partial Assessment (B)	Partial Assessment (B)

Organizations

Borrower	Implementing Agency
Islamic Republic of Pakistan	Provincial Disaster Management Authority (Punjab), Punjab Irrigation Department, State Planning and Development Department

Project Development Objective (PDO)

Original PDO

The project aims to support restoration of resilient flood protection infrastructure and strengthening government capacity to manage disasters and climate variability.

FINANCING

	Original Amount (US$)	Revised Amount (US$)	Actual Disbursed (US$)
World Bank Financing			
IDA-56860	125,000,000	116,976,239	115,652,073
Total	**125,000,000**	**116,976,239**	**115,652,073**
Non-World Bank Financing			
Borrower/Recipient	0	0	0
Total	**0**	**0**	**0**
Total Project Cost	**125,000,000**	**116,976,239**	**115,652,073**

KEY DATES

Approval	Effectiveness	MTR Review	Original Closing	Actual Closing
02-Jun-2015	14-Sep-2015	28-Sep-2018	01-Dec-2019	30-Nov-2021

RESTRUCTURING AND/OR ADDITIONAL FINANCING

Date(s)	Amount Disbursed (US$M)	Key Revisions
23-Sep-2019	60.04	Change in Loan Closing Date(s) Reallocation between Disbursement Categories
09-Dec-2020	77.65	Change in Loan Closing Date(s)
30-Nov-2021	100.92	Cancellation of Financing Reallocation between Disbursement Categories

KEY RATINGS

Outcome	Bank Performance	M&E Quality
Satisfactory	Satisfactory	Substantial

RATINGS OF PROJECT PERFORMANCE IN ISRs

No.	Date ISR Archived	DO Rating	IP Rating	Actual Disbursements (US$M)
01	11-Aug-2015	Satisfactory	Satisfactory	0
02	28-Jun-2016	Moderately Satisfactory	Moderately Satisfactory	13.88
03	31-Dec-2016	Moderately Satisfactory	Moderately Satisfactory	25.67
04	08-Jun-2017	Moderately Satisfactory	Moderately Satisfactory	28.67
05	07-Dec-2017	Moderately Satisfactory	Moderately Satisfactory	31.67
06	27-Jun-2018	Moderately Satisfactory	Moderately Satisfactory	41.04
07	30-Dec-2018	Moderately Satisfactory	Moderately Unsatisfactory	55.04
08	27-Jun-2019	Moderately Satisfactory	Moderately Unsatisfactory	57.04
09	24-Dec-2019	Moderately Satisfactory	Moderately Unsatisfactory	60.04
10	12-Jun-2020	Moderately Satisfactory	Moderately Satisfactory	65.00
11	24-Nov-2020	Moderately Satisfactory	Moderately Satisfactory	77.65
12	17-Jun-2021	Satisfactory	Moderately Satisfactory	82.65
13	02-Dec-2021	Satisfactory	Moderately Satisfactory	106.68

SECTORS AND THEMES

Sectors

Major Sector/Sector	(%)
Public Administration	**11**
Other Public Administration	11
Transportation	**11**
Other Transportation	11

Water, Sanitation and Waste Management	**78**
Public Administration - Water, Sanitation and Waste Management	30
Other Water Supply, Sanitation and Waste Management	48

Themes

Major Theme/ Theme (Level 2)/ Theme (Level 3)	(%)
Finance	**25**
Finance for Development	25
Disaster Risk Finance	25
Human Development and Gender	**0**
Disease Control	0
Pandemic Response	1
Urban and Rural Development	**75**
Disaster Risk Management	75
Disaster Response and Recovery	25
Disaster Risk Reduction	25
Disaster Preparedness	25

ADM STAFF

Role	At Approval	At ICR
Regional Vice President:	Annette Dixon	Hartwig Schafer
Country Director:	Rachid Ben Messaoud	Najy Benhassine
Director:	Ede Jorge Ijjasz-Vasquez	John A. Roome
Practice Manager:	Bernice K. Van Bronkhorst	Abhas Kumar Jha
Task Team Leader(s):	Haris Khan	Ahsan Tehsin, Hyunjee Oh
ICR Contributing Author:		Syed Muhammad Bilal Khalid

I. PROJECT CONTEXT AND DEVELOPMENT OBJECTIVES

A. CONTEXT AT APPRAISAL

Context

1. Pakistan has experienced a number of adverse natural events including floods, earthquakes, droughts, cyclones and tsunamis, with approximately 3 million people (1.6 percent of total population) affected by natural catastrophes each year. At the time of project inception, the national cost of disaster-related damages and losses over the decade prior exceeded US$18 million. Since 1973, approximately 77 percent of all the people affected by natural disasters in Pakistan were impacted by flooding events. At project appraisal, annual economic impact of flooding was estimated between US$1.2 billion and US$1.8 billion, equivalent to 0.5 percent and 0.8 percent of the Gross Domestic Product (GDP) and between 3 and 4 percent of the Federal Budget.[1] Further, simulations showed that a major flooding event (occurring, on average, once every 100 years) could causes losses in excess of US$ 15.5 billion, equivalent to around 7 percent of national Gross Domestic Product (GDP) and 40 percent of the Federal Budget.[2]

2. After a large earthquake in 2005, country systems evolved from an ex-post disaster response perspective to an ex-ante risk management approach, with the National Disaster Management Authority (NDMA) established as the lead agency at the Federal level to coordinate disaster response. In 2010, the 18th Amendment to the Constitution of Pakistan granted provinces greater responsibility to prepare for and respond to disasters. However, there was limited clarity on functional mandates, poor capacity of disaster risk institutions, and weak operationalization of disaster management funds at the federal, provincial and district levels by the time of project appraisal.[3]

3. Punjab's population, geographic location and climatic conditions make it one of the most exposed provinces to natural disasters. Over the past 30 years, 66.6 percent of all people affected by natural disasters in Pakistan were residents of Punjab.[4] The northern regions of Pakistan are also at risk from flooding, landslides, earthquakes and avalanches because of the mountainous terrain and climatic conditions. The province of Punjab and eight Pakistan-administered northern districts (hereby referred to as the State[5]) were badly affected by floods in 2014, which resulted in over three hundred deaths and damage to 129,880 houses. The floods directly affected 2.5 million people due to inundation and/or displacement.[6] In both regions, extreme weather events routinely disrupted economic activity, impacted service delivery, reduced agricultural productivity and rural household income, and burdened the public exchequer to provide relief, recovery, and rehabilitation.

4. The National Disaster Management Authority (NDMA) conducted a detailed needs assessment following the 2014 floods and estimated the budget for resilient recovery at approximately US$440 million.[7] The report indicated that 434 embankments, water harvesting schemes, reservoirs and secondary and tertiary irrigation channels had been affected due to flooding, and proposed interventions such as flood resilient infrastructure and emergency infrastructure restoration for water channels, protection walls, and dikes. The assessment also highlighted the need for disaster risk reduction (DRR) mainstreaming, including technical assistance for Provincial Disaster Management Authorities (PDMAs) and District Disaster Management Authorities (DDMAs), trainings for allied government officials, knowledge management, and streamlining of disaster risk reduction (DRR) structures and strategies.

[1] Budget estimates taken from 2014-2015 Budget in Brief (*http://finance.gov.pk/*) exchange rate fixed at 102.
[2] World Bank. 2015. *Fiscal Disaster Risk Assessment: Options for Consideration,* Pakistan.
[3] Project Appraisal Document for Disaster and Climate Resilience Improvement Project (DCRIP), 2015.
[4] World Bank. 2015. *Fiscal Disaster Risk Assessment: Options for Consideration,* Pakistan.
[5] The State included the eight districts of Neelum, Hattian, Bagh, Poonch, Haveli, Kotli, Bhimber and Muzaffarabad.
[6] Pakistan: Flood Impact Assessment, Pakistan Economic Survey 2014-15, Ministry of Finance, Government of Pakistan, 2015.
[7] Recovery Needs Assessment and Action Framework, NDMA, Government of Pakistan, 2014.

5. The 2014 floods indicated the high level of vulnerability of people and infrastructure to disasters in Punjab and the State. Once relief operations concluded, the federal and provincial governments focused on medium- to long-term planning for disaster management, recovery, and reconstruction to increase resilience. The Government of Pakistan requested an emergency operation with the aim of improving readiness in addressing future natural disasters. The Bank's global knowledge in disaster risk management (DRM) and climate change made it an important partner in supporting the country to build knowledge, strengthen institutional capacity, and mobilize financial resources to prepare for and respond to disaster events. The Bank's previous experience in financing disaster risk management (DRM) capacity and institutional development projects in Pakistan provided important lessons for the Disaster and Climate Resilience Improvement Project (DCRIP, or the project).

6. The project was prepared in coordination with the Asian Development Bank (ADB) to determine medium- to long-term recovery, reconstruction, and resilience strategies for both Punjab and the State. Asian Development Bank's (ADB) engagement with the Government of Pakistan included rehabilitation and reconstruction of damaged provincial roads, irrigation infrastructure, and livelihood restoration efforts as well as technical assistance to relevant agencies, with the aim of increasing resilience.[8]

Theory of Change (Results Chain)

7. The project was appraised in 2014 when Bank preparation did not require an explicit Theory of Change; the Theory of Change was thus developed retrospectively for this assessment. The graphic for project interventions and their contribution to the Project Development Objective (PDO) is presented below.

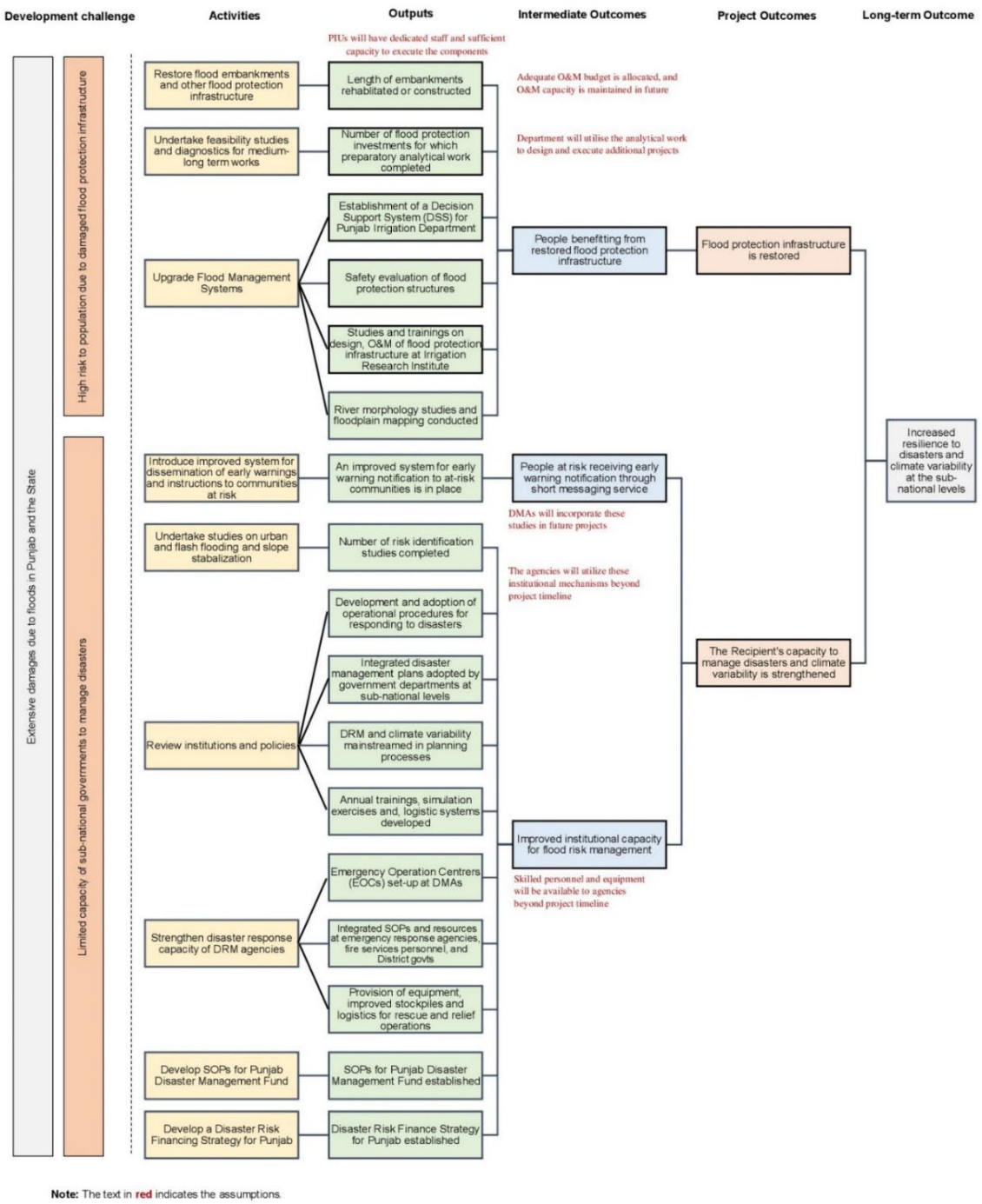
8. In the short-term, the project would rehabilitate damaged flood protection infrastructure, and upgrade flood management systems to enhance physical resilience of risk areas. An early warning notification system would reduce the risk of hazards faced by high-risk populations. These initiatives would be reinforced by institutional strengthening, capacity building and knowledge generation. Project outcomes would support the long-term objective of increased resilience to disasters and climate variability in Punjab and the State. Achieving this long-term objective would require sustained effort, financing, and capacity building.

9. The Theory of Change was formulated using the following critical assumptions: (a) the implementation agencies (IAs) - Project Implementation Units (PIUs) - will have dedicated staff and sufficient capacity; (b) adequate operations and maintenance (O&M) budget will be allocated and O&M capacity will be maintained by sub-national governments in the future; (c) relevant government departments will utilize the analytical work to design and execute additional projects; (d) Disaster Management Authorities (DMAs) will incorporate risk identification studies in future projects (e) government agencies will utilize the established institutional mechanisms beyond project timeline; and (f) skilled personnel and equipment will be available to government agencies beyond project timeline.

Figure 1: Theory of Change

Problem Statement: Extensive risk of flooding at sub-national levels requires moving beyond reactive approach to medium- and longer-term planning for recovery, reconstruction, and resilience.

[8] Project Appraisal Document for Disaster and Climate Resilience Improvement Project (DCRIP), 2015.



Note: The text in **red** indicates the assumptions.

Project Development Objectives (PDOs)

10. The objectives of the project are: (i) to support restoration of flood protection infrastructure; and (ii) to strengthen the Recipient's capacity to manage disasters and climate variability.[9]

[9] The PAD describes the PDO as follows: "The project aims to support restoration of flood protection infrastructure and strengthen government capacity to manage disasters and climate variability", May 20, 2015.

Key Expected Outcomes and Outcome Indicators

11. There were two key project outcomes: to restore flood protection infrastructure to resilient standards in Punjab and the State which would mitigate risks from future hazards; and to increase capacity to identify, manage and respond to disasters and climate variability at sub-national levels through technical assistance and institutional strengthening of disaster management and irrigation authorities. The PDO-level results indicators were:

    - Direct project beneficiaries;
    - Female beneficiaries;
    - Number of people benefitting from restored flood protection infrastructure through the project;
    - Number of people at risk receiving early warning notifications through mobile short messaging service; and
    - Improved institutional capacity for flood risk management.

Components

12. **Component 1: Restoring Flood Protection Infrastructure and Upgrading Flood Management Systems** (Appraisal Cost: US$100 million; Actual Cost: US$89.3 million). This component was devised to support three activities, with US$80 million for Punjab and US$20 million for the State.

    - Sub-component 1.1: Flood Protection Works – financed the restoration of flood protection infrastructure damaged during the 2014 floods in Punjab and the State through the Punjab Irrigation Department (PID) and the State Planning and Development (P&D) Department, respectively. Investments included a) restoration of flood embankments to resilient standards, and b) rehabilitation of other infrastructure such as spurs, and river channelization works.
    - Sub-component 1.2: Feasibility Studies and Diagnostics for Medium-Long Term Works – financed preparatory activities (feasibility studies, consulting services for surveys, designs, environmental and social impact assessments, etc.) for proposed medium-long term investments for flood protection in Punjab and the State.
    - Sub-component 1.3: Upgrading Flood Management – supported Punjab Irrigation Department (PID) in implementation of non-structural measures, including: (a) establishment of a Decision Support System (DSS); (b) safety evaluation of flood protection infrastructures; (c) supporting the Irrigation Research Institute to undertake studies/trainings; and (d) river morphology studies and floodplain mapping of selected eastern rivers.

13. **Component 2: Managing Disasters and Climate Variability** (Appraisal Cost: US$17 million; Actual Cost: US$20.1 million).[10] This component supported activities to strengthen government's capacity to better manage disasters and climate variability, with US$14 million for Punjab and US$3 million for the State.

    - Sub-component 2.1: Disaster and Climate Risk Identification – (a) studies on urban and flash flooding in Punjab; and (b) slope stabilization studies in the State.
    - Sub-component 2.2: Institutional Strengthening for DRM and Climate Variability – (a) institutional and policy review; (b) strengthening of disaster management authorities (DMAs) down to district level and improving early warning systems; (c) mainstreaming DRM and climate variability aspects in the planning processes in collaboration with Planning & Development Department (P&D), Punjab.
    - Sub-component 2.3: Fiscal Resilience – (a) development of a Disaster Risk Finance Strategy; (b) development of an appropriate governance structure, standard operating procedures (SOPs), fiduciary safeguards and controls, and transparent allocation criteria for the Punjab Provincial Disaster Management Fund; (c) development of a standard emergency cash transfer system in collaboration with the Provincial Disaster

[10] The actual cost is higher than the appraisal value as US$4 million (SDR 2,668,500) was reallocated from Category 1 - expenditures by PID to Category 3 - expenditures by the State P&D Department under the first project restructuring.

Management Authority (PDMA) and Punjab Social Protection Authority (PSPA).

14. **Component 3: Project Management** (Appraisal Cost: US$8 million; Actual Cost: US$5.1 million). This component financed the Project Implementation Units (PIUs) within PID and Punjab Disaster Management Authority (PDMA) - cumulatively US$6 million – as well as the State P&D Department (US$2 million), to support project implementation.

15. **Component 4: Contingent Emergency Response** (Appraisal Cost: US$0 million; Actual Cost: US$0 million). This allows the government to request reallocation of Bank financing from other project components and/or channel additional funds to partially cover emergency response and recovery costs. The component was not activated.

B. SIGNIFICANT CHANGES DURING IMPLEMENTATION

Revised PDOs, Outcome Targets and PDO Indicators

16. The PDO and PDO indicators were not revised during implementation.

Revised Components

17. Overall components and sub-components were not revised during implementation. The activity and associated indicator 'Establishment of a Decision Support System (DSS) at PID' under sub-component 1.3 were dropped.[11]

Other Changes

18. The project underwent three Level 2 restructurings:

- **First project restructuring (23 September 2019):** (a) the closing date for the project was extended by 13 months from December 1, 2019 to December 31, 2020; (b) the activity and corresponding Intermediate Results Indicator (IRI) 'Establishment of a Decision Support System at PID' under Component 1 was dropped; and (c) US$4 million (SDR 2,668,500) was reallocated from 'Category 1 of Expenditures by PID' to 'Category 3 of Expenditures by State P&D Department'.
- **Second project restructuring (9 December 2020):** The closing date of the project was extended by another 11 months from December 31, 2020 to November 30, 2021.
- **Third project restructuring (30 November 2021):** Partial cancellation of project savings worth US$8 million (SDR 5,739,292.63 million) was completed based on the request from Government of Pakistan. This restructuring related to project savings which resulted from exchange rate gains, differences between the estimated and actual costs of activities, and cancellation of minor activities.

19. The COVID-19 pandemic posed an unprecedented challenge for sub-national governments. Project financing of US$7.74 million was utilized to support the emergency response efforts in both Punjab and the State, including US$5 million from PID, US$2 million from Punjab Disaster Management Authority (PDMA) and US$0.74 million from State financing. The Contingent Emergency Response Component (CERC) was not triggered as responding to the COVID-19 emergency was aligned with project scope and PDO.

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

20. As this was an emergency project, there were significant initial delays in setting up of PIUs. The primary bottleneck for implementation was that an umbrella PC-1 had been approved by the government under a framework approach, which required the preparation and approval of individual PC-1s for each sub-project during implementation. The process was further prolonged following the 2018 general elections in Pakistan, as there were significant delays in obtaining necessary approvals. Collectively, these led to a lag in expected financial utilization and physical progress, requiring an extension to bring the civil works and activities to an orderly closure. Further, given the high-level

[11] Disclosable Restructuring Paper - Disaster and Climate Resilience Improvement Project - P154036, September 2019.

ownership and renewed commitment from government to expedite implementation, fill capacity gaps, and process internal approvals on time, there was potential for fuller achievement of the PDO and results indicators with a 13-month extension (December 31, 2020).

21. The activity and corresponding Intermediate Results Indicator (IRI) for establishment of DSS was dropped due to prolonged delays and change in priorities of the Flood Risk Assessment Unit at PID. It was in administrative approvals for 18 months prior to cancellation.

22. US$4 million in uncommitted financing was reallocated from PID to the State component due to cancellation of the DSS activity and savings due to exchange rate depreciation. The strong implementation progress of the State P&D Department and the identification of additional critical resilience building interventions which could be implemented within the extended project period also contributed to the decision.

23. To compensate for the unexpected implementation delays due to COVID-19, the project closing date was extended for a second time by 11 months to November 30, 2021, cumulatively 23 months and 29 days from the original closing date. The project closed with a cancellation of US$8 million credit due to cost savings. Overall, a disbursement of US$115.65 million was achieved against the approved amount of US$116.98 million.[12] These changes did not alter the long-term outcome of the project or the PDO.

II. OUTCOME

A. RELEVANCE OF PDOs

Assessment of Relevance of PDOs and Rating

24. At approval and closure, the project was consistent with World Bank's Pakistan Country Partnership Strategy (CPS) for 2015-19[13] as it supported and further improved the country's DRM capacity and reduced vulnerability of the poorest to disasters. Specifically, DCRIP aligned with Outcome Indicator 3.3 "Increased Resilience to Disasters in Targeted Regions" under Result Area 3 "Inclusion". Further, by committing to development of provincial and district level disaster management plans and institutional strengthening for government agencies, the project aligned with Country Partnership Strategy (CPS) objectives to increase the number of provinces with (i) DRM plans, (ii) improved disaster management, and (iii) early warning systems.

25. The project addressed the CPS agenda on climate change. The second theme – deepening engagement at the province level – was addressed through support to government entities of Punjab and the State for disaster resilience at the district level. In addition, the third crosscutting theme – climate change adaptation and mitigation in public and private sectors – was addressed because climate adaptation and disaster resilience are core themes in reducing vulnerability and improving preparedness towards disaster and climate related emergencies.

26. The project was in line with Pakistan's Vision 2025 development strategy to achieve sustained and inclusive economic growth – a focus on resilience would prevent fiscal shocks from disasters which restrain sustained growth. Another priority area for the Government was institutional reform which was addressed through technical assistance components for both Punjab and the State. DCRIP also addressed Government of Punjab's focus on agriculture through improved flood management infrastructure to help mitigate loss of agricultural productivity due to flooding events.

[12] There is a minor discrepancy between the disbursed amount (US$115.65 million) and actual cost (US$114.56 million) at this stage as the financial closing is ongoing. Once finalized, the total costs shall equal project disbursement.

[13] The CPS was extended to FY20 by the Performance and Learning Review, Report No. 113574. The new CPF for Pakistan will outline the strategic priorities from 2022-2026.

27. **The relevance of PDO is rated High.** The PDO remained aligned to the CPS and to national concerns on DRM. It also supported the Bank's long-term engagement with Pakistan's disaster resilience sector. There were no shortcomings and the operation provided clear evidence of the alignment of PDOs to the current CPS objectives.

B. ACHIEVEMENT OF PDOs (EFFICACY)

Assessment of Achievement of Each Objective/Outcome

28. The PDO was to assist the Borrower with restoration of flood protection infrastructure (Objective 1) and to strengthen the Recipient's capacity to manage disasters and climate variability (Objective 2). The PDO was specific and was appropriately measured through five indicators (refer to paragraph 11).

29. The total beneficiaries directly benefitting from the project (PDO Indicator 1) were 9,391,391 - over four times the original target of 2,000,000. This included (i) 4,381,011 beneficiaries from completed civil works (PDO Indicator 3), (ii) 2,02,000 beneficiaries of COVID-19 support and (iii) 2.98 million individuals benefitting from early warning messages (PDO Indicator 4). Female beneficiaries (PDO Indicator 2) at project closure were 4,646,436 - over four times the original target of 1,000,000. The assessment of total beneficiary population is elaborated in Annex 7.

Objective 1: Support Restoration of Flood Protection Infrastructure

30. 400.41 kilometers of flood protection infrastructure was rehabilitated in Punjab and the State (IRI 1), including embankments, flood bunds, approach embankments, spurs, studs, etc. The flood embankments were restored to resilient standards following guidelines by the Federal Flood Commission and as specified in the Manual of Irrigation regarding embankment top width, side slopes, free board, and flood levels. Originally, 17 flood protection works were planned for Punjab and 34 for the State; however, as a result of project savings, a further 5 and 17 subprojects were proposed, respectively. Therefore, a total of 73 civil works were undertaken through this project with 22 in Punjab (380.52 kilometers) and 51 in the State (19.89 kilometers). The project fell short of achieving the 500-kilometer rehabilitation IRI target set under the Results Framework (RF) during the Mid-Term Review. This is because the targets were approximated and some of the originally envisioned civil works could not be undertaken following technical, social and/or environmental assessments. However, a greater number of works were completed (albeit of lesser length), benefitting over 4.38 million individuals (PDO Indicator 3), including 2.2 million women.

31. In the State, restoration work included fencing work for protection of water channels, repair of powerhouse approach roads and channel beds, and lining work at power channels, reducing vulnerability of powerhouses to floods and improving resilience of electricity supply in the State. Following such interventions, loadshedding reduced from 8 hours to maximum of 3 hours a day, power voltage increased from 160 to 220 volts, daily generation losses decreased, and State revenues increased by up to 25 percent (PKR 150 million). Further, power channel rehabilitation at Qadirabad and Rehra hydel power stations alone increased generation capacity from 0.293 megawatts to 1.371 megawatts, with an additional PKR 9.38 million added to the State exchequer.[14]

32. Overall, the rehabilitation efforts reduced losses and damages due to floods. The monsoon flooding in 2019 damaged 239 houses, resulted in 69 deaths and injured 54 individuals in Punjab and the State compared to the 129,880 houses damaged and 367 deaths in the 2014 flooding. While the scale of this flooding was not at 2014 levels,[15] the impact

[14] Outcomes Assessment Report of DCRIP Interventions in District Bagh and Haveli, State PIU, July 2020.

[15] In 2019, monsoon rainfall for the State and Punjab was 226.9 millimeters and 221.1 millimeters, respectively. In contrast, during the 2014 floods, the city of Lahore, Punjab alone received 432 millimeters of rainfall in three days whereas Palandri city in the State received 313 millimeters of rainfall in 24 hours. According to the Pakistan Meteorological Department, the 2014 monsoon rainfall was the second highest for the State and fourth highest for Punjab since 1961.

in project regions was much less compared to other provinces such as Sindh and Khyber Pakhtunkhwa.[16] In Punjab alone, the project has saved approximately 0.5 million acres of land (including 0.34 million acres of agricultural land), 432 settlements, public and private infrastructure, trees, as well as over 10,000 livestock from future flooding impacts. Furthermore, focus group discussions with targeted communities in the State indicate that property values around project sites have also increased as locations have been protected from future flooding and associated risks – in Chehla Bandi, Muzaffarabad and Bani Pansari, Bagh there was an estimated twelvefold increase in land prices.[17]

33. The project also introduced government departments to new techniques and approaches for flood protection such as the use of sheet piling for embankment stabilization, which is in line with the principles of building back better. Sheet piling was used in ADB and World Bank project sites where no additional bank or bed movement was acceptable. It has a quick installation process, requires little maintenance, can withstand high pressures, and ensures safety against internal erosion and seepage. Steel sheet piling was used at the Nawabpur Flood Bund, Shujaabad Main Canal, and Taunsa Left Marginal Bund by PID, saving over 39,000 acres of agricultural land, 110 settlements, structures worth PKR 490,000, and preventing relocation of 49 individuals. Further, approximately 371 structures, including housing units, cattle sheds, and shops fell under the Corridor of Impact[18] (CoI) of flood embankments and would have had to be demolished under original project designs. Alternative techniques and approaches – such as decreasing the width of embankments, limiting expansions, reducing slopes, and introducing safety bunds and rubble masonry walls – protected these structures from demolition and future flood damages, saving approximately PKR 25 million and preventing relocation of 2,597 individuals. Rehabilitation work also created an enabling environment for livelihood generation in Punjab and the State. For example, in Balloki, Punjab the reconstruction of embankments and adjoining ramps and roads protected 9,090 acres of agricultural and residential land. Residents were able to reclaim previously inundated agricultural land and rehabilitate damaged houses, drainage, and sanitation systems as well as access paths which improved farm to market accessibility.

34. 5 preparatory analytical works were also undertaken by PID and State PIUs for proposed medium-long term investments against a target of 4 (IRI 2). This includes a feasibility study and design for flood protection of Kotli Mandi City and other vulnerable areas in the State. Exchange rate gains and project savings allowed for additional preparatory studies to be undertaken which supported the construction of over 28 kilometers of flood protection infrastructure through project financing, saving over 127,900 acres of land, protecting 206 settlements and 8 structures worth PKR 560,000, and benefitting 670,452 individuals, contributing directly to PDO 1.

35. Support was also provided through non-structural measures to enhance flood management capabilities of PID. ICT and technical equipment were provided to PID's new Water Resources Division. Supporting the operationalization of this division to undertake integrated water resource management enhanced PID's capacity for flood mitigation and contributed to the achievement of PDO 1. A key activity on establishment of DSS as well as studies on river morphology and floodplain mapping were deleted from the scope of the project.

36. The PID was also provided instruments for its Hydraulic Structure Safety Evaluation Unit, including a hydrographic survey boat, computers, and related hardware. These have strengthened the Unit's capabilities to assess the structural safety of flood protection works, including conducting hydrographic surveys and data analysis.

37. Procurements were also undertaken for the Irrigation Research Institute –including deep well inspection cameras and water monitoring units – to improve operations and maintenance of flood protection infrastructure along with better management of future climate impacts. The PID field units were also equipped with 152 flood fighting vehicles

[16] Monsoon 2019 Daily Situation Report No. 048, National Disaster Management Authority, Government of Pakistan.
[17] Outcomes Assessment Report of DCRIP Interventions in District Bagh and Haveli, State PIU, July 2020.
[18] Refers to the minimum land width required for construction including embankments, facilities, and features such as approach roads.

to strengthen the department's on-ground flood mitigation and response capacity during future flood emergencies.

38. 104 male and 4 female PID irrigation engineers - including Executive Engineers, Superintending Engineers, and Chief Engineers - were provided general and specialized capacity building trainings (project management, procurement, and financial management etc.). A post-training survey indicated that 89 percent of participants were satisfied with the training content and said that it increased their confidence and motivation levels. Furthermore, on Bank's guidelines, standard operating procedures (SOPs) for combating COVID-19 were prepared and disseminated amongst contractors, including relevant trainings. In the State, 184 individuals were provided trainings related to DRR policies, geographic information system (GIS) analysis, information technology (IT) and monitoring and evaluation (M&E). These have enabled government officials to better perform their functions and will reduce dependency on external resources in the future.

Objective 2: Strengthen the Recipient's Capacity to Manage Disasters and Climate Variability

39. It was anticipated that at project completion 500,000 people at risk would receive early warning messages for all types of disasters against a baseline of 50,000 (PDO Indicator 4). This target was surpassed as PDMA Punjab's contact database was upgraded to include geo-referenced contact details of 1.8 million at-risk individuals, with a minimum outreach of 2.98 million individuals.[19] Early warning messages are sent directly to mobile phone users in exposed areas which enables them to take precautionary measures such as storing essential commodities or relocation, helping the government avoid human and material losses. For example, during the 2019 floods, 30,000 early warning text messages were issued to targeted vulnerable communities in Kasur resulting in the evacuation of approximately 9,000 individuals. In total 6,146,976 early warning messages were disseminated during the project lifetime for a wide spectrum of shocks across Punjab. During the project lifetime, procurement of services from telecom companies for text messages dissemination was completed through DCRIP finances; however, future financing will be undertaken through Government of Punjab's annual allocation of PKR 1 billion for disaster response, thereby ensuring sustainability of this intervention. Further, DCRIP also improved institutional capacity for flood risk management (PDO Indicator 5) by creating an institutional mechanism for disaster response and developing SOPs for the Punjab Disaster Management Fund (PDMF).

40. 12 studies on identifying the disaster and climate risk environment were also undertaken, against a target of 4 (IRI 1), to support optimal utilization of risk information for informed planning and decision-making at the sub-national levels. These included a climate change study in Punjab as well as mapping of major nullahs and tributaries for flood warning and mitigation in the State. Such studies supported PDO 2 by increasing the knowledge base on disaster and climate variability, identifying vulnerable areas, and supporting the development of emergency logistic and DRM plans. Further, the Bank also supported PDMA with the development of Multi-hazard Vulnerability and Risk Assessments (MHVRA) for selected districts of Punjab where information on hazards was gathered and analyzed to develop future scenarios of hazardous events, including their frequency, magnitude, and spatial extent. DCRIP also supported the printing and dissemination of MHVRA studies for 15 districts, which raised awareness and helped district administrations in developing DRM plans and devising strategic and cost-effective evacuations for at-risk communities. Originally planned studies on urban and flash flooding in Punjab and slope stabilization in the State were not undertaken as client priorities evolved during project implementation.

41. The project also financed capacity assessment plans for the State Disaster Management Authority (SDMA), the Land Use Plan (LUP) at State P&D Department as well as for PDMA and district-level DMAs in Punjab. These plans engaged relevant stakeholders in mapping existing skills against desired capacities, highlighted assets and needs, and identified areas for further strengthening. Some identified gaps were addressed under capacity development

[19] Figures based on data provided by PDMA Punjab.

trainings organized through project financing (refer to paragraph 45).

42. Through the project, the DMAs in both Punjab and the State were also assisted with the development and adoption of operational procedures for responding to disasters (IRI 2). Provincial and district level DRM Plans were introduced by the State and Punjab DMAs which increased the ability of the government apparatus to absorb, accommodate and recover from disasters and climate variability. By focusing on prevention, preparedness, response, rehabilitation and recovery, the DRM plans supported mainstreaming of disaster management at the sub-national levels. The Punjab provincial DRM plan was approved by PDMA Punjab whereas district DRM plans were approved by the district DMAs. In the State, the DRM plans were approved and notified by the Disaster Management Commission.

43. Effective disaster management requires the use of latest technologies to improve predictions, maximize efficiency in response and assess damages. Necessary goods and equipment were procured to enable DMAs in Punjab and the State to better undertake their responsibilities – including reduced damages and improved response time - for a wide-range of emergencies experienced during project lifetime and beyond. By supporting procurement of a mobile communication office for PDMA Punjab, the project enabled proper monitoring of relief and rescue operations in remote areas, undertaking of public service announcements, and dissemination of key awareness messages to the public. The project also supported PDMA Punjab to update its equipment by procuring 72 breathing apparatus, 36 hydraulic concrete chainsaw, 36 hydraulic combi tools, 8 water bowsers, 6 fiber optic cameras, a geographic information system (GIS) mapping device, a search and rescue drone, 2 fire fighting vehicles, 6 earthquake and disaster search and rescue vans, and 9 water rescue units. Such equipment will support the PDMA to identify vulnerable communities, save lives during rescue missions and understand the scope of damage due to various disasters in the province. Further, by procuring 4 Digital Satellite News Gathering (DSNG) vans, DCRIP has enabled PDMA Punjab to share real-time district data with the center during disaster events and support rescue operations.

44. The State government lacked the proper equipment to deal with the magnitude of emergencies it faces each year. Through the project, equipment was purchased for State Disaster Management Authority (SDMA) and 10 district DMAs, including 17 fire tenders, 12 water bowsers, 11 ambulances, 3 cranes, and 12 small fire tenders. In the State, a major fire incident occurred in Neelum District where shops built with wooden material caught fire, and due to the presence of a local fire tender procured through DCRIP, the fire was put out in a timely manner by the District Disaster Management Center (DDMC). Further, there was an incident of collapsed buildings due to an earthquake in the Jatlaan Area of Mirpur District where a rescue operation was conducted by a crane procured through the project for the District Disaster Management Center (DDMC). Following the capacity assessment of Land Use Plan (LUP), at the State P&D Department, it was observed that the department had limited equipment and technical expertise to monitor the rapidly expanding urbanization, disaster risks and other vulnerabilities. Therefore, soil testing equipment, high resolution satellite imageries and information technology (IT) equipment was procured to improve LUP's capacity for DRM. The equipment was then utilized to prepare digital maps, assess land use patterns, and undertake land suitability classification, which are now available on the department website.

45. Trainings were also imparted in both Punjab and the State to support institutional strengthening of government line departments. Through DCRIP, PDMA Punjab's GIS teams were trained to use the inundation model to simulate flood extents, highlight areas to be inundated and identify villages that fell in the hazard zone. This proved important during the 2019 flooding, when pre-flood messages were sent to at-risk communities and response time to the disaster was reduced. The PDMA IT team was also trained to use the GIS-based applications and successfully managed Food and Agriculture Organization's (FAO) surveillance and monitoring dashboard for the locust emergencies. In addition, through trainings by PIU, PDMA also developed and maintained apps on philanthropic donations, locust monitoring and smog reporting. Additionally, community-based DRM training was also provided to 225 government officials to enhance management capacity at the grassroots level. In the State, initiatives included an exposure visit to Sri Lanka on procurement rules, job orientation training for 54 newly recruited district DMA staff, and training on DRR planning

to 23 government officials.

46. In Punjab, resources were allocated to strengthen the DRM capacity of PDMA, including utilization of technology to strengthen emergency operations. A state-of-the-art Emergency Operation Center (EOC) was established at the PDMA Headquarters which is a major step towards modernizing the disaster management capabilities of PDMA. The center serves as a hub for data collection, processing, and dissemination in real-time with the key objective to facilitate informed decision making. It also functions as a research center to analyze, propose, control, and manage different phases of disaster response. The information and outreach of Emergency Operation Center (EOC) was ensured through the establishment of downstream District Emergency Operation Centers (DEOCs) across all 36 districts. The District Emergency Operation Centers (DEOCs) provide critical grassroots level disaster management, including 24/7 monitoring and reporting as well as rapid response for hazard situations, and have also empowered District DMAs to consolidate their disaster management services. The establishment of such a comprehensive top-to-bottom coordination infrastructure with last mile outreach has transformed the disaster management and response capabilities of PDMA. Through this intervention, Punjab has led the transition to a data and technology driven DRR architecture - which served as a model for the Khyber Pakhtunkhwa province - while also promoting inter- and intra-provincial coordination for DRR and climate change. Similar EOCs were also established at the center and 10 districts of the State.

47. The capability of EOCs to swiftly collect, analyze and respond to real time data on disasters was demonstrated during the COVID-19 outbreak. GIS based 'heat maps', situational trend analysis, situation reports, multiple emergency alerts (via text messages and social media updates) were generated for public and media outreach. This stream of emergency communications facilitated real-time monitoring of the COVID-19 outbreak across all 36 districts of Punjab. Moreover, the data collected from districts provided robust support for other government initiatives such as emergency disbursement of various cash assistance programs and relief activities.

48. Through DCRIP, PDMA Punjab also established 700 Village Emergency Loss of Livelihoods Reporting and Facilitation Centers (VERFCs) as a flagship initiative at the sub-district and village levels to support effective decentralized decision making, disaster response and information dissemination in the wake of natural calamities. These centers will collect First Information Reports (FIR) during disasters at the community level and digitize this data to provide access to real time information through PDMA's control rooms for District Administration, district law enforcement agencies and other disaster response agencies. During the pandemic, the Village Emergency Loss of Livelihoods Reporting and Facilitation Centers (VERFCs) were used to collect data on COVID-19, disseminate information to health centers, and allocate need-based resources to the local communities. This increased the efficiency of government operations by reducing operational burdens for urban centers, improving response times, and enhancing coordination between and across government departments for effective response.

49. Interventions under the project have evolved PDMA Punjab and SDMA into frontline departments for emergency response. During the 2019-2020 locust outbreaks, PDMA proactively developed an action plan and supplied 02 bowsers procured via DCRIP to field operation teams to ensure uninterrupted clean water supply. For its efforts, PDMA gained strong recognition by FAO. Further, during the smog calamity in 2020, data from PDMA's smog application was used to prepare daily reports for senior leadership of district governments. The early warning portal was also used to instruct brick kiln operators to convert to 'zig-zag' technology; consequently, conversion of around 6,000 brick kilns was reported.[20]

50. During COVID-19, necessary goods and services were swiftly procured through DCRIP to provide requisite support to government departments in dealing with the crisis. Procurement of medical equipment, personal protective

[20] DCRIP Aide Memoire, November 2021.

equipment (PPE), ambulances, and IT equipment (such as video conferencing systems) ensured smooth functioning of the government apparatus during this emergency. Through the systems established via DCRIP, DMAs were able to provide robust support to respective health departments, district administrations and other involved agencies, augmenting the capabilities of the health infrastructure to cope with the pandemic emergency. Further, personal protective equipment (PPE) was distributed to all line departments and district administration to ensure compliance with COVID-19 standard operating procedures (SOPs), benefitting 89,520 individuals. High Dependency Units were also established in all 36 districts of Punjab to provide healthcare facilities to COVID-19 patients.

51. DCRIP also aimed to help manage the significant contingent liability arising from natural catastrophes and address the financing gap for post-disaster emergency response and reconstruction in Punjab. The project supported the Finance Department Punjab and PDMA with the development of the Disaster Risk Finance Strategy and SOPs for the Punjab Disaster Management Fund (PDMF) (IRI 3). Operationalization of the strategy and fund will provide immediate resources to the Punjab government in the aftermath of a disaster and establish a mechanism for emergency cash transfer in the province during relief and recovery phase. Additional interventions related to fiduciary safeguards and controls, governance structure and allocation criteria were not pursued due to evolving priorities of the Finance Department Punjab. Similarly, the proposed intervention for emergency cash transfer was not implemented as the federal government introduced an umbrella social protection program called Ehsaas which included a cash transfer window.

Justification of Overall Efficacy Rating

52. **The overall efficacy rating is Substantial.** In terms of outcomes, the project almost fully achieved – and in some respects exceeded - its objectives of restoring flood protection infrastructure and strengthening the Recipient's capacity to manage disasters and climate variability. The project exceeded targets set for the number of beneficiaries, including female beneficiaries, the number of people at risk receiving early warning messages as well as the number of analytical works and risk identification studies undertaken. Further, the project also met targets of improved institutional capacity for flood risk management, development, and adoption of operational procedures for responding to disasters at the central and district levels, and establishment of SOPs for PDMF. The successes from the project moved beyond flood management to include other disasters such as heatwaves, smog, locusts, fire, earthquakes, and the COVID-19 pandemic, with positive results, highlighting enhanced capacity in Punjab and the State. All but one of the results targets at the component level were met or exceeded; the intermediate result target related to 'length of embankment rehabilitated or constructed' was not fully achieved as some proposed civil works were cancelled following feasibility assessments, yet it has a significant achievement of 80 percent.

C. EFFICIENCY

Assessment of Efficiency and Rating

53. The project generated substantial economic returns in the form of life saving, reduced risk of injuries, lesser land erosion, fewer losses of crops and livestock, resilient physical infrastructure, easy mobility, trained personnel equipped with state-of-the-art instruments to better perform their jobs, appreciation of land value for the vulnerable segment, rehabilitation of water schemes and other infrastructure, and expanded economic activity due to the multiplier effect of project spending. Some of the benefits of the project can be quantified, while others, especially related to systemic improvement and soft interventions, like research and information dissemination, are difficult to measure. The PAD included economic analysis based on easily quantifiable economic returns like lifesaving, reduced injuries, reduction in damage to physical infrastructure, and value of rebuilt assets. For the Implementation Completion and Results Report (ICR), efficiency analysis covers a greater scope of project interventions due to increased availability of data at the end of project life. Though no comparable statistics are available for disaster related losses in pre and post project periods, the number of direct project beneficiaries is quite high at 9.4 million,

with equitable gender divide. Therefore, the benefit-cost ratio found under the Implementation Completion and Results Report (ICR) is much higher than at the appraisal stage.

54. The benefit-cost ratio of the project has been estimated in the range 13.1 to 30.9 with an average value of 22.[21] Fourteen different benefits, aligned with the project's objectives, have been identified and then estimated using available data based on certain assumptions. In aggregate, the project is expected to generate economic benefits, in present value terms, in the range US$1.5 – 3.5 billion. Comparing these benefits with the cost, US$114.6 million, the benefit-cost ratio of the project has been estimated in the range 12.8 to 30.3, which is quite reasonable to justify the Bank's funding. Further details have been provided in Annex 4.

55. The project faced delays in implementation, but the extended project timeline allowed for overachievement of certain targets. Initially, the project amount was US$125 million to be disbursed in four years with an original closing date of December 1, 2019. However, due to initial procedural hindrances, political changes, approval delays and the COVID-19 pandemic, the project was finally closed on November 30, 2021. The PIUs faced unnecessary and lengthy approval processes, specifically in the hiring of a Third-Party Monitoring & Validation (TPV) firm in Punjab and procurement of vehicles and other instruments. Nevertheless, implementation was accelerated towards the end of the project lifetime allowing for overachievement of most PDO indicators. The implementation lag resulted in delayed benefits of approximately US$122 million, as risk-exposed people remained vulnerable for extra time. This opportunity cost could have been avoided by the timely completion of the project; however, delays due to the COVID-19 pandemic were unavoidable. The cost of delayed implementation was observed in terms of prolonged vulnerabilities in target areas that could have been mitigated through the project's early implementation.

56. Cancellation of minor activities and exchange rate depreciation caused divergence between estimated and actual costs leading to project savings. The bulk of project savings were due to the massive depreciation of PKR against US$.[22] DCRIP was able to utilize most savings towards additional activities resulting in greater benefits but US$8 million in unutilized financing was cancelled. Moreover, most activities under the project were clustered near project completion date which delayed materialization of benefits.

57. **The overall efficiency rating is Substantial**. The project exhibited a high benefit-cost ratio indicating good value for money. The estimated final benefits are even higher than those at the appraisal stage, largely due to the availability of data on a greater number of benefit types at the time of writing the ICR. However, the project faced delays in implementation due to a mix of unavoidable and avoidable factors and cancellation of some minor activities. The overall efficiency is what would be expected in the operation's sector.

D. JUSTIFICATION OF OVERALL OUTCOME RATING

58. **The overall outcome rating is Satisfactory** based on the project's high relevance and substantial efficacy and efficiency. The project succeeded in restoring damaged flood protection infrastructure and strengthening the Recipient's capacity to manage disasters and climate variability at the sub-national levels. This was evident by the length of embankments constructed, the number of direct project and early warning messaging beneficiaries on project closure, as well as the improved institutional capacity for flood risk management in both Punjab and the State. The project was able to extend its scope beyond flood resilience to strengthen the response of DMAs to a range of emergencies including COVID-19 and achieve or exceed all but one of its results targets. It faced minor challenges in operational achievement, including delays in implementation, a two-year extension, and dropping of

[21] Economic benefits have been estimated for 10 years after the project completion. Present values of physical assets and economic activity have been found using 5% discount rate, while discount rate for human related benefits has been adjusted for population growth. Exchange rate for the analysis has been used PKR175/USD.
[22] The exchange rate was around PKR/US$ 100 at the start of the project, while it was around PKR/US$175 on completion.

some initially planned investments under the framework approach due to evolving government priorities.

E. OTHER OUTCOMES AND IMPACTS

Gender

59. Efforts to address gender gaps under DCRIP included (a) undertaking interventions that benefited both men and women; (b) ensuring gender dimensions were considered in studies, civil works and DRM plans; (c) consulting women during community-based interventions; (d) ensuring female participation in trainings; (e) considering gender parity when hiring for VERFCs in Punjab; and (f) monitoring and reporting gender-bifurcated data for beneficiaries under project M&E. Inclusion of women, especially in stakeholder consultations, resulted in better social acceptability of project schemes. Through DCRIP, over 4.6 million women benefited under various interventions.

Institutional Strengthening

60. Institutional strengthening was a major area of intervention under Component 2 as adequately managing disasters requires extensive knowledge, planning skills and response capacities. The activities supported the technical and managerial capacity enhancement of the implementation agencies (IAs) - PID, PDMA, P&D - as well as associated government departments (LUP, SDMA) in Punjab and the State. During preparation and implementation stages, the project also benefitted from technical support by the World Bank team, including application of relevant best practices. Details on specific interventions have been presented under the Efficacy section.

Poverty Reduction and Shared Prosperity

61. During disasters, the poor and vulnerable are often disproportionately affected as disruption of economic activities, destruction of assets and loss of lives, often induce and exacerbate poverty.[23] Project interventions improved the resilience of flood protection infrastructure, leading to safety and socioeconomic benefits for predominantly disadvantaged communities in rural areas. The project protected over 400 major settlements in Punjab and saved over 371 structures – including houses, shops, and cattle sheds - as well as 2,597 individuals from relocation while improving their safety and resilience to disasters and climate variability. Protection of 0.34 million acres of agricultural land, construction of 358 kilometers of all-weather roads and 359 ramps (11 kilometers) also provided economic benefits to nearby populations. For civil works, local skilled and unskilled labor, machinery, and earth materials were used which increased economic benefits for these areas. Further, capacity enhancement of DMAs in Punjab and the State enabled them to respond more swiftly during disasters, reducing the loss of lives and damages. The early warning system also allowed at-risk communities to prepare for disasters or evacuate from affected regions, leading to positive externalities in terms of poverty reduction and shared prosperity in these regions.

III. KEY FACTORS THAT AFFECTED IMPLEMENTATION AND OUTCOME

A. KEY FACTORS DURING PREPARATION

62. **Emergency Context:** Following the 2014 floods, the project was prepared as an emergency operation at the request of the Government of Pakistan to increase resilience of affected regions through infrastructure and non-structural approaches. The task team was therefore required to deliver under accelerated timelines. Preparation was aligned with the Jhelum and Tawi Flood Recovery Project (P154990), as this was prepared in parallel and presented jointly for Board approval. This required the task team to coordinate closely during preparation.

[23] Making Women's Voices Count: Addressing Gender Issues in Disaster Risk Management in East Asia and the Pacific, World Bank, 2012.

63. **Realistic Objectives:** The project was designed considering Pakistan's DRM priorities which were high on the national and provincial agendas following the 2014 floods. The background and preparation considered lessons from previous Bank-financed recovery projects such as the Balochistan Disaster Management Project, keeping in mind the technical, institutional, financial, and human capacities of involved sub-national government entities - including the O&M allocations to line departments for civil works. The project aimed to realize provincial governments' desire to move beyond relief operations and towards medium to long-term planning for recovery, reconstruction, and resilience.

64. **Appropriate Design:** The project benefitted from having clearly structured components - by focusing on ex-post restoration of damaged infrastructure to resilient standards, and ex-ante enhancement of government capacity covering a large geographic area, DCRIP was designed to have a long-term impact. Due to the emergency nature of the project, a framework approach was used to finalize civil works based on certain selection criteria; to comply with the strict timelines of project appraisal, the Government shared a prospective list of ready investments with the Bank from which sub-projects were to be selected during project lifetime.

65. **Implementation Readiness:** The project proposed establishing PIUs at PID, PDMA, and the State P&D Department with dedicated staff to oversee all project activities. However, the narrow timelines for preparation and emergency nature of the project presented challenges for setting-up of PIUs, causing initial delays in implementation. Further, given that the State had limited experience in handling Bank operations, institutional arrangements had to be discussed to ensure the PIU was adequately resourced with the required skillsets and competencies.

66. **Well-designed Results Framework (RF):** The Results Framework (RF) for DCRIP was well-designed, and the identified indicators adequately covered both project components. The PDO indicators remained relevant during project lifetime, with only one IRI dropped during implementation. Percentage-based targets were set during project preparation due to unavailability of data, and actual targets were assigned to the RF during project implementation.

B. KEY FACTORS DURING IMPLEMENTATION

67. **Initial Delays and Staffing Challenges:** Due to the adoption of a framework approach, there were initial delays as specific investments had to be identified and approved by the government during project implementation. Setting up PIUs and their staffing (including lack of appointments for full-time Project Directors, Financial Specialists and Procurement Specialists) also hindered progress. Upon hiring of requisite personnel, the pace of implementation improved considerably. To address delays, Bank team enhanced supervision through additional Implementation Support Missions (ISMs) and hiring of relevant sectoral experts. The three PIUs were closely supported by the Bank team to enhance their capacity for procurement and contract management. PDMA Punjab, in particular, faced issues with staff retention during project lifetime; however, it managed to enhance implementation activities in the final 18 months to ensure timely delivery. Delayed clearance of safeguards was also a bottleneck for awarding civil works, but turnaround time was improved by increasing capacity in the safeguards team, particularly for the State.[24] Given the slow initial progress, the Mid Term Review (MTR) was also delayed to September 2018. Implementation pace also improved with timely completion of the agreed actions during Implementation Support Missions (ISMs).

68. **Elections 2018:** The national elections in July 2018 slowed implementation progress in Punjab. Certain project approvals were delayed in the months prior to the election due to potential political transition. In the aftermath of the elections, a new government set-up and frequent changes to bureaucracy severely constrained decision making, which resulted in further implementation delays. This situation is reflected by the fact that in FY 2018-19, there were no new disbursements in Punjab under this project.[25] This slowdown was a key reason for the first project extension.

[24] DCRIP Aide Memoire, October 2020.
[25] DCRIP Technical Note, August 2019.

69. **Financing:** There were instances when government regulations on financing caused operational delays, resulting in low utilization of project financing, especially at the start of the project. Under the Punjab Government's austerity drive, key activities such as procurement of flood fighting vehicles for PID faced delays due to lack of timely approval.[26] Also, during project lifetime, there was considerable depreciation of the Pakistani Rupee against the US Dollar. Due to exchange rate fluctuations, cancellation of certain activities, and differences in projected and actual costs, there were significant project savings. The Bank team worked proactively with the Government to ensure timely reprogramming and strategic utilization of these savings. Additional investments contributed to overachieving several targets of the RF by project completion with only US$8 million in uncommitted financing cancelled.

70. **COVID-19:** The pandemic also posed a major challenge as it brought project implementation to a standstill due to lockdowns and health risks for staff. The Bank team was able to utilize the flexibility in project design to provide critical support to Punjab and the State in pandemic emergency response, by repurposing financing and procuring medical and protective equipment. While the pandemic and subsequent lockdowns caused slippage in project timelines, the Bank was able to effectively utilize this project as a vehicle for critical and timely support to sub-national governments, in direct alignment with the PDO. Consequently, the Government requested an 11-month extension of the closing date to overcome implementation delays.

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

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

M&E Design

71. The results indicators selected to monitor progress were well-aligned with the PDO. The RF included a mix of quantitative and qualitative targets that were appropriate and realistic, especially considering the baselines at project initiation. The purpose of the selected indicators was to monitor progress, assess impact, and capture outputs from component activities. The IRIs also followed from the PDO outcomes. These were measurable and bifurcated by component in the RF to ensure ease in monitoring and assessing impact. Due to a lack of data, targets were initially set as percentages based on estimations, and were later revised to exact figures during the Mid Term Review (MTR). The M&E staffing was adequate, with an M&E Specialist at each PIU to coordinate and consolidate reporting. The M&E staff collected and reported data and other necessary information at regular intervals to ensure updated information was available. The data sources, their frequency, methods, and responsibility for collection were clearly laid out in the RF; progress on all indicators was to be submitted on an annual basis.

M&E Implementation

72. The quality of reporting by the PIUs was moderately satisfactory for most of the project duration. All physical outputs were regularly monitored by PIUs through in-person site visits during the absence of Third-Party Monitoring & Validation (TPV) firms; however, submission of progress reports was not always timely. There were also considerable delays in the hiring of a TPV firm by PID, as a draft contract agreement was sent to the Cabinet Committee for approval. This practice had not been adopted previously under the project, was not required, and delayed the hiring of a TPV firm. The Bank flagged this issue during the April 2021 ISM and emphasized the requirement of conducting TPV to monitor and validate interventions implemented during the project lifecycle. Other options for contracting the services for TPV were suggested and PID PIU submitted a case for direct contracting.[27] A TPV firm was subsequently hired by PID in July 2021 for 10.5 months.

[26] DCRIP Aide Memoire, April 2021.
[27] DCRIP Aide Memoire, April 2021.

73. M&E data collection for the RF remained satisfactory throughout project duration. Over time, the timeliness and quality of data improved as PIUs became more adept at data collection, analysis, and reporting, including coordination with relevant line departments. Detailed notes on methodology and mechanisms for data collection were provided on the RF by the PIUs in Punjab and the State which eased compilation of the final matrix. For civil works, results were also bifurcated by sub-project, making it easier to monitor progress for the component. The RF was revised in September 2019 when the qualitative IRI 'Establishment of a Decision Support System' was dropped.

M&E Utilization

74. The M&E data collected by the PIUs was used to prepare project progress reports which were submitted to the Bank as per legal agreements. The data provided insight for ISMs, where key staff from both PIUs and the IAs participated and was useful for project management to monitor implementation and track progress. The RF indicators were routinely monitored alongside delivery of outputs and activities for each component and sub-component. These indicators were also used by respective line departments to address project performance. The findings from the project's M&E were used for course correction, informed decision making and resource allocation.

Justification of Overall Rating of Quality of M&E

75. **The overall M&E Quality is Substantial.** There were moderate shortcomings in M&E implementation. The M&E system as designed and implemented was generally sufficient to assess the achievement of the objectives and test the links in the results chain, but with moderate weaknesses. Despite hurdles, the M&E data was utilized in an effective manner to track progress, monitor project activities, and record results against the PDO.

B. ENVIRONMENTAL, SOCIAL, AND FIDUCIARY COMPLIANCE

76. **Environmental:** The project was classified as a safeguard's category "B", and triggered OP 4.01 Environmental Assessment and OP 4.12 Involuntary Resettlement and OP 7.50 Projects on International Waterways. The project completed the planned mitigation activities. Predicted environmental impacts were mainly related to civil works associated with restoration and rehabilitation of flood embankments and damaged flood protection walls, raising and strengthening of riverbanks and spurs. The project benefitted from having an Environmental and Social Management Framework (ESMF) and Resettlement Policy Framework (RPF). The safeguard instruments were disclosed by PIUs on April 29, 2015. Site specific Environmental and Social Management Plans (ESMPs) and/or Resettlement Action Plans (RAPs) were prepared as and when necessary, sites were identified and plans for civil works were finalized. The Punjab and State PIUs were both staffed with dedicated Environmental Specialists throughout the project, and Bank staff significantly built the capacity at both PIUs in preparing and implementing safeguards instruments. The project has set many good examples of safeguards compliance including inclusion of safeguards instruments in all bidding documents, enforcement of penalties for contractors for safeguards non-compliances, design modifications to avoid tree cutting and excessive compensatory tree plantation activities. The project also applied soil bio-engineering techniques in the State in areas prone to landslides and for land restoration. Various capacity building trainings of contractors and staff were conducted during project implementation. The environmental and social audit by third party also validated safeguards compliance in the field. The three-tiered safeguards monitoring through PIU staff, supervision consultants and M&E benefited the project due to which the environmental safeguards rating remained "Moderately Satisfactory" in the initial three years and 'Satisfactory" in the last three years. The project complied with all applicable safeguards policies.

77. **Social:** DCRIP was classified as category "B" project as planned activities mostly involved rehabilitation and repair of existing structure with low to moderate social impact potential. The project triggered OP 4.12 Involuntary Resettlement in anticipation of the social perspective. The project completed the planned mitigation activities. Social impacts initially anticipated for the project were both positive and negative, which informed the design of the project. Amongst the potential negative impacts, the more significant one was related to loss of land or infrastructure, or access to land

resources. Therefore, in addition to the Environmental and Social Management Framework (ESMF), the project also developed Resettlement Policy Framework (RPF). The safeguard instruments were disclosed by the PIUs on April 29, 2015. The PID and State PIUs remained adequately staffed with a dedicated Social Specialist throughout the project, who prepared site specific Environmental and Social Management Plans (ESMPs) as and when necessary, though initially requiring a lot of handholding. Bank staff helped built the capacity at both PIUs in preparing and implementing safeguards instruments. Implementation of ESMPs for individual interventions remained smooth and the respective staff at the PIUs were able to mainstream it, mostly through the inclusion of safeguard related clauses and requirements in the bidding documents.

78. In the case of the State, there was no civil work involving any displacement or resettlement. In the case of Punjab, initial engineering designs for rehabilitation of flood protection bunds could have resulted in removal of existing residential/communal structures and affect certain roads in at least 16 sub-schemes; out of these, design modifications (adjustment in width, freeboard, wetting channel prism, etc.) were made in 15 cases to successfully protect these structures, resulting in zero removals and displacement of people. An Abbreviated Resettlement Action Plan (ARAP) was required in only one case (Haveli Main Line & Allied Hydraulics) where design adjustments could not protect all the structures and a few structures had to be removed. Four affectees were paid approximately PKR 1 million in total. The project complied with all applicable safeguards policies.

79. Various trainings on capacity building of contractors and staff were conducted throughout project implementation. In Punjab alone, supervision consultants and PIU conducted 22 training workshops on environmental and social safeguards for 853 participants including contactor staff, labor, community activists as well as officials of relevant government departments. Active stakeholder consultation remained a good example of social compliance by the project. Most project schemes were carried out in areas where women mobility and social activity is higher than many other parts of the country. In few cases (for instance Remodeling of Marginal Bund at Panjnad, and Restoration of J-Head Spurs near Kalowal), the stakeholder consultation agenda also included formation of Grievance Redressal Committee (GRC) at the local level, with local community members nominated as representatives. However, involvement of women in local Grievance Redressal Committees (GRCs) could not be prioritized. The environmental and social audit by third party also validated the safeguards compliance in field. The three-tiered safeguards monitoring through PIU staff, supervision consultants and M&E benefited the project due to which the social safeguards rating remained “Satisfactory” throughout the project life.

80. **Procurement:** All procurements were carried according to Bank’s Procurement Guidelines and were monitored/tracked using the Bank’s online STEP system. Among the three IAs, the State PIU achieved significant progress and independently could have been rated Satisfactory for procurement performance; however, procurement delays observed at PDMA and PID PIUs resulted in an overall Moderately Satisfactory procurement performance rating. It is noted that over 20 percent of procurements were cancelled prior to initiation and repurposed by every IA - 24 percent for PID, 20 percent for PDMA and 23 percent of the State - which is significant and indicates lack of planning in identifying the required activities. These cancelled activities were considered redundant and not pursued further. Moreover, there was a large variation in contract award time, from a minimum of 2 to a maximum of 745 days. This lag occurred during bid evaluation and contract awarding process, with the management delaying approvals for initiating or concluding procurement activities.[28] Such delays can be mitigated by delegating award decisions to project implementing authorities. 5 complaints were received under the PDMA component for health-related COVID-19 emergency procurements in which PDMA has no expertise. Technical support was provided by the Health Department, and the complaints were resolved resulting in either a ‘change in award decision’ or ‘re-bidding’. It is important that the procuring agency obtain services of skilled and technically qualified professionals to manage the procurements,

[28] Delays in procurements were also separately detailed in the Technical Notes from October 2018 and August 2019.

especially in determining the required specifications prior to approaching the market.

81. **Financial Management (FM):** The Financial Management (FM) rating remained moderately satisfactory during most of the program period mainly due to delay in releases from the Finance Department to the PIUs. Government procedure requires all unspent balance in the designated accounts of the project to be revalidated for expenditure in the next fiscal year. During project lifetime, Government of Punjab amended treasury rules whereby the Finance Department Punjab required revalidation of all unspent balances by the Cabinet and the Chief Minister.[29] This delayed project payments and negatively impacted implementation. The Bank team highlighted this issue during multiple missions and the situation improved over time. Throughout project implementation, all components of the program were sufficiently and appropriately staffed. Interim Financial Reports were submitted in a timely manner and were accepted and recorded into the system. Audit reports were also received in timely manner and were acceptable to the Bank. Audit reports were issued with unqualified opinion; there was no exception relating to FM that required a waiver.

C. BANK PERFORMANCE

Quality at Entry

82. The Bank performance at entry was satisfactory. The project had a strong concept, and built on lessons from previous operations, taking a two-pronged approach that invested in both infrastructure and capacity building to strengthen longer-term resilience outcomes. The project was prepared in light of national priorities, with high level of interest and commitment from the Government. The key risks to the project were correctly identified, including overextension of government departments in the aftermath of the 2014 floods as well as lack of prior implementation record in the State. The project sufficiently considered potential safeguard issues in light of proposed activities. Further, a social inclusion and gender plan that gave priority to vulnerable families/communities in early recovery and risk reduction activities was also included.

83. The World Bank team was prompt in addressing any concerns raised during the internal review process. The task team ensured simplicity in project implementation by clearly defining the scope of work and selecting activities that aligned with the objectives. The project also considered the existing government operations in Punjab and the State and their capacity for project implementation. Budget was allocated to establish PIUs to support implementation as well as ensure timely initiation and completion of project activities. Due to the framework approach, sub-projects for restoration were not initially identified leading to implementation challenges. Also, absolute targets were not set in RF and were established during project lifetime due to lack of data.

Quality of Supervision

84. The Bank's quality of supervision was satisfactory. ISMs were carried out regularly with a roster of experts including procurement, financial, social and environmental safeguards, and technical experts. Additional missions were carried out when necessary to address roadblocks and support PIUs with project implementation. There was close supervision throughout the project lifetime, with the task team providing adequate and timely solutions for key issues such as procurement, staffing, government approvals and hiring of TPVs. The RF indicators were closely monitored during, and when required, in-between ISMs to track progress and ensure that activities undertaken linked with project impact. The Task Team Leaders (TTLs) and safeguards and fiduciary specialists addressed all reported problems in a timely manner and supported PIUs through on-site visits and relevant expertise. Due to COVID-19, undertaking virtual ISMs and coordinating with the government and PIUs proved challenging; communication was hindered during the transition phase. To address these gaps, TPVs were utilized, and a senior technical expert based in Lahore, Punjab was brought onboard to engage regularly with PID.

[29] Technical Note for the DCRIP Implementation Support Mission, August 2019.

85. All project documentation, including ratings, clearly reflected the challenges and progress of PIUs. Delays in decision making and implementation were clearly outlined in Management Letters, Aide Memoires as well as Implementation Status and Results reports, and project ratings were duly downgraded to reflect these challenges. Project ratings were downgraded subsequent to the delays from the 2018 elections. The Aide Memoire during this period recorded detailed evidence of these delays. Once the project got back on track, the ratings were duly upgraded to reflect the improvement in pace of implementation.

86. Achieving the PDO remained the primary focus of supervision. Over project lifetime, the scope for several activities was flexibly readjusted, substantive financial savings were absorbed and deployed to achieve the PDO. The team also undertook timely project restructuring – dropping certain activities, removing associated indicators, and extending project timelines, to protect and consolidate the development gains from the project. This approach is manifested in the overachievement of most targets in the RF.

87. For sustainable transition arrangements, all completed sub-projects in Punjab and the State were duly handed over to the relevant departments which included fiscal liability for future O&M through recurring budgetary allocations. In addition, through various trainings and procurements, the capacity of Irrigation Research Institute, HSSEU and State departments was also enhanced. Equipment procured by PIUs was also transferred to respective departments, and hiring of staff for VERFCs, District Disaster Management Authorities (DDMAs) and EOCs through the government budget will ensure capacity retention beyond project lifetime.

Justification of Overall Rating of Bank Performance

88. **The overall Bank performance was Satisfactory**, with minor shortcomings in quality at entry and quality of supervision. The team undertook detailed project preparation as well as regular and effective supervision, including strong collaboration with the PIUs. Regular monitoring ensured that DCRIP met or exceeded most of its targets by project closure. However, uncertainty of exact interventions at project initiation, lack of exact targets, capacity issues and the COVID-19 pandemic posed some challenges for the project.

D. RISK TO DEVELOPMENT OUTCOME

89. The achievements under the project are likely to be sustained as civil works were undertaken to resilient standards. The capacity building undertaken in Punjab and the State was realistic and will sustain given the strong political will to prepare for and mitigate disaster risk. However, in order to guarantee sustainability, it will be important to ensure that skilled technical personnel remain involved in the DRM sector over the medium- and long-term. Specifically, for Punjab, the project can be seen as the first phase of a longer-term commitment with the provincial government. The proposed future interventions will build up on the foundations and successes of this project, leading to greater impact on DRM in the province.

90. There are risks to sustainability of project interventions. While changes to policies, operational procedures and management plans developed under DCRIP are unlikely to be altered, there remain potential risks in their implementation and enforcement, especially considering the constraints in governments' financial resources. There is also a risk of insufficient budgeting for O&M of rehabilitated infrastructure after project closure. At present, all sub-projects completed under DCRIP have been allocated O&M costs under the recurrent budget.

91. In addition, effects of climate change can significantly alter future flooding patterns and exposure to other disasters. In light of rapid urbanization, inappropriate land-use planning, environmental degradation as well as an ongoing pandemic, the vulnerability of affected communities is likely to increase. Such risks can be further examined and included for mitigation in future engagement with the Government.

V. LESSONS AND RECOMMENDATIONS

92. **For operations focused on strengthening disaster risk management, flexibility in project design is useful to enable proactive response towards evolving needs of the client particularly during emergencies.** The PDO for DCRIP was comprehensive and covered both ex-ante and ex-post aspects of disaster risk management and was flexible enough to include both natural and health-related disasters. With the outbreak of COVID-19, the project was able to swiftly repurpose financing for all three PIUs to support the sub-national governments in managing the emergency response. The emergency financing proved critical in ramping up the capacity of DMAs and allied government departments in both Punjab and the State to effectively manage the health crisis, while also contributing towards achieving the PDO.

93. **Creating readiness in target sectors to absorb future financing through strategic planning is crucial for consolidating gains from investments.** Non-utilization of project financing due to currency depreciation, costs savings and cancellation of activities can be seen as an opportunity to enhance development impact and overachieve the PDO. It is recommended that certain project funds should be allocated to build capacity of PIUs in financial management and planning, enabling them to utilize such financing. DCRIP resulted in significant financial savings due to consistent depreciation of local currency during the project lifetime. The Bank team worked with clients to proactively allocate available financing to additional critical resilience building interventions identified during project implementation. The identification and implementation of these additional investments enabled DCRIP to exceed the targets for several of the key project indicators.

94. **Supporting decentralization of DRM functions and strengthening grassroots capabilities positively affect achievement of project outcomes.** The project design focused on enhancing capacities of DMAs at the grassroots level in both Punjab and the State. For Punjab, this included adoption of district level disaster management plans, initiation of community-based DRM planning, and establishment of DEOCS and VERFCs. In the State, activities included development of district DRM plans as well as crucial procurements for DDMAs. These interventions significantly strengthened the outreach, coordination, and response capabilities of Punjab and State DMAs which was demonstrated during a range of disasters including floods, smog, locust emergency, heat waves as well as the COVID-19 pandemic. With consolidated decentralized capabilities, the DMAs have transformed into frontline institutions in emergency response.

95. **In emergency contexts, it may be useful to spend additional time identifying sub-projects under a framework approach prior to operationalization.** The framework approach provided greater flexibility in implementation under DCRIP; however, it also resulted in initial delays as civil work sites were identified and approved during implementation. Delays were further compounded when decision making slowed during the elections. Hence, the urgency to get an emergency project off the ground was partially defeated as the actual implementation was delayed when executing the framework approach. Therefore, it may be beneficial to identify civil works early on in emergency contexts to improve implementation readiness and to avoid complex infrastructure works which require extended preparation timelines.

96. **To improve M&E, the Bank can explore standardizing RFs for recovery projects and utilizing ICT tools for improved reporting.** As DCRIP was an emergency project, civil works for rehabilitation had not been identified prior to project implementation. Correspondingly, the required data for several indicators such as the number of beneficiaries and length of embankments to be rehabilitated was not available at the time of project preparation. The RF therefore set targets in percentages based on estimations which resulted in difficulties for tracking progress during implementation. By having a standardized RF for recovery projects and enhancing government capacity for generating baseline data, the Bank can streamline the preparation process. Such an initiative can also be supported with increased use of ICT

tools such as remote sensing, community-based monitoring or app-based surveys for improved data collection, supervision, and transparency, especially in emergency contexts when access to physical sites may be limited.

ANNEX 1. RESULTS FRAMEWORK AND KEY OUTPUTS

A. RESULTS INDICATORS

A.1 PDO Indicators

Objective/Outcome: Restoration of flood protection infrastructure

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Female Beneficiaries	Number	0.00 29-May-2015	1,000,000.00 28-Sep-2018		4,646,436.00 30-Nov-2021

Comments (achievements against targets):

Target exceeded (464 percent of original target). The baseline of female beneficiaries for this Project was zero. After the inception of the Project, women benefitted from interventions including restoration of civil works in Punjab and the State, capacity development of PDMA and SDMA to manage disasters and climate variability, as well as through the emergency support provided to the sub-national governments for COVID-19. Upon Project closure the number of female beneficiaries stood at 4,646,436. In Punjab the number of female beneficiaries as project closure was 3,872420 and in the State female beneficiaries were 774,016. This high achievement was because: (i) most project interventions were designed to benefit men and women equally; (ii) gender dimensions were considered in all proposed studies, civil works, and disaster management plans; (iii) community-based interventions consulted women; and (iv) female participation was ensured in capacity development programs.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion

Direct Project Beneficiairies	Number	0.00 29-May-2015	2,000,000.00 28-Sep-2018		9,391,391.00 30-Nov-2021

Comments (achievements against targets):

Target exceeded (437 percent of original target). The baseline for project beneficiaries was 0. By project closure the total number of beneficiaries was 9.39 million, with 1.49 million beneficiaries in the State and 7.9 million in Punjab. This increase in beneficiaries was due to the enhanced scope of the project under both components during implementation including (i) an increase in the number of flood protection works from 51 to 73; (ii) a higher rate of individuals receiving early warning notifications; (iii) procurement of additional goods and services due to project savings and exchange rate depreciation; and (iv) addition of beneficiaries receiving support through the COVID-19 emergency response.

Objective/Outcome: Strengthen government capacity to manage disasters and climate vulnerability

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of people at risk receiving early warning notifications through mobile short messaging service	Number	50,000.00 29-May-2015	500,000.00 29-May-2015		2,980,000.00 30-Nov-2021

Comments (achievements against targets):

Target exceeded (596 percent of original target). At project inception, the baseline numbers for those receiving early warning notification from PDMA Punjab was 50,000 with a target of 500,000. During the course of the Project, PDMA Punjab dealt with numerous shocks including urban and flash flooding, smog, monsoon, heatwaves, locust emergencies as well as the COVID-19 pandemic. These emergencies highlighted the need to expand and utilize the existing early warning notification system. As a result, PDMA Punjab was able to develop a contact database of 2.98 million at-risk individuals who could be notified of disaster risk through text messages. During project lifetime, approximately 6.15 million early warning messages were disseminated by PDMA Punjab.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Improved institutional capacity for flood risk management	Text	No SOPs for Punjab disaster fund, limited SOPs at sub-national levels 29-May-2015	Integrated disaster management plans adopted by government departments at sub-national levels 29-May-2015		Integrated disaster management plans developed by government departments at sub-national levels 30-Nov-2021

Comments (achievements against targets):

Target achieved. At project initiation, both Punjab and State DMAs had limited capacity for disaster risk management. The target was to have both regions develop and adopt integrated disaster management plans. Through DCRIP funds, the State Disaster Management Authority developed DRM plans for both the State and the 10 districts. The State DRM plan was approved and notified by the Disaster Management Commission whereas the District DRM plans were approved by the respective District Disaster Management Authorities in the State. In Punjab, provincial and district DRM plans were also developed which were approved by PDMA Punjab.

A.2 Intermediate Results Indicators

Component: Component 1: Restoring Flood Protection Infrastructure and Upgrading Flood Management Systems

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion

Length of embankments rehabilitated or constructed	Kilometers	0.00 29-May-2015	500.00 28-Sep-2018		400.41 30-Nov-2021

Comments (achievements against targets):
Target partially achieved (80 percent of original target). The Project rehabilitated 400.41 kilometers of flood protection infrastructure in Punjab and the State against a target of 500 kilometers. As this was an emergency project, a framework approach was used to finalize civil works during implementation and a target of 500 kilometers was set during the mid-term review. A total of 73 civil works were undertaken, with 22 in Punjab (380.52 kilometers) and 51 in the State (19.89 kilometers). The Project fell short of achieving the target as some of the originally envisioned civil works could not be undertaken following technical, social and/or environmental assessments.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of flood protection investments for which preparatory analytical work completed	Number	0.00 29-May-2015	4.00 29-May-2015		5.00 30-Nov-2021

Comments (achievements against targets):
Target exceeded. (125 percent of original target). 4 studies were originally envisioned to be completed under this Project to support medium-long term investments in Punjab and the State. Preparatory activities included feasibility studies, consulting services for surveys, designs, as well as environmental and social impact assessments in Punjab and the State. Exchange rate gains and project savings allowed for one additional study to be undertaken.

Component: Component 2: Managing Disasters and Climate Variability

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of Risk identification studies completed	Number	0.00 29-May-2015	4.00 29-May-2015		12.00 30-Nov-2021

Comments (achievements against targets):

Target exceeded (300 percent of original target). A number of studies on identifying disaster and climate risk environment were undertaken through DCRIP for informed planning and decision-making as well as for optimal utilization of risk information. Against a target of 4 studies, 12 were completed under DCRIP by project closure. These included a climate change study in Punjab as well as mapping of major nullah's and tributaries for proposing gauging stations for flood warning and mitigation in the State. In addition, the Bank also contributed to the development of district level Mult-hazard Vulnerability and Risk Assessments (MHVRAs) by PDMA Punjab.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Development and adoption of operational procedures for responding to disasters	Yes/No	No 29-May-2015	Yes 29-May-2015		Yes 30-Nov-2021

Comments (achievements against targets):

Target achieved. At the baseline, neither Punjab nor the State had developed or adopted operational procedures for responding to disasters; however, by project closure, the set target was achieved. In Punjab, a provincial level community-based disaster risk management program was developed to adequately plan and respond to disasters. Even at the State level, disaster management plans were developed for all districts.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
SOPs for Punjab Disaster Management Fund established	Yes/No	No 29-May-2015	Yes 29-May-2015		Yes 30-Nov-2021

Comments (achievements against targets):

Target achieved. At project inception, there were no SOPs for the Punjab Disaster Management Fund. However, one of the areas of focus under DCRIP was to better manage the contingent liability and meet financial needs for post-disaster emergency response and reconstruction in Punjab. Therefore, the Project supported the Punjab Government with the development of SOPs for the Punjab Disaster Management Fund.

B. KEY OUTPUTS BY COMPONENT

Project Development Objective: "(i) To support restoration of flood protection infrastructure; and (ii) to strengthen the Recipient's capacity to manage disasters and climate variability"

Objective/Outcome 1: Restoring Flood Protection Infrastructure	
Outcome Indicators	1. Direct project beneficiaries: 4,391,391 (cumulative target: 2,000,000) 2. Female beneficiaries: 2,196,436 (cumulative target: 1,000,000) 3. Number of people benefitting from restored flood protection infrastructure: 4,381,011 (target: 2,000,000)
Intermediate Results Indicators	1. Length of embankment rehabilitated or constructed 2. Number of flood protection investments for which preparatory analytical work completed 3. Establishment of a Decision Support System for PID (dropped)
Key Outputs by Component (linked to the achievement of the Objective/Outcome 1)	1. Length of embankment rehabilitated or constructed: 400.4 kilometers (target: 500 kilometers) 2. Number of flood protection investments for which preparatory analytical work completed: 14 (target: 4) 3. Establishment of a Decision Support System for PID: dropped (target: Yes)
Objective/Outcome 2: Managing Disasters and Climate Variability	
Outcome Indicators	1. Direct project beneficiaries: 4,355,781 (cumulative target: 2,000,000) 2. Female beneficiaries: 2,177,150 (cumulative target: 1,000,000) 3. Number of people at risk receiving early warning notifications through mobile short messaging service: 2,980,000 (target: 500,000)

	4. Improved institutional capacity for flood risk management: Integrated disaster management plans adopted by government departments at sub-national levels (target: Integrated disaster management plans adopted by government departments at sub-national levels)
Intermediate Results Indicators	1. Number of risk identification studies completed 2. Development and adoption of operational procedures for responding to disasters 3. SOPs for Punjab Disaster Management Fund established
Key Outputs by Component (linked to the achievement of the Objective/Outcome 2)	1. Number of risk identification studies completed: 20 (target: 4) 2. Development and adoption of operational procedures for responding to disasters: Yes (target: Yes) 3. SOPs for Punjab Disaster Management Fund established: Yes (target: Yes)

ANNEX 2. BANK LENDING AND IMPLEMENTATION SUPPORT/SUPERVISION

A. TASK TEAM MEMBERS

Name	Role
Preparation	
Haris Khan	Task Team Leader(s)
Khalid Bin Anjum	Procurement Specialist(s)
Akmal Minallah	Financial Management Specialist
Anwar Ali Bhatti	Team Member
Masood Ahmad	Team Member
Raja Rehan Arshad	Team Member
Salma Omar	Social Specialist
Jaafar Sadok Friaa	Team Member
Francis V. Fragano	Safeguards Advisor/ESSA
Helene Bertaud	Counsel
Tayyeb Masud	Team Member
Gabi George Afram	Team Member
Shahnaz Meraj	Team Member
Javaid Afzal	Environmental Specialist
Huma Ali Waheed	Team Member
Malik Najaf Khan	Team Member
Fouad Muhammad Khan	Team Member
Sarmad Ahmed Shaikh	Team Member

Shiraz Ali Shah	Team Member
Benedikt Lukas Signer	Team Member
Quanita Mahmood Ali Khan	Team Member
Samina Mussarat Islam	Social Specialist
Ahsan Tehsin	Team Member
Suhaib Rasheed	Team Member
Muhammad Waheed	Team Member
Navid Rahimi	Team Member
Supervision/ICR	
Ahsan Tehsin, Hyunjee Oh	Task Team Leader(s)
Haider Raza	Procurement Specialist(s)
Akmal Minallah	Financial Management Specialist
Abid Khan	Team Member
Sana Ikram Sharif	Team Member
Babar Naseem Khan	Social Specialist
Chaudhry Riaz Ahmad Khan	Team Member
Syed Muhammad Bilal Khalid	Team Member
Sana Ahmed	Environmental Specialist
Shafiq Hussain	Team Member
Nihan Rafique	Team Member

B. STAFF TIME AND COST

Stage of Project Cycle	Staff Time and Cost	
	No. of staff weeks	US$ (including travel and consultant costs)
Preparation		
FY15	35.096	221,163.18

FY16	21.946	141,683.88
Total	**57.04**	**362,847.06**
Supervision/ICR		
FY16	9.622	55,515.78
FY17	30.699	152,413.99
FY18	28.585	139,395.79
FY19	33.858	166,136.76
FY20	30.313	118,182.05
Total	**133.08**	**631,644.37**

ANNEX 3. PROJECT COST BY COMPONENT

Components	Amount at Approval (US$M)	Actual at Project Closing (US$M)	Percentage of Approval (US$M)
Component 1: Restoring Flood Protection Infrastructure and Upgrading Flood Management Systems	100.00	89.32	89.3
Component 2: Managing Disasters and Climate Variability	17.00	20.11	118.3
Component 3: Project Management	8.00	5.13	64.1
Component 4: Contingent Emergency Response	0	0	0
Total	**125.00**	**114.56**	**91.6**

ANNEX 4. EFFICIENCY ANALYSIS

1. The "Disaster and Climate Resilience Improvement Project", funded by the World Bank, aimed at strategizing disaster risk management, building disaster and climate resilience, improving technical skills of personnel equipped with state-of-the-art instruments in concerned departments, working to improve the early warning system, rebuilding damaged physical assets, and rehabilitation.

Table 4.1: **Benefits-Cost Ratio**

(Million US$)

	Lower Limit	Upper Limit	Average
VSL Saving	235.3	2278.2	1256.8
VSI Saving	0.3	1.3	0.8
Crops and livestock saved	471.6	471.6	471.6
Buildings and other infrastructures saved	123.1	123.1	123.1
Mobility through all-weather road	6.0	6.0	6.0
Appreciation of land value	99.7	99.7	99.7
Training Effectiveness	4.8	4.8	4.8
Benefits of vehicles	19.3	19.3	19.3
Benefits of other equipment	7.3	7.3	7.3
Multiplier Effect	300.0	300.0	300.0
COVID related benefits	216.2	216.2	216.2
Misc.	16.6	16.6	16.6
PV of Benefits	1500.3	3544.2	2522.2
Cost of the Project	114.56	114.56	114.56
Benefit-Cost Ratio	13.1	30.9	22.0

2. Overall, the project is rated "substantial" on efficiency due to high value for money but (partially unavoidable) delayed implementation. The benefit-cost ratio has been found quite high which shows high value for money. The estimated benefits are even higher that those estimated at the appraisal stage. The appraisal document of the project includes economic analysis which is based on easily quantifiable economic returns like lifesaving, reduced injuries, reduction in damage to physical infrastructure, and value of rebuilt assets. For ICR, efficiency analysis covers almost all of the areas in which project intervened mainly because of the data availability at the end of the project life. This is why, benefit-cost ratio found in ICR is much higher than the one found at appraisal stage. The project however faced delays in implementation due to a mix of unavoidable (like COVID-19 pandemic) and avoidable (like procedural) factors and cancellation of some minor activities.

3. **The benefit-cost ratio of the project has been estimated in the range 13.1 to 30.9 with an average value of 22.** Thirteen different benefits (Table 4.1), aligned with the project's objectives, have been identified and then estimated using available data with certain assumptions. The list of benefits include lifesaving, reduced risk of injuries, lesser land erosion, smaller loss of crops and livestock, resilient physical infrastructure including buildings, easy mobility, trained personnel equipped with state-of-the-

art instruments to better perform job, appreciation of land value for the vulnerable segment, rehabilitation of water schemes and other infrastructure, and expanded economic activity due to multiplier effect of the project spending. The benefit-cost ratio has been estimated on the basis of quantifiable benefits of the project; however, this ratio is under-estimated as there are unquantifiable benefits, especially related to systemic improvement and soft interventions, like research and information dissemination. It is noteworthy that the benefit-cost ratio is higher than that found at the appraisal stage as at that time the economic analysis was based on only easily quantifiable economic returns like lifesaving, reduced injuries, reduction in damage to physical infrastructure, and value of rebuilt assets. But for ICR, efficiency analysis covers almost all of the areas in which project intervened mainly because of the data availability at the end of the project life.

4. **PID, PDMA Punjab and the State PIU.** The benefit-cost ratios have been initially estimated for each PIU and then the aggregate ratio has been estimated by taking sum of all benefits of the project and dividing by the total cost. The disaggregated benefit-cost ratios have been found in the range 6.4 to 110.4 for different PIUs. For each component of the project, most of the benefits have been estimated for 10 years starting after completion of the project. Most of the benefits accumulated during the project life have been ignored as maximum activities, such as civil works and procurement of vehicles and equipment, took place in the last year of the project. However, some benefits, such as those related to COVID, are estimated only for the period when they were observed – during the project life. All benefits that are expected to accrue in the future period are discounted (at 5% discount rate) to get present value. Prevailing exchange rate (PKR 175/ US$) has been used to convert PKR values into US$.

5. The benefit-cost ratio of PID-PIU component has been estimated in the range 13.9 to 18.5 with an average value of 16.2 (Table 4.2). PID-PIU undertook civil works like construction of embankment and all-weather roads, procured flood fighting vehicles and focused on capacity building of the department through training of personnel and procurement of equipment such as instruments for Hydraulic Structure Safety Evaluation Unit (HSSEU). Fourteen types of benefits have been identified and measured using available data with some assumptions.

a. First, construction of 380-kilometer-long embankment in Punjab will save nearby settlements from floods. Each year settlements near rivers are exposed to floods risks of different intensities. To measure the average number of deaths per year, data from 2010 to 2017 has been taken from NDMA publications. The average number of deaths in this period was 606 per year. It is assumed that the constructed and rehabilitated embankment will reduce at least 20%[30] of the deaths. The benefit of this reduction has been estimated using value of statistical life (VSL) measured by Rafiq and Shah (2010) in the range US$122,047 to US$435,294. Each year's benefits are then discounted[31] to get present value. The present value of expected saved lives over next 10 years has been found in the range US$125 – 445.9 million for different VSL.

b. Second, constructed embankment also reduced the probability of injuries in floods. Past data shows that on average 200 persons get injured each year in floods. Again, it is assumed that the constructed and rehabilitated embankment will reduce at least 20% of injuries. Benefits of this

[30] For most of the components, 20% improvement is used to find benefits. This is just a conservative estimate. Actual benefits may exceed this.

[31] For human related benefits discount rate has been adjusted for population growth rate. More specifically, discount rate for such benefits is 3.2% (5% minus population growth rate of 1.8%).

reduction have been estimated using value of statistical injury (VSI), which is found in the range US$417 to US$1,654 by Rafiq and Shah (2010). The present value of expected reduced injures over the next 10 years has been found in the range US$0.14 – 0.55 million for different VSI.

c. Third, constructed and rehabilitated embankment will save crops in the flood prone regions. According to data provided by PID, total area saved through this intervention is approximately five hundred thousand acres. Value of agriculture land in the concerned districts have been taken from Rashid and Sheikh (2015) and then crop yield is estimated by rental value of the land, which is assumed 5% (of the land value) per year (a value used in many studies in Pakistan). It is assumed that the constructed embankment will save at least 20% of the crops, which generates economic benefits, in present value terms, of US$359 million.

d. Fourth, reduced risk of floods will save livestock in the areas which are exposed to such disasters. PID data show that about 2.9 million population is direct beneficiary of this project. The number of beneficiary households has been found by dividing this population by average household size in rural areas of Punjab (taken from HIES, 2018-19). Annual income/expenditure of households and the percentage contribution of livestock in expenditures of rural households have also been taken from HIES. Assuming that the project intervention will save 20% of the livestock, the present value of benefits has been estimated at US$72 million.

e. Fifth, constructed embankments have reduced the risk of house damage in floods. According to data of past 8 years, approximately 75,000 houses are damaged each year in floods. Value of each house (building only) in this area is US$500 (estimated from value of houses that were saved from relocation – another benefit of the project, mentioned below – and provided by PID). Assuming that risk of house damage is reduced by 20%, the benefit of saved houses has been estimated at US$57.8 million.

f. Sixth, in flood prone areas, public physical assets like schools, hospitals and mosques are also exposed to risk along with houses. The embankments also reduced the risk of such damage. Data on such losses due to past floods is not available, so the saving of these assets has been assumed equal to benefits of saved houses. These are conservative estimates as services halted due to floods, which these assets provide, are of much higher value.

g. Seventh, embankments reduce the rate of land erosion. Ashraf, Bhatti and Shakir (2017) found that each year the River Chenab was getting wider by 1%. Average width of Chenab is 850 meters. Though embankment was constructed on different rivers and in different regions, this economic analysis assumes same 850 meters width of rivers and 1% erosion rate per year. With these figures, the project has saved approximately 800 acres of land in different districts of Punjab. Using value of land taken from Rashid and Sheikh (2015), the benefit of saved land has been found US$5.2 million.

h. Eighth, on almost all subprojects of civil work, housing units, cattle shed, shops and other structures fell in the CoI of the embankments. The project opted for alternative engineering solutions to save these structures. In total, 371 structures were saved by adopting alternative engineering designs. It is estimated that an amount of approximately Rs. 25 million was saved by

protecting these structures. This amounts to US$0.15 million.

i. Ninth, all-weather roads (shingle road with brick edging) constructed on top of embankments improved locomotion of local farmers. This resulted in securing livelihood of those farmers and ultimately enhancing their income for their economic uplift. Moreover, it resulted in low operating cost of vehicles. Economic activity is estimated using assumed traffic (1000 vehicles covering 25 KM per day) on the road and cost of vehicles per KM (PKR 10/KM). Moreover, extra operating cost (50%), which is saved due to smoothness of the road (the factor of 50% has been taken from Robbins and Tran, 2015). These benefits amount to US$6 million.

j. Tenth, due to reduced risk of disaster, value of land has appreciated. Information provided by PID show 10-20% appreciation in land prices. In the analysis it is assumed that value of land has appreciated by 20% in one KM range of embankment. Using value of land taken from Rashid and Sheikh (2015), the benefit of land appreciation has been estimated at US$92.8 million. This benefit disproportionately accrues to the poor as they live in areas that are more exposed to risk of floods.

k. The next three benefits are generated due to capacity building interventions in PID. The first benefit of these, which is eleventh in the sequence, is related to effectiveness of training. Under this project, 108 employees of different ranks working in PID were trained. There is no evidence of how effective these trainings are. However, studies show that such trainings enhance productivity of workers by 15 to 20%[32]. This efficiency analysis assumes that the trainings undertook under the project increased productivity of workers measured by their salary. Over a period of 10 years, the present value of benefits is measured at US$1.3 million.

l. Twelfth, US$5.95 million has been allocated to procure vehicles which will be used for flood fighting and disaster management. The benefits of vehicles are estimated using rate of return (1.5% per month) in transport sector of Pakistan. Over a period of 10 years, the benefits of vehicles are estimated at US$8.3 million.

m. Thirteenth, PID has been equipped with instruments like those for Hydraulic Structure Safety Evaluation Unit (HSSEU). These instruments will be utilized for monitoring of hydraulic structures and other important infrastructure on the canal system. Benefits of these instruments are estimated at US$1.1 million.

n. Fourteenth, under the project, PID has procured materials and labor services from local markets. This spending has generated economic activity in the local market. Such expansion in economic activity has been measured through multiplier effect. The value of multiplier used in this analysis is 3, which is consistent with empirical literature on public spending in Pakistan. Assuming that 85% of the project budget has been spent in local market, the multiplier effect has been estimated at US$195 million.

6. Together these fourteen benefits generate economic value in the range US$981.7 – 1303 million with an average value of US$1142.4 million. The spending by PID PIU has been US$70.56 million. These

[32] See Konings and Vanormelingen (2010) for a reference on training of firms' workers

figures generate benefit-cost ratio in the range 13.9 to 18.5 with an average value of 16.2.

Table 4.2: **Benefit-Cost Ratio of PID** (Million US$)

	Lower Limit	Upper Limit	Average
VSL Saving	125.0	445.9	285.5
VSI Saving	0.1	0.6	0.3
Crops saved	359.0	359.0	359.0
Livestock saved	72.0	72.0	72.0
buildings/structures saved	57.8	57.8	57.8
Infrastructure saved	57.8	57.8	57.8
Value of Land Erosion saved	5.2	5.2	5.2
Relocation saved	0.1	0.1	0.1
Benefits of All Weather Road	6.0	6.0	6.0
Appreciation of Land value	92.8	92.8	92.8
Training Effectiveness	1.3	1.3	1.3
Vehicle benefit	8.3	8.3	8.3
Other Equipment	1.1	1.1	1.1
Multiplier Effect	195.0	195.0	195.0
PV of Benefits	981.7	1303.0	1142.4
Cost of the Project	70.6	70.6	70.6
Benefit-Cost Ratio	13.9	18.5	16.2

7. **The benefit-cost ratio of the State PIU component has been estimated in the range 6.4 to 10.9 with an average value of 8.6** (Table 4.3). The State PIU component spent US$28.4 million on flood protection civil works, analytical work including research studies, institutional strengthening, and response to COVID-19. The benefits include reduced risk of deaths and injuries, crops and livestock saving, reduction in damage of buildings and other infrastructure, increased productivity due to trainings, analytical studies, capacity building through vehicles and other equipment, appreciation of land value, multiplier effect, and effective management of the COVID-19 pandemic. Most of the categories in this component match those in the PID component, therefore the methodology measuring benefits is same. However, estimation of COVID related benefits needs elaboration. In Pakistan there were 1.4 million cases of COVID-19 which resulted in 29 thousand deaths. The prevalence rate has been 6% and the death rate has been 2%. The project provided personal protection equipment (PPE) to front-line workers of different departments. The number of direct beneficiaries, as provided by the State PIU, was 50 thousand. Using prevalence and death rates, these expenditures saved 59 lives during pandemic. Using VSL, the benefits are accrued in the range US$14.5 – 51.6 million. Moreover, benefits of rehabilitation of water schemes and power houses have been estimated at US$3.7 million. The value of research studies is difficult to measure, but these studies will be helpful in designing effective disaster management strategies. Therefore, actual benefits of this component of the project are greater than those mentioned in this efficiency analysis.

Table 4.3: **Benefit-Cost Ratio of the State PIU Component** (Million US$)

	Lower Limit	Upper Limit	Average
PV of Benefits	181.9	309.7	245.8
VSL Saving	35.3	125.9	80.6
VSI Saving	0.0	0.1	0.1
Crops saved	4.3	4.3	4.3
Livestock saved	36.3	36.3	36.3
buildings/structures saved	3.7	3.7	3.7
Infrastructure saved	3.7	3.7	3.7
Training Effectiveness	1.6	1.6	1.6
Vehicles benefit	8.3	8.3	8.3
Other Equipment	3.7	3.7	3.7
Rehabilitation	3.7	3.7	3.7
COVID related benefits	14.5	51.6	33.1
Appreciation of Land value	6.9	6.9	6.9
Multiplier Effect	60.0	60.0	60.0
Cost of the Project	28.4	28.4	28.4
Benefit-Cost Ratio	6.4	10.9	8.6

8. **The benefit-cost ratio of the Punjab PDMA component has been estimated in the range 21.5 to 110.4 with an average value of 65.9** (Table 4.4). The flagship initiative under this component of the project was establishment of Village Emergency Reporting and Facilitation Centers. These centers will support effective decentralized decision making, disaster response and information dissemination in the wake of natural calamities and disasters. The main benefit of these centers is effective disaster management which reduces the risk of deaths, injuries, and other damages. The value of saved lives and injuries has been estimated in the range US$75 – 1706 million and US$0.2 – 0.7 million, respectively. PDMA Punjab played active role during pandemic and became the forefront agency for responding to emergencies in the province. It distributed Personal Protection Equipment (PPE) to all the provincial line departments, police, other law enforcement agencies and district administration to ensure compliance with COVID-19 SOPs. The economic value of these interventions has been estimated at US$202 million. The methodology of estimating these benefits is same as that used for the State PIU component. However, under this component lives were saved due to PPEs (1.17 million beneficiaries), COVID related medical equipment (90 thousand beneficiaries) and tracking of foreign returnees (about 104 thousand beneficiaries). The project also focused on strengthening of institutional capacity through trainings and procurement of vehicles and other equipment. The benefits of these interventions have been estimated at US$7.15 million. Finally, this component too has spent significant portion of the project cost in the local market, which generated multiplier effect of expanded economic activity. The economic value of multiplier effect has been estimated at US$45 million.

Table 4.4: **Benefit-Cost Ratio of PDMA-Punjab Component** (Million US$)

	Lower Limit	Upper Limit	Average
PV of Benefits	336.8	1721.9	1029.3

VSL Saving	75.0	1706.4	890.7
VSI Saving	0.2	0.7	0.4
Training Effectiveness	1.9	1.9	1.9
Vehicle benefit	2.8	2.8	2.8
Medical Equipment	1.4	1.4	1.4
IT Equipment	1.1	1.1	1.1
COVID related benefits	201.7	201.7	201.7
Multiplier Effect	45.0	45.0	45.0
Loss due to other disaster	7.7	7.7	7.7
Cost of the Project	15.6	15.6	15.6
Benefit-Cost Ratio	21.5	110.4	65.9

9. **The project faced delays in implementation and divergence between estimated and actual costs.** Initially, the project was committed US$125 million, which were to be disbursed in four years, 2016-19. But due to delays, the project was finally completed on November 30, 2021. This delay was partially due to outbreak of COVID-19 pandemic which resulted in country wide lockdowns and halted economic activity, especially in the construction sector. However, PIUs also adopted unnecessary and lengthy approval processes. More specifically, PID PIU hired services of TPV just 3 months before completion of the project, whereas these services are required during the project's lifecycle to authenticate the works executed. PID also awarded contract of procurement of flood fighting vehicles worth US$5.95 million just few months before completion date. PIU PDMA, though made impactful investments and interventions, utilized only 41.3% of the committed amount till the second last month of the project lifecycle. These delays in implementation of project resulted in delayed benefits that amount to about US$122 million, as risk-exposed people remained vulnerable for extra time. This was an opportunity cost that could have been avoided by timely completion of the project. However, delays due to Covid-19 pandemic were unavoidable.

10. Moreover, there was divergence between estimated cost and actual disbursement, which resulted in saving of US$8 million. This saving was mainly due to massive depreciation of PKR against US$; exchange rate was around PKR/US$100 at the start of the project, while it was around PKR/US$175 on completion date. However, cost saving was also due to delays in procurement thereby canceling some minor activities. For instance, due to unnecessary delays in procurement, some activities related to Hydraulic Structure Safety Evaluation Unit were cancelled.; this is a real cost as saved amount has lower opportunity cost as compared to expected benefits of the intervention. Moreover, most of the activities under the project were clustered near project completion date which resulted in delayed materialization of benefits.

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

1. Comments from the Provincial Disaster Management Authority (PDMA) Punjab, Government of Punjab

"This is to refer to the Disaster and Climate Resilience Improvement Project (DCRIP) assisted by the World Bank (WB). Also, we refer to the draft of the Implementation Completion and Results Report (ICR00005614) conducted by a well-versed team of the World Bank.

We agree with the project outcomes, results and overall rating and it is believed that the implementation progress was remarkable, as most of the total project objectives were achieved.

On the other hand, we would like to mention that during DCRIP implementation course (2015-2021), we found the World Bank Team to be very supportive during the continued challenges faced by the project team in terms of procurement activities, particularly in the phase of the COVID-19 pandemic. Accordingly, regular supervision and review missions by the Bank helped in guidance and handholding to achieve project objectives. The mission members have always been very cooperative, and the wrap– up discussion with the Planning and Development Department (P&D) aided in resolving implementation issues very promptly. Also, the Aide Memoires have provided objective and useful feedback to track project progress and for initiating corrective actions.

Under World Bank assisted DCRIP, we achieved policy level studies on Climate Change, Community Based Disaster Risk Management, Program Implementation, Organizational Capacity Assessment, as well as Provincial and District Disaster Management Plans. Furthermore, DCRIP strengthened Punjab Government's capacity through strategic procurement of state-of-the-art equipment to improve the overall response capacity in potential disaster affected areas. PDMA's proactive approach to disaster management has led to successful mitigation of disasters through major initiatives and interventions.

In addition to the foregoing, the cooperation provided by the Bank is very much appreciated in permitting activities to resume promptly and ensuring maximum achievement of project objectives. We look forward to a future partnership with the World Bank Group in support of new projects covering climate resilience, disaster management, early warning, urban flooding, scaling up of Village Emergency Operation Centers, scaling up of Multi-hazard Vulnerability and Risk Assessment Survey, implementation of Community Based Disaster Risk Management Program across Punjab, community resilience and technical assistance for Urban Flood Resilience Program, drought mapping, formulation of Drought Management and Mitigation Plan, implementation of Capacity Enhancement Plan (strengthening of Disaster Response Force (DRF), DDMAs and PDMA), snow storms and landslides, improvement of EWS of all barrages, dams and nullahs.

With World Bank patronage and Government of Punjab's sensitization towards a more disaster resilient province, DCRIP has enabled us to make a difference by ensuring the safety and security of human lives and livelihoods, and by doing so, transforming the existing crisis response system into a more sustainable disaster risk management system."

2. Comments from the Planning and Development (P&D) Department, State Government

"The objectives of the DCRIP State project were to support the restoration of flood protection infrastructure to resilient standards and to strengthen State institutional capacity to manage disasters and climate variability. The DCRIP project, after its successful implementation, has been completed in November 2021.

The Implementation Completion & Result Report (ICR) has been prepared by the World Bank to document the project's interventions and its impact in the State. The report itself is a comprehensive document and covers every aspect of project. The report presents the overall impact particularly on direct beneficiaries and total population after completion of project interventions. The attached ICR shows detailed impact evaluation on the lives, properties and livelihood of people benefitting from project activities in the State. The project outcomes and achievement of Project Development Objectives in the State are also incorporated in ICR accordingly.

On behalf of the State Government, PIU-DCRIP would like to acknowledge and to thank the World Bank for providing generous support by launching a multi-sectoral resilience project through the Disaster and Climate Resilience Improvement Project (DCRIP) under P&DD for restoration of damaged flood protection structures and for enhancing the capacity of disaster management institutions to cope with the disasters in the State."

ANNEX 6. SUPPORTING DOCUMENTS

1. DCRIP project documentation (PAD, ISRs, Aides Memoires, Legal Documents), available from World Bank database.

2. Recovery Needs Assessment and Action Framework, National Disaster Management Authority (NDMA), Government of Pakistan, 2014.

3. DCRIP: Case Study on Implementation of Safeguard Measures: Rehabilitation and Up-gradation of River Training Works U/S Balloki Headworks, Project Implementation Unit (PIU) Punjab Irrigation Department, April 2021.

4. DCRIP: Outcomes Assessment Report of DCRIP Interventions in District Bagh and Haveli, Project Implementation Unit (PIU) State Planning & Development Department, July 2020.

5. DCRIP: Impact Assessment Report of Interventions in District Mirpur and Kotli, Project Implementation Unit (PIU) State Planning & Development Department, February 2021.

6. DCRIP: Implementation Completion Report: Baseline Creation & Third-Party Monitoring/Validation, Project Implementation Unit (PIU) State Planning & Development Department, March 2022.

7. DCRIP: Impact Evaluation Report: Baseline Creation & Third-Party Monitoring/Validation, Project Implementation Unit (PIU) State Planning & Development Department, March 2022.

8. Documentary prepared by PDMA Punjab, 2021.

ANNEX 7. BREAKDOWN OF PROJECT BENEFICIARIES

Project Beneficiaries by PIU

Sr#	Year	Total Beneficiaries[33]	Female Beneficiaries[34]
1.	Punjab Irrigation Department	2,902,898	1,422,420
2.	PDMA	5,000,000	2,450,000
3.	State	1,488,493	774,016
Total		**9,391,391**	**4,646,436**

Project Beneficiaries by Component

Sr#	Year	Total Beneficiaries	Female Beneficiaries
1.	Component 1: Restoration of flood protection infrastructure	4,381,011	2,191,038
2.	Component 2: Strengthen government capacity to manage disasters and climate variability	5,010,380	2,455,398
Total		**9,391,391**	**4,646,436**

Project Beneficiaries by Project Year

Sr#	Year	Total Beneficiaries	Female Beneficiaries
1.	Year 1	0	0
2.	Year 2	200,000	50,000
3.	Year 3	1,000,000	500,000
4.	Year 4	1,064,511	531,527
5.	Year 5	2,316,873	1,181,605
6.	Year 6	3,102,858	1,520,400
7.	Year 7	**9,391,391**	**4,646,436**
Total		**9,391,391**	**4,646,436**

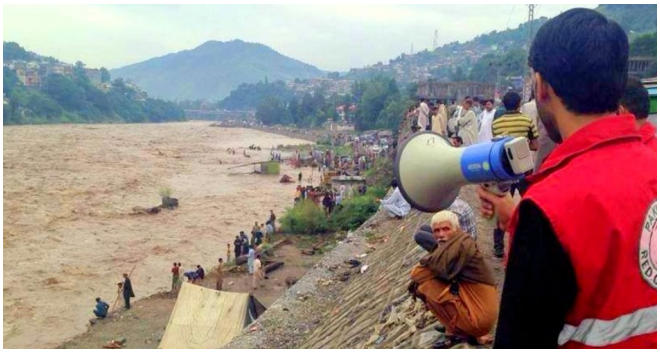
[33] The beneficiaries for civil works were calculated through geographic information system (GIS) analysis considering the embankments rehabilitated and the population protected using census data. The beneficiaries of COVID-19 supplies and Village Emergency Loss of Livelihoods Reporting and Facilitation Centers (VERFCs) were calculated using procurement data for personal protective equipment (PPE) and approximate population benefitted.

[34] The female beneficiaries were estimated from direct project beneficiaries by reflecting the female proportion of total population in the total beneficiary population. For Punjab, the female population is 49 percent of total population and for the State it stands at 52 percent, based on the 2017 Census of Pakistan.

ANNEX 9. PICTURE GALLERY

Picture 1: 2014 Flood Damages in Punjab

Picture 2: 2014 Flood Damages in the State



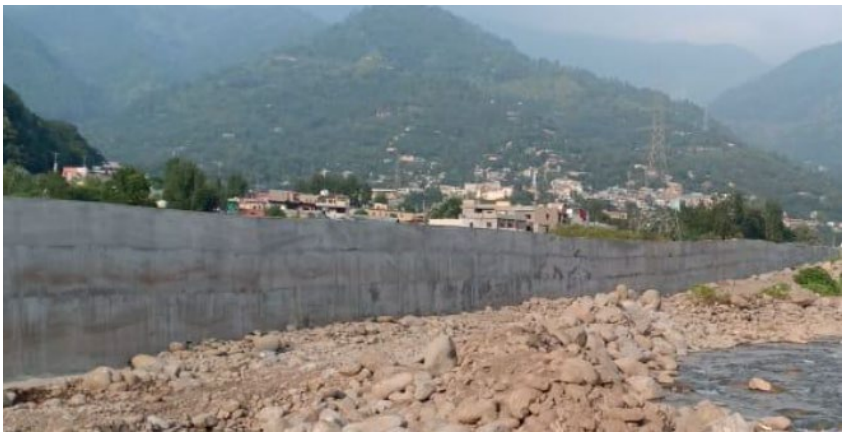
Component 1: Restoration of Flood Protection Infrastructure

Picture 3: Spur with earthwork, stone apron, stone pitching, and shingle on top of spur in Kalowal Gujrat, Punjab

Picture 4: Steel sheet piling to enhance resilience of Nawabpur Flood Bund and LMB Taunsa, Punjab

Picture 5: Construction of channel at Shala Bagh under the State Irrigation Department

Picture 6: Cantilever retaining wall at Bani Pasari under the State Irrigation Department



Picture 7: Power channel protection work at Battat hydropower plant by State Power Development Organization

Picture 8: Interventions by the State Forest Department

Component 2: Strengthen government capacity to manage disasters and climate variability

Picture 9: Emergency Operation Centre and District Emergency Operation Centre, PDMA Punjab

Picture 10: Rescue and relief equipment, PDMA Punjab

Picture 11: DSNG Vans and Mobile Communication Office, PDMA Punjab

Picture 12: Procurement of rescue and relief equipment, SDMA

COVID-19 Procurements

Picture 13: COVID-19 procurements for the State Health Department