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IDA/R2018-0041/1

March 1, 2018

Closing Date: Tuesday, March 20, 2018 at 6 p.m.

FROM: Vice President and Corporate Secretary

Nepal - Modernization of Rani Jamara Kulariya Irrigation Scheme - Phase 2 - Project

Project Appraisal Document

Attached is the Project Appraisal Document regarding a proposed credit to Nepal for the Modernization of Rani Jamara Kulariya Irrigation Scheme - Phase 2 - Project (IDA/R2018-0041), which is being processed on an absence-of-objection basis.

Distribution:
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Document of

The World Bank

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Report No: PAD2489

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED CREDIT

IN THE AMOUNT OF SDR 45.3 MILLION
(US$66 MILLION EQUIVALENT)

TO

NEPAL

FOR A

MODERNIZATION OF RANI JAMARA KULARIYA IRRIGATION SCHEME - PHASE 2

February 23, 2018

Water Global Practice
South Asia Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective January 31, 2018)

Currency Unit =	Nepalese Rupee (NPR)
NPR 104 =	US$1
US$ 1.45712000=	SDR 1

FISCAL YEAR (Nepali calendar fiscal year begins at first day of month Shrawan each year)

July 17, 2018 – July 16, 2019

ABBREVIATIONS AND ACRONYMS

ACP	Agriculture Contact Point
ADS	Agriculture Development Strategy
ACIU	Agriculture Component Implementation Unit
AGDP	Agricultural Gross Domestic Product
BIA	Biodiversity Impact Assessment
BS	British Standard
CAD	Command Area Development
CCA	Cultivable Command Area
CE	Citizen Engagement
CPS	Country Partnership Strategy
CR	Cross Regulators
DoA	Department of Agriculture
DoI	Department of Irrigation
EA	Environmental Assessment
EHS	Environmental, Health, and Safety
EMP	Environmental Management Plan
ENPV	Economic Net Present Value
ERR	Economic Rate of Return
FFS	Farmer Field School(s)
FGD	Focus Group Discussions
FHH	Female-headed Household
FM	Financial Management
FMIS	Farmer-Managed Irrigation System(s)
FNPV	Financial Net Present Value
FRR	Financial Rate of Return
GAP	Gender Action Plan
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GON	Government of Nepal
GRM	Grievance Redress Mechanism
HR	Head Regulators
ICR	Implementation Completion and Results Report
IDA	International Development Association

IMT	Irrigation Management Transfer
IP	Irrigation Project
IPMP	Integrated Pest Management Plan
IS	Indian Standard
ISF	Irrigation Service Fee
IUFR	Interim Unaudited Financial Report
IWRMP	Irrigation and Water Resources Management Project
JPM	Joint Participatory Management
JT	Junior Technician
LCW	Long-Crested Weir
LEMC	Local Environmental Monitoring Committee
LS	Lumpsum
M&E	Monitoring and Evaluation
MIP	Medium Irrigation Project
MIS	Management Information System
MoAD	Ministry of Agricultural Development
MoI	Ministry of Irrigation
MOM	Management, Operation, and Maintenance
MoRJKIP	Modernization of Rani Jamara Kulariya Irrigation Scheme
MoF	Ministry of Finance
MOM	Management, Operation, and Maintenance
NCB	National Competitive Bidding
NGO	Non-Governmental Organization
NITP	Non-Conventional Irrigation Technology Project
NRs/NPRs	Nepalese Rupee
O&M	Operation and Maintenance
OAG	Office of the Auditor General
PDO	Project Development Objective
PIM	Project Implementation Manual
PIO	Project Implementation Office
PPSD	Project Procurement Strategy for Development
RAP	Resettlement Action Plan
RBMP	River Basin Management Plan
RF	Results Framework
RJK	Rani, Jamara, and Kulariya
RPF	Resettlement Policy Framework
RVP	Regional Vice President
SA	Social Assessment
SIMF	Social Impact Management Framework
STEP	Systematic Tracking of Exchanges in Procurement
TOR	Terms of Reference
VCDP	Vulnerable Community Development Plan
WECS	Water and Energy Commission Secretariat
WiP	With-Project
WoP	Without-Project
WRM	Water Resources Management
WUA	Water Users Association
WUC	Water Users Committee

Regional Vice President:	Annette Dixon
Country Director:	Qimiao Fan
Senior Global Practice Director:	Guang Zhe Chen
Acting Country Manager:	Bigyan B. Pradhan
Practice Manager:	Takuya Kamata
Task Team Leader(s):	Ahmed Shawky M. Abdel Ghany, Purna Bahadur Chhetri

BASIC INFORMATION

Is this a regionally tagged project?	Country(ies)	Financing Instrument
No	Nepal	Investment Project Financing

[ ] Situations of Urgent Need of Assistance or Capacity Constraints

[ ] Financial Intermediaries

[ ] Series of Projects

Approval Date	Closing Date	Environmental Assessment Category
20-Mar-2018	31-Dec-2023	B - Partial Assessment

Bank/IFC Collaboration
No

Proposed Development Objective(s)

The Project Development Objectives are to improve irrigation services and to promote improved farming practices for farmers in the irrigated areas of the Rani Jamara Kulariya Irrigation Scheme.

Components

Component Name	Cost (US$, millions)
Component 1: Scheme Modernization	52.9
Component 2: Strengthening Water Users Associations/Committees (WUAs/WUCs) and Agricultural Production Support	13.4
Component 3: Project Management	5.5

Organizations

Borrower:	Nepal
Implementing Agency:	Department of Irrigation

PROJECT FINANCING DATA (US$, Millions)

[✓] Counterpart Funding	[ ] IBRD	[✓] IDA Credit	[ ] IDA Grant	[ ] Trust Funds	[ ] Parallel Financing

Total Project Cost:	Total Financing:	Financing Gap:
72.0	72.0	0.0
	Of Which Bank Financing (IBRD/IDA): 66.0	

Financing (in US$, millions)

Financing Source	Amount
Borrower	3.0
International Development Association (IDA)	66.0
Local Farmer Organizations	3.0
Total	**72.0**

Expected Disbursements (in US$, millions)

Fiscal Year	2018	2019	2020	2021	2022	2023	2024
Annual	0	7.0	14.0	16.0	14.0	11.0	4.0
Cumulative	0	7.0	21.0	37.0	51.0	62.0	66.0

INSTITUTIONAL DATA

Practice Area (Lead)

Water

Contributing Practice Areas

Agriculture

Climate Change and Disaster Screening

This operation has been screened for short and long-term climate change and disaster risks

Gender Tag

Does the project plan to undertake any of the following?

a. Analysis to identify Project-relevant gaps between males and females, especially in light of country gaps identified through SCD and CPF

Yes

b. Specific action(s) to address the gender gaps identified in (a) and/or to improve women or men's empowerment

Yes

c. Include Indicators in results framework to monitor outcomes from actions identified in (b)

Yes

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	High
2. Macroeconomic	Moderate
3. Sector Strategies and Policies	Moderate
4. Technical Design of Project or Program	Moderate
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Substantial
7. Environment and Social	Substantial
8. Stakeholders	Substantial
9. Other	
10. Overall	Substantial

COMPLIANCE

Policy

Does the project depart from the CPF in content or in other significant respects?

[ ] Yes [✓] No

Does the project require any waivers of Bank policies?

[ ] Yes [✓] No

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	✓	
Natural Habitats OP/BP 4.04	✓	
Forests OP/BP 4.36	✓	
Pest Management OP 4.09	✓	
Physical Cultural Resources OP/BP 4.11		✓
Indigenous Peoples OP/BP 4.10	✓	
Involuntary Resettlement OP/BP 4.12	✓	
Safety of Dams OP/BP 4.37		✓
Projects on International Waterways OP/BP 7.50	✓	
Projects in Disputed Areas OP/BP 7.60		✓

Legal Covenants

Sections and Description

The Recipient shall maintain, throughout the period of implementation of the Project, the following structures, all with a mandate, composition, staffing and resources acceptable to the Association: (a) the Project Steering Committee; (b) the PIO within DOI; (c) the ACIU within DOA.

Sections and Description

The Recipient shall maintain ACPs, responsible for: (a) supporting the ACIU for maintaining effective coordination with other agencies and firms engaged in agriculture development; (b) ensuring timely implementation of planned activities; (c) organizing field based extension training activities; (d) providing agricultural training; (e) establishing demonstrations and farmer field schools; (f) providing support in organizing and selecting farmers for training and cross learning visits; and (g) preparing and submitting monthly progress reports to ACIU.

Sections and Description

Unless the Association shall otherwise agree, the Recipient shall ensure that, except in case of unsatisfactory performance, or as required by the Recipient's laws, core staff in PIO and ACIU shall not be transferred to other positions until completion of the Project.

Sections and Description

Without limitation upon the provision of Section 3.01 of this Agreement and Section I.D of this Schedule, the Recipient shall, by not later than six (6) months after the Effective Date, engage an independent party, with terms of reference satisfactory to the Association, for regular independent monitoring of environmental compliance and performance of the Project.

Sections and Description

For the purposes of making grants under Parts B.2(a) and (b) of the Project, the Recipient shall ensure that the ACIU enters into a Grant Agreement with each Eligible Grant Recipient receiving a Competitive Learning and Adaptive Research Grant or Performance-Based Technology Adoption Grant (together referred as "Grants"), under terms and conditions approved by the Association, and in accordance with the Project Implementation Manual.

Conditions

Type	Description
Effectiveness condition	The Additional Condition of Effectiveness consists of the following, namely, that the Recipient has prepared and adopted the Project Implementation Manual in form and substance satisfactory to the Association.

PROJECT TEAM

Bank Staff

Name	Role	Specialization	Unit
Ahmed Shawky M. Abdel Ghany	Team Leader(ADM Responsible)	Irrigation & WRM	GWA09
Purna Bahadur Chhetri	Team Leader	Co-TTL, Agriculture	GFA12
Shambhu Prasad Uprety	Procurement Specialist(ADM Responsible)	Procurement	GGO06
Chandra Kishor Mishra	Procurement Specialist	Procurement	GGO06
Ramesh Raj Bista	Procurement Specialist	Procurement	GGO06
Yogesh Bom Malla	Financial Management Specialist	Financial management	GGO24
Dinesh Kumar Shrestha	Team member	Irrigation Design Consultant	GWA09
Drona Raj Ghimire	Environmental Safeguards	Environment safeguards	GEN06

	Specialist		
Hiromi Yamaguchi	Team Member	Operations consultant	GWA06
Joop Stoutjesdijk	Team Member	Irrigation Engineering	GWA02
Jun Zeng	Social Safeguards Specialist	Social Development & Safeguards	GSU06
Jaya Sharma	Team Member	Gender	GSU06
Junko Funahashi	Counsel	Legal	LEGES
Neena Shrestha	Team Member	Procurement	GGO06
Prakash Awasthi	Team Member	Safeguards documents	GEN06
Rekha Shreesh	Social Safeguards Specialist	Social Safeguards	GSU06
Rupa Shrestha	Team Member	Procurement	GGO06
Satish Kumar Shivakumar	Team Member	Finance Officer	WFALA
Tara Shrestha	Team Member	Assistance	SACNP
Zakia B. Chummun	Team Member	Operations	GWA09

Extended Team

Name	Title	Organization	Location
Shyam Ranjitkar	Irrigation Engineer	FAO	USA
Kunduz Masylkanova	Economist	FAO	Italy

NEPAL
NP MODERNIZATION OF RANI JAMARA KULARIYA IRRIGATION SCHEME - PHASE 2

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I. STRATEGIC CONTEXT

A. Country Context

1. Nepal's economy has performed reasonably well. Growth averaged 4.3 percent (at market prices) over 2005-15. Although declining as a share in the economy, agriculture continues to play a large role, contributing one third of value-added. The service sector has grown in importance, accounting for more than half of value-added in recent years. Industry in general, and manufacturing have grown more slowly and their relative shares in the economy are falling. Similarly, exports continue to struggle, while imports are fueled by remittances which are around 30 percent of Gross Domestic Product (GDP). Inflation was in single digit for most of the past decade, with the peg of the Nepalese rupee to the Indian rupee providing a nominal anchor. Fiscal balances remained sustainable owing to strong revenue growth and modest spending. The incidence of poverty measured against the national poverty line fell by 19 percentage points from 2003/04 to 2010/11, and in 2010/11 (recent data not available), 25 percent of the population was counted as poor. Most multidimensional indicators of poverty also showed improvements across regions in Nepal. However, these gains remain vulnerable to shocks and setbacks, like the 2015 earthquakes which were followed by trade disruptions resulting in the lowest economic growth in 14 years in 2016.

2. Economic activity, which rebounded strongly in FY2017, following two challenging years, has once again been disrupted by floods affecting more than one-third of the country. Rebound in FY2017 stemmed partly from a base effect, as well as a favorable monsoon boosting agricultural output, and earthquake reconstruction gathering speed to raise investment. High inflation in the past two years has moderated sharply and has decelerated to 3.9 percent (year-on-year) in November 2017. Government revenue continued to perform well, and spending has also picked up significantly in FY2017 compared to previous years. Nevertheless, ambitious expenditure targets envisioned in the budget have not been met and the quality of spending has not improved with 60 percent of the capital spending occurring in the last quarter. In the first quarter of the FY2018, the spending pressures have increased with the local elections, preparation for provincial and federal elections, and implementation of federalism. Meanwhile, rapid credit growth in early 2017 has slowed but deposits growth has continued to decline, pushing up the interest rates. On the external side, the cumulative effect of a sharp trade balance deterioration and a slow growth of remittances, are putting pressures on the current account. Economic activity, which was expected to progress well in FY2018, has been affected by the worst floods in decades particularly affecting the agriculture output.

3. Elections for all three tiers (local, provincial and federal) of the state architecture defined by the new constitution were completed in December 2017, marking a protracted but successful conclusion of a political transition that began with the signing of the Comprehensive Peace Agreement in November 2006. At the sub-national level, funds, functions and functionaries hitherto managed by the central, district and village authorities are moving to seven provinces and 753 municipalities for which new legislation, institutions and administrative procedures are being formalized as constitutionally prescribed. Meanwhile, the central level authority is being streamlined with a focus on oversight. These exercises at state restructuring are expected to result in improved outreach and service delivery but will likely take time before they become fully operational.

B. Sectoral and Institutional Context

Improvement of Irrigation to Exploit Agriculture

4. Agriculture in Nepal has yet to exploit the full potential to contribute to improving living standards and livelihood of the people. Agriculture is the mainstay of the rural economy and a source of income for the majority of Nepali with 66 percent of the population engaged in agriculture, 32 percent contribution to the GDP (Central Bureau of Statistics, FY16), and 50 percent contribution to exports earning. The level of income from agriculture is low by regional and international standards, particularly for the major cereal crops (lower than their potential yield by at least 50 percent). Nepal's rural population comprises mainly smallholder farmers, and about 80 percent of the rural population ages 15 and above is engaged in agriculture. The absence of able-bodied farm labor due to exodus to the cities and the Gulf region, continuation of traditional irrigation practice, and limited exposure to modern agriculture practices have led to reduced farm production. The pressing priority is to improve agricultural productivity and foster diversification toward high-value products to secure food security for a growing population and to improve rural incomes.

5. Public investment to improve irrigation is paramount for transforming the agriculture sector. The frail mountain terrain limits the agricultural potential area to 2.64 million ha, of which 1.77 million ha has irrigation potential. The irrigation conveyance and on-farm/use efficiencies are low. At present, the total irrigated area stands at 1.39 million ha, of which only 42 percent has year-round irrigation. There is limited new land that can be brought under farming as most of the economically suitable lands for agriculture have already been exploited due to the substantial increase in Nepal's population in the past century. There is, however, some potential for horizontal expansion in newly irrigated lands of around 0.35 million ha through investment in interbasin transfers. Thus, the largest potential for increasing production is by providing better agricultural inputs and ensuring irrigation to the existing cultivated land, namely, a 'vertical expansion'. Modern agricultural practices require crop diversification, high-yielding varieties, improved fertilization, and reliable year-round irrigation.

6. Improving irrigation is critical to agriculture both during the monsoon season, to overcome the periods of dry spells, and during the dry season, when rainfall is negligible. Agriculture is becoming even more vulnerable to water due to the erratic monsoon rain. Farmers receive unreliable rainfall with both droughts and intense rainfall/floods often occurring in the same season. Transforming the agriculture sector requires upgrading the irrigation systems to regulate the irrigation supply. Only by mobilizing public funding to invest in effective irrigation systems, farmers can focus on the complementary inter-farm/farm-level investments such as improving agricultural techniques and inputs and cropping intensity, thus transforming farming to more profitable levels.

Government Irrigation Policy and Irrigation Development Program

7. The Government of Nepal (GoN) has recognized the lack of intensive cropping, inadequate supply and use of basic agricultural inputs, and problems with deteriorated and inefficient irrigation systems. The Agriculture Development Strategy (ADS) (2015) recognizes concentrated investment in irrigation as one of the means to accelerate agricultural growth. One of the key targets of the ADS is to achieve 5 percent growth in agricultural GDP by 2025 from the current 3 percent. To achieve this, the ADS plans to expand the area under year-round irrigation from the current 18 percent to 60 percent by 2025. Thus, irrigation is seen as a critical investment for national agricultural production and economic transformation.

8. As the GoN internalized the concept of year-round irrigation through its Nepal Water Resource Strategy (2002) and National Water Plan (2005), the Department of Irrigation (DoI) aimed to provide year-round irrigation to high-potential areas to boost crop production, leading to food self-sufficiency, employment generation, and poverty reduction. Four themes under this DoI goal and some of the DoI target indicators for the next five years, in incremental areas and crop yields, are referred to in annex 1.

9. The DoI is entrusted with planning, designing, and implementing medium to large irrigation projects (IPs) mostly in the hills and Terai region. The Rani-Jamara-Kulariaya (RJK) IP, Mahakali III, Babai IP, Sikta IP, and Bagmati IP are examples of such large undertakings. The DoI intends to continue the development of feasible new irrigation schemes in the future. The DoI has started the use of solar energy to pump blue water to adjoining river terraces for irrigation, and intends to expand its use to all feasible areas. The RJK Irrigation Scheme (the closed World Bank-financed Phase 1 and the proposed Phase 2) is among the largest schemes in the entire country under the category of new schemes, and it benefits one of the poorest areas in the Terai in the southwest of the Karnali River basin.

Farmer Organizations and Participatory Irrigation Management

10. Improving irrigation services in the existing traditional farmer-managed irrigation systems (FMIS) developed and managed by the communities requires a combination of (a) rehabilitating and modernizing existing irrigation and drainage infrastructure to improve reliability of supply and expand the system of secondary and tertiary canals; (b) the development of more efficient mechanisms for managing the irrigation systems down to the field level, through a clear delineation of responsibilities between the GoN and the WUAs in charge of delivering irrigation services to farmers; and (c) pool of funding through GoN and users' contributions for operation and maintenance (O&M) and asset replacement over time.

11. The Irrigation Policy 2013 envisaged the farmers' participation right from the planning stage to the O&M and clearly promulgates a participatory approach as one of its governing policies. For the development of tertiary and lower-order canals, the beneficiary farmers will have to share a certain percentage of the total development cost that can be in the form of labor, cash, or land. The WUAs/WUCs are supposed to play a vital role in disseminating the information to the general farmers regarding the irrigation and drainage system development plans and develop consensus on tentative alignment of canal network, offtake locations, and other infrastructure. Besides, they need to coordinate on land acquisition and resettlement issues, among others.

C. Higher Level Objectives to which the Project Contributes

12. The proposed project is consistent with the Nepal Country Partnership Strategy (CPS) for FY14–18 (83148-NP, discussed by the Board on May 29, 2014) to support poverty reduction and shared prosperity in Nepal. The proposed project is aligned with Pillar 2 of the CPS 'Increasing Inclusive Growth and Opportunities for Shared Prosperity'. The proposed project aims to improve agriculture and water productivities through modernizing or rehabilitating the lower-order irrigation infrastructure, strengthening WUAs, and implementing a comprehensive agricultural improvement program (CPS Outcome 2.1). The proposed project will also contribute to sustainable growth and poverty reduction and is fully consistent with the World Bank's twin goals of ending poverty and boosting shared prosperity in the project area.

II. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

13. The Project Development Objectives (PDOs) are to improve irrigation services and to promote improved farming practices for farmers in the irrigated areas of the Rani Jamara Kulariya Irrigation Scheme.

B. Project Beneficiaries

14. The proposed project is in the Terai (plain) area of Nepal. Located in the Kailali District of the Far Western Development Region, the project covers three municipalities, two at the township levels (Tikapur and Lamki-Chuwa) and one at the village level (Janakinagar). Tikapur Municipality is the main market center in the project area.

15. The existing Rani Jamara and Kulariya Irrigation Scheme consists of three independent traditional irrigation systems constructed, operated, and managed by the indigenous Tharu community. The ethnic composition of the project area includes Tharus as the dominant group (48 percent) followed by Chhetri (17 percent), Dalit (15 percent), Brahmin (10 percent), and others (7 percent). There are three WUAs for the branch canals, one central committee (WUA federation) that has representations of the three WUAs, in addition to 48 WUCs for the subbranch and tertiary canals.

16. The target area is the 14,300 ha of the RJK command area. The scheme abstracts water from the Karnali River, a major left-bank tributary of the Ganges River. A majority 48 percent of the households in the RJK command area are members of the indigenous Tharu community. Based on the 2015 Census, agriculture is the main source of livelihood for around 60 percent of the RJK households, whereas around 21.7 percent of the households considered their off-farm daily wages as their main source of livelihood. As per the impact evaluation performed by the MoRJKIP throughout 2017, the majority of households were engaged in agriculture, but 30.4 percent were also engaged in other jobs to supplement their income. As many as 27.4 percent of the households were led by a female. The land that corresponds to the household seasonal cropping patterns is the only area that is currently irrigated, at 9,106.8 ha, with the remaining 2,087.4 ha not being cultivated.

C. PDO-Level Results Indicators

(a) Area provided with new/improved irrigation or drainage services: in hectares

(b) Farmers reached with agricultural assets or services: in number, with the number of females as a supplemental indicator

(c) Farmers adopting improved intensified cropping promoted under the project: in percentage of target beneficiaries, with the number of females as a supplemental indicator

III. PROJECT DESCRIPTION

17. The proposed operation is the second phase of the IDA-supported MoRJKIP (Phase 1) that closed on September 30, 2017. Initially, the two phases were prepared jointly as one operation, yet eventually it was

decided to split them into two phases. Phase 1 focused on modernization of the higher-order irrigation infrastructure (intakes and feeder and branch canals, including related flood protection), enhancement of the capacity of WUAs to operate and maintain the improved/new irrigation infrastructure, and preparation and initiation of an agricultural development program. The proposed operation (Phase 2) will focus on modernization of the lower-order irrigation system (subbranches, tertiary canals, and watercourses) so that irrigation water can reach farmer fields with the optimal flows, continuation of the WUA/WUC support program, and implementation of a comprehensive agricultural improvement program.

18. The proposed Phase 2 complements Phase 1 in two interrelated ways: (a) below the main/conveyance system introduced by Phase 1, the irrigation distribution and on-farm application would both continue to be very low compared to global/regional norms without Phase 2 (see the technical details in annex 1); and (b) the WUA's function is not supposed to stop at the main system level. There is a need to utilize the immense potential for jointly participatory management (JPM) in the RJK community, building on the creation and empowerment of WUAs attained under Phase 1, so that the WUAs can also have a major role in the O&M of the irrigation subsystem down to the farm level.

19. **Link with the GoN's policy to develop year-round irrigation.** In the project area, it is reported that during the non-monsoon/winter season many farmers seek jobs abroad due to the lack of lucrative winter cropping, and then they return to Nepal in the monsoon season to grow paddy. The project will help in tackling this problem by modernizing the irrigation system to increase cropping intensity from around 150 percent to 250 percent. Despite the absence of inter/intra-seasonal surface storage, the project seeks to meet the aforementioned GoN's year-round irrigation strategy through (a) modernizing the lower-order canal system to enable the operators/farmers to optimize the use of canal storage and soil moisture storage in reducing water losses and (b) extending the canal system to connect better with the Karnali River, compared to the pre-Phase 1 situation when the river often meandered away from the hand-dug approach canals, and thus water failed to adequately reach the branch canals in the winter season (forcing many farmers to grow only one crop in the monsoon season or resort to using groundwater in the winter season at a high pumping cost).

A. Project Components

20. The envisaged project components are as follows (see detailed information in annex 1):

Component 1: Scheme Modernization (US$52.9 million, of which US$51.3 million IDA)

21. Component 1 will support the construction and modernization of the lower-order irrigation infrastructure, including the subbranch canals, tertiary canals, and watercourses. The activities will include design and execution of irrigation and drainage subsystems below the branch canals and down to the field outlet levels, including not only the irrigation subsystems but also related river training and flood protection works, collector and tertiary drains, and control structures. This component will thus finance the following activities: (a) Provision of technical assistance for design, monitoring of construction works and quality control, and implementation of the environmental management plan; (b) Construction, rehabilitation, and modernization of the lower-order irrigation infrastructure, including subbranch canals, tertiary canals, and watercourses; (c) Design and construction of flood and erosion protection system in the command area; (d) Improvement, upgrade, and maintenance of rural roads and construction of bridges for better access to the agricultural production areas; and (e) Improvement and upgrading of service roads for better access for maintenance and operation of the canals and canal infrastructure.

Component 2: Strengthening WUAs/WUCs and Agricultural Production Support (US$13.4 million, of which US$11.3 million IDA)

22. Component 2 will support two subcomponents: 2a: Strengthening WUAs/WUCs and 2b: Agricultural Production Support.

23. **Subcomponent 2a.** The activities will include carrying out a program of activities, including capacity building and training to strengthen WUAs/WUCs to assume responsibility for management, operation, and maintenance (MOM) of the modernized system, including proper and equitable distribution of water, water use, development, and implementation of MOM plans; setting ISFs; proper maintenance of records and accounts; promoting citizen engagement (CE) and gender mainstreaming for participatory irrigation management (that is, the aforementioned GoN's JPM program), a Gender Action Plan (GAP) as part of a Vulnerable Community Development Plan (VCDP), and participatory monitoring, learning, and evaluation. The GAP includes awareness raising, capacity development trainings, farmer field school (FFS), agriculture-based training, small farm machinery support to women members, compensation to female-headed households (FHHs), and so on.

24. **Subcomponent 2b.** The subcomponent will carry out a series of agriculture-based activities in the project area, building on the capacity developed by Phase 1, which created the Agriculture Component Implementation Unit (ACIU) (under the Department of Agriculture [DoA]) at Tikapur. Phase 2 will support a value chain approach to internalize the gains made in Phase 1 and to sustain agricultural production through the promotion of climate-smart agriculture and livestock practices, crop diversification, post-harvest support (storage, grading, and marketing), farmer training, production and block demonstrations and FFS, and other adaptive processes. The agricultural activities will be aligned with the ADS by focusing on high-value crops, taking advantage of the irrigation improvements. This subcomponent will thus finance extension and outreach services (including through sub-grants), technology adoption support (mainly through small performance-based subgrants), soil management practices, plant protection and seed testing mini-lab and equipment, mechanization support (through the provision of matching grants), post-harvest support (including through sub-grants), promotion of livestock activities for income generation and nutrition needs, support program for landless and marginalized poor people, support for marginal and flood-affected land[1], training and study visits, and vehicles and logistics. Provision of matching grants will be made through an agreement between the ACIU and the eligible beneficiaries following a fair and transparent process as guided by the Project Implementation Manual (PIM) to be finalized by project effectiveness to ensure compliance with the fiduciary requirements.

Component 3: Project Management (US$5.5 million, of which US$3.4 million IDA, including goods, technical assistance, and capacity building)

25. Component 3 will support activities to ensure effective project management, including fiduciary and safeguards management and monitoring and evaluation (M&E). This component will also finance the preparation of a potential future Phase 3 to cover the RJK-Lamki extension.

B. Project Cost and Financing

[1] These are unutilized or unmanaged lands that are not habituated by squatters and hence do not trigger involuntary resettlement.

Table 1. Components by Financiers

Components by Financiers (US$, millions)	IDA Loan		Government		Beneficiaries		Total	
	Amount	%	Amount	%	Amount	%	Amount	%
Component 1	51.3	96.9	0.8	1.4	0.9	1.7	52.9	73.7
Component 2	11.3	84.4	0.0	—	2.1	15.6	13.4	18.6
Component 3	3.4	62.1	2.1	37.9	—	—	5.5	7.7
Total project costs	66.0	91.9	2.8	3.9	3.0	4.2	71.8	100.0

26. The project will have different cofinancing arrangements, based on funding flows for each component. Under all components, cofinancing of IDA and borrower funds will be 'joint financing', with different IDA percentages (Component 2 will have at least two different IDA percentages, as it comprises small grants for which counterpart percentages follow GoN/DoA norms). Based on lessons from Phase 1, eligible disbursements for the DoA will be grouped under one subcategory, separate from the DoI. The end-beneficiary/WUA contributions will be through parallel financing, as these will mainly be cash and in-kind contributions to O&M of canals such as labor charges during the project lifetime[2]. Refer to Annex 2 for further details, including on agreed provisions for retroactive financing and a draft Table for eligible expenditure by categories.

C. Lessons Learned and Reflected in the Project Design

27. The M&E framework under Phase 1 was below par, while the last Implementation Status and Results Report indicated that Phase 1 had been on track toward meeting the PDO in a satisfactory manner. The Project Implementation Office (PIO) acknowledges the need for Phase 2 to mobilize full-time consultants for M&E.

28. A focused effort needs to be made to reach landless poor farmers. Landless poor farmers have only benefited indirectly from Phase 1 through the farm labor added due to the construction and agricultural activities. These landless farmers have recently been granted public lands by the GoN, and hence they should directly access the irrigation improvements under Phase 2 if their land is located within the command area.

29. The experience of Phase 1 and the World Bank-funded IWRMP has shown that IPs, when integrated with a strong agricultural component, tend to produce tangible and quick impact on increasing agricultural productivity and are well received by local farmers. However, to help farmers benefit from the additional gains in production, the project will need to strengthen the post-harvest support. Phase 2 will thus adopt a value chain approach with a strong focus on marketing aspects to ensure optimal returns from investment.

30. Use of modern technologies and tools and equipment (for example, power tillers, threshers, reapers and rice planters, and drip irrigation systems) has contributed to reducing the cost of production as well as addressing labor shortages. In Phase 2, the project will continue to promote these technologies and packages to help farmers attain efficiency in production and make agriculture more competitive and profitable.

[2] In the first 4 years of the project, the total MOM costs would be around $0.2 million/year, at least half of which would be born by the Government, until the ISF collected from end users picks up. Starting year 5 of the project, the total MOM costs may reach US$0.9 million, of which the Government would contribute around 20-30 percent and end users/WUAs contribute 70-80 percent, in cash and in kind. The total end-user contributions (ISF) over the project lifetime would be around US$1 million (which the cost table does not include), mostly in-kind.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

31. The DoI will have the overall responsibility for implementing the proposed project and be the main implementing agency through the PIO in Tikapur. The DoA will be the implementing agency for Subcomponent 2b and the ACIU in Tikapur (that reports to both the PIO and DoA) will be responsible for implementing the agricultural activities. The proposed implementation arrangements are largely similar to those in Phase 1. The PIO located in Tikapur continues to be the main office for the day-to-day management and implementation of the project. A small liaison office will be established in the DoI in Kathmandu to liaise with related agencies and stakeholders on behalf of the PIO. The PIO will be responsible for overall contractual management of civil works coordination with WUAs, agricultural agencies, forestry and environment departments, wildlife conservation, local agencies for roads, and district administration. Agricultural activities will be implemented through the AICU in close consultation with the PIO, WUAs, and other stakeholders in the municipalities. This will entail coordinated planning, implementing, and monitoring agricultural activities with the PIO, local government, and other actors in the project area; preparation of financial and progress reports; and submission of audit reports.

32. The PIO will be headed by a project manager, based in Tikapur, who will be assisted by staff from the Social, Environmental, and Institutional, Technical, Procurement, and Financial Management (FM) Units. The Social, Environmental, and Institutional Unit, headed by a sociologist who will be deputed by the DoI, will have direct links to the WUAs to implement the institutional and capacity development program. A Local Environmental Monitoring Committee (LEMC), composed of, inter alia, local protected area agency, forest authority, nongovernmental organizations (NGOs), will visit the project area periodically to inspect environmental management and facilitate coordination. The GoN will also engage an independent party for regular monitoring of the environmental compliance, management, and performance in the project. The frequency of these inputs may be revised during project implementation, depending on actual requirements.

33. The agriculture service centers and agriculture contact points (ACPs), currently managed by the District Agriculture Development Offices, will eventually be implemented by the community agriculture service centers under respective municipalities. While the transition is expected to take place soon, it will take at least three to five years before these centers become fully functional. Thus, the main task of the ACIU will be to (a) continue to provide the extension services in the RJK command area during the transition and (b) support the establishment of these service centers and staff capacity to effectively deliver agricultural advisory services after project closure.

34. The Project Steering Committee, chaired by the Secretary of the MoI, will maintain the structure and composition. Membership includes senior management staff of the Ministry of Finance (MoF), Ministry of Agriculture Development, Ministry of Forests and Soil Conservation, Ministry of Environment, National Planning Commission, DoI, and DoA. The Steering Committee provides overall policy guidance and ensure coordination between related agencies to support the project.

B. Results Monitoring and Evaluation

35. The PIO, with the support of its project implementation consultants, will be responsible for overall project M&E. The GoN will engage an independent party for regular independent monitoring of the

project's environmental compliance and performance, as done under Phase 1. The M&E for most indicators, including on safeguards compliance, will be conducted on a quarterly basis and the results will be presented as part of the project's quadrimester progress report. The PIO will use simple management information system (MIS) and grievance redress mechanism (GRM) databases, to track progress in project implementation and in CE, respectively.

C. Sustainability

Sustainability of the Assets Created/Modernized and Institutions Supported by the Project

36. Sustainability of the assets created or modernized by the project will be secured by adopting the proper design and construction methods (see annex 1), the ownership of farmers and WUAs of the assets (the JPM approach), and the O&M arrangements that will be put in place by the project.

37. The sustainability of institutions supported by the project will be secured through the extensive capacity-building activities under Phase 2. Specifically, activities under Component 2 will adopt the GoN's Irrigation Policy (2013), which mandates the participation of water users in every cycle of the project from project design through implementation and JPM in the system's O&M after completion of the command area development (CAD) activities. The subcomponent 2a will support organizational development to improve the handover to WUCs of the completed portion of the CAD and JPM aspects, based on the experience gained in the past from other large-scale IPs (Sunsari Morang, Bagmati, and Narayani IPs).

Financial Sustainability and Autonomy of O&M

38. MOM of the irrigation scheme will be carried out by the WUAs and its costs will be financed jointly by the GoN and water users. The MOM funding requirements for both the Phase 1 and 2 investments will be determined through an asset management study to be carried out amid effectiveness for Phase 1 and Year 5 for the Phase 2.

39. Indicatively, the total MOM funding requirement for main and secondary canals and flood protection infrastructure is estimated at Nepalese Rupee (NPR) 158.9 million, including MOM of main canals and flood protection infrastructure at NPR 78.2 million and secondary and tertiary canals at NPR 80.7 million. Of the total estimated amount, the GoN will contribute NPR 12.5 million and the remaining NPR 68.4 million is expected from water users through their cash and in-kind contributions. In 2017, the water users contributed around NPR 62.0 million or 91 percent of the required amount. Water users' contributions included cash contribution at NPR 1.3 million and in-kind contribution at NPR 60.7 million.

40. The required MOM funding requirement is expected to reduce from the currently estimated amount at NPR 158.9 million to NPR 143.4 million after the secondary and tertiary canals are modernized and built. This corresponds to NPR 9,153 per ha, which is less than the current (actual) contribution of water users at NPR 9,793 per ha. However, it is critical for water users to increase their cash contribution from NPR 117 per ha (collected through the ISF on 11,300 ha, which is currently linked to the irrigation network) to NPR 727 per ha to allow the WUAs to meet the cash portion of MOM funding requirements.

Environmental and Water Resources Sustainability

41. The agricultural component will build the capacity of the farmers' groups, cooperatives, and individual entrepreneurs to be able to take up sustainable and climate-smart agricultural and livestock

practices through various interventions, such as practical training, cross-learning events, promotion of appropriate tools and technologies, and adopting value chain approaches to ensure that farm produce finds access to markets. Through FFS, the project will develop FFS facilitators/local resource persons who will continue to provide services even after the project is concluded.

42. Phase 2 will not increase the net withdrawal from Karnali River, as the goal is to increase—within the command area—the irrigation conveyance and distribution efficiencies. The saved water/drainage losses will offset the possible increase in crop transpiration. Also, there will not be any significant impact on groundwater. The groundwater safe yield (sustainability) will not be affected as the groundwater aquifer is replenished by drainage/flood flows from not only the project command area but also from two other adjacent catchments (Palharia and Mohana). Thus, the recharge far exceeds the discharge. For many aquifers in Nepal, including the aquifer underlying the project area, the ratio of recharge to discharge is as high as 5:1, as the groundwater is mostly tapped for the domestic rather than the irrigation purposes.

43. Floods, such as the recent one that occurred in the summer of 2017, do not cause sizable damage to the scheme. The recent flood has only disrupted few livelihood activities at the right bank of Patharia River, for which flood control dikes will be constructed under the proposed Phase 2. The proposed dikes will also help contain the dolphins within their preferred river path amid the high monsoon floods.

V. KEY RISKS

A. Overall Risk Rating and Explanation of Key Risks

44. The overall risk rating for the proposed project is Substantial, as assessed in the Systematic Operations Risk-rating Tool presented in the data sheet of this PAD. There is a strong commitment from the DoI and DoA to address and mitigate the risks. The main risks and associated risk management/mitigation measures can be summarized as follows:

45. **Political and governance - High.** Nepal's transition has been characterized by frequent government changes. Nonetheless, new constitutional checks and a far fewer number of political parties following the 2017 elections bode well for stability in the coming days. However, state restructuring on this scale is uncharted territory for Nepal and smoothening the transition from the previous unitary system to the new federal one will remain a daunting task. The new system takes effect in January 2018 and, in principle, provides opportunities to decentralize development benefits and make service delivery more effective and accountable. However, the risks of jurisdictional overlap between the three tiers of government, lack of clarity and coherence between policies and devolved powers, and duplication of efforts will remain high during the coming few years. Key aspects of the new system require further definition and may continue to be contested by different population groups. The project will be operated by the federal level of the government, and this should help mitigate risks arising from any lack of clarity on subnational roles/responsibilities during the ongoing changes.

46. **Fiduciary - Substantial.** A heavy procurement workload will be assigned to the DoI. The DoI and DoA have been received capacity building in World Bank procurement/fiduciary through the Phase 1 and other projects. The World Bank will guide the DoI and DoA staff to address risks from procurement and contract management, and train them on the newly introduced procurement/contract monitoring tool, the Systematic Tracking of Exchanges in Procurement ('STEP'). The World Bank has demonstrated a

willingness to help the GoN build political consensus with political parties and stakeholders. The DoI through its PIO and consultants will interact with the WUAs to coordinate the procurement.

47. **Institutional capacity for implementation and sustainability - Substantial.** In Nepal staff transfers occur every two years. The ongoing political transition is likely to affect staff transfer and retention. Frequent staff turnover, as has been observed in the past, tends to undermine smooth and timely implementation of planned activities. The risk will be mitigated by (a) continued staff capacity building and (b) the hiring of relevant consultants on an as needed basis to fill in capacity gaps that may arise.

48. **Environment and social - Substantial.** Compared to Phase 1, the proposed project will intervene in the subsystem and inter-farm areas, closer to the privately-owned assets and farmer livelihoods, thus likely requiring a greater effort in applying OP/BP 4.12. There could be risks associated with vulnerable groups including indigenous peoples. The environmental risks, as in Phase 1, are related to construction disturbances, health and safety, biodiversity, and increased use of pesticides. These risks will be mitigated by designing and implementing necessary mitigation measures including Resettlement Policy framework (RPF), VCDP, Environmental Assessment (EA) containing an Environmental Management Plan (EMP), Biodiversity Impact Assessment (BIA) and Integrated Pest Management Plan (IPMP), training the PIO staff and contractors on safeguards, inclusion of contractors' safeguards obligations in the international/national contracts, and monitoring of their compliance by the PIO and supervision consultants.

49. **Stakeholders - Substantial.** Key risks include farmers' inability to provide a sufficient level of financial contribution for O&M and lack of WUA capacity to take over O&M for the introduced system. The institutional and extension support under Component 2 will address this risk.

VI. APPRAISAL SUMMARY

A. Economic and Financial Analysis

50. Through Phase 1 and 2 investments, the MRJKIP aims at improving water productivity and strengthening farmer organizations within the RJK command areas at off-farm and on-farm levels. The analysis (please see annex 4) examined the feasibility of the MRJKIP through aggregation of Phases 1 and 2 investments and potential benefits to them. Main actual and anticipated direct benefits include (a) increases in yields, (b) increases in cropping intensity, (c) diversification toward high-value nutritious crops, (d) prevented flood-related damages and losses, and (e) reduced CO_2 emissions. Indirect benefits to non-farm communities are not accounted. The project benefits are assessed for 40 years at 2017 prices and using opportunity cost of capital at 5 percent, and assuming 70 percent success rate for all benefits except the above (d) prevented flood-related damages and losses and 100 percent for the (d).

51. Annual net incremental benefits to average farm households are expected to range from NPR 38,653 to NPR 50,250. Total net incremental returns are estimated at NPR 44.2 billion. Estimated financial rate of return is 15.4 percent and financial net present value is NPR 11.1 billion. Economic net present value of benefits is estimated at NPR 22.4 billion with economic rate of return at 25.1 percent.

52. The project is moderately sensitive to changes to the project cost, benefits, and lack of diversification. A project cost increase by 20 percent drops the base Economic Rate of Return (ERR) from 25.1 percent to 21.4 percent, whereas a 20 percent reduction in the scope of benefits drops it to 20.6

percent. The project is sensitive to a lack of diversification and two years delay in benefit accumulation with respective ERRs dropping to 14.9 percent 16.3 percent under these scenarios.

B. Technical

53. The DoI project preparation consultants have finalized the engineering designs and modes of canal rotation in consultation with the World Bank team, WUAs, and the MoRJKIP stakeholders. Each branch canal will have one pilot/priority area of about 300 ha, which will include watercourses serving an average area of about 28 ha with a field outlet providing water to 4 ha. The pilot area for Kulariya branch will be Bhagaraiya sub-secondary system with 287 ha; for Jamara branch, it will be Bhagatpur sub-secondary system and Simreni 1, 2, and 3 (Uttar Simreni, Dakshin Simreni, and Sati Padampur); and for Rani branch, it will be the kulos area. See annex 1 for the technical details.

C. Financial Management

54. The FM capacity assessments for the DoI and DoA are found satisfactory, given the experience from Phase 1 as well as from the other ongoing World Bank-supported projects. The same processes and procedures that are applicable in Phase 1 for planning, budgeting, funds flow, accounting, reporting, internal control/audits, and external audits will apply for this project as well. Overall, financial reporting, budget allocation, and fiduciary transactions will be the responsibility of the DoI through the PIO and the DoA through the ACIU at Tikapur that is responsible for the FM of its own activities under Subcomponent 2b. The staffing for accounts and finance functions at both agencies are found adequate and satisfactory. The PIO shall be responsible for submission of periodic consolidated financial reports of both components. The PIO shall prepare and furnish to IDA, not later than 45 days after the end of each Fiscal quarter, interim unaudited financial reports (IUFRs) for the project covering the Fiscal quarter. The annual consolidated project financial statement will be audited by the Office of the Auditor General (OAG), which is considered acceptable by IDA for this purpose, and submitted to IDA within six months after the end of the fiscal year. There are no outstanding audit reports or audit issues. The PIO shall be responsible for disbursement of both components. Based on quality and timeliness of the financial reports of Phase 1, a report-based disbursements approach is proposed for Phase 2. The disbursements will be in the form of reimbursement supported by IUFRs or direct payments with invoices/relevant supporting documents. For operationalization of the small subgrants under Component 2, by project effectiveness, a PIM will be prepared satisfactory to IDA, which shall include the rules, methods and procedures, and fiduciary arrangements for managing this subgrant activity. According to the RPF, if acquisition of small land plots is needed, the GoN/borrower will fund the related compensations/expenses in the form of parallel financing.

D. Procurement

55. The DoI is the primary responsible agency for project implementation. The DoI will also be responsible for consolidating a Procurement Plan for the component under the DoA. The procurement capacity assessment for the DoI and DoA is Satisfactory, given the experience from Phase 1 as well as other ongoing World Bank-supported projects.

56. Procurement for the project will be carried out in accordance with the ‘World Bank Procurement Regulations for Recipients under Investment Project Financing’, dated July 1, 2016 (hereafter referred to as ‘Procurement Regulations’). ‘Guidelines on Preventing and Combating Fraud and Corruption in Projects

Financed by IBRD Loans and IDA Credits and Grants', dated July 1, 2016, and 'Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants', dated July 1, 2016, shall apply to the project. Key procurement activities under the project include (a) complex and high-value works contracts in the CAD of the Rani Jamara Kulariya Irrigation Scheme and (b) consulting services for supervision of construction works.

57. A Project Procurement Strategy for Development (PPSD) for the project and a Procurement Plan for the first 18 months have been prepared. The PPSD proposes to use a market approach of complex and high-value works contracts by adopting an 'open and international' with a 'prequalification' selection method for the construction and rehabilitation of canal structures, girder bridges, and agricultural roads improvement. The market approach for works and goods contracts above the estimated value of US$25,000 and below US$5 million will be 'open and national' following the Public Procurement Act 2007 (with the first amendment) and the regulations made thereunder, along with the IDA prescribed caveats, stated in the PPSD. The procurement approach for consulting assignment estimated to cost around US$2.5 million will be open and international. The PPSD mentions corrective measures to mitigate the risks based on the experience of the DoI in implementing Phase 1.

58. **Procurement Plan.** Project procurement planning and transactions will be done using the STEP system, the World Bank's online procurement planning and tracking system. Necessary training to project staff on STEP will be conducted by the World Bank team. Approved Procurement Plans, procurement opportunities, and contract award information will be published on the World Bank's external website, through STEP. The same information will also be made available through the GoN's project website.

E. Social (including Safeguards)

59. **Indigenous Peoples OP/BP 4.10.** The project will be implemented in an area with indigenous ethnic minorities. Tharus, indigenous to the area, are in a majority (48 percent), followed by other indigenous groups from the hill. The project areas also comprise other vulnerable groups such as Dalits and women-headed households. Given that Phase 2 impact zone is defined, a Social Assessment (SA) and a VCDP have been prepared. The SA and VCDP will cover the mitigation measures and interventions related to indigenous groups and other vulnerable groups.

60. **Involuntary Resettlement OP/BP 4.12.** Major issues of land acquisition are unlikely. However, the upgrading works may require acquisition of small plots of land and may have impacts on structures requiring relocation. The RPF for land acquisition and resettlement has being prepared. It will provide a legal framework on involuntary resettlement. The RPF provides a detailed resettlement planning procedure. It includes, among others, entitlement matrix, communication strategy, and GRM. The PIO, supported by the social safeguards consultant, has carried out the SA of the following pilot areas, where detailed designs were completed by project appraisal: Bhagaraiya sub-secondary system with 287 ha for the Kulariya branch; Bhagatpur sub-secondary system and Simreni 1, 2, and 3 (Uttar Simreni, Dakshin Simreni, and Sati Padampur) for the Jamara branch; and kulos area for the Rani branch canal. The SA indicates that there will be no impact on the private assets and livelihood due to the project activity in the pilot areas and thus Resettlement Action Plan (RAP) is not required. During implementation, if any impact on private assets and livelihood is noted, the project will manage such cases as required by the RPF. For the remaining schemes where project interventions were not determined by appraisal, the RPF will be a guiding document for preparing RAPs during implementation, once the detailed designs are ready.

Eexpenditures relating to land acquisition and compensation, resettlement and/or rehabilitation payment to Displaced Persons will be financed exclusively out of the Recipient's own resources.

61. **Citizen Engagement.** In Phase 2, CE has been incorporated through Component 2, by engaging water users in every cycle of the project and the JPM in the system's O&M after completion of the CAD activities. A GRM that involves community members in resolution of problems and disputes will be established.

62. **Gender and Social Inclusion.** Phase 2 will build on the lessons from Phase 1, feedback from focus group discussions, and insights to better incorporate women. The proposed project will establish a procedure for involving women, disadvantaged, and vulnerable groups in the JPM activities and for ensuring their presence in the WUAs/WUCs, building on the progress attained in Phase 1. The proposed project will continue to maintain 33 percent female membership in the WUAs/WUCs and dedicate separate sessions for women, aimed at increasing their roles throughout the subproject cycle, including WUAs' administration and decision making. The project will organize the public events in an environment that will encourage female participation, study tours, involving at least 5 female trainees from project staff, and training events on gender and social inclusion to the three branch-level WUAs and to their WUA assembly.

63. The budget for CE, gender and implementation of GAP will be mobilized from the budget for the subcomponent 2a, as well as for safeguards management under Component 3 (the VCDP). The detailed information of the above Citizen Engagement, and Gender and Social Inclusion is provided in annex 6.

F. Environment (including Safeguards)

64. **Environmental Assessment OP/BP 4.01.** As the project scope includes physical construction activities and agricultural production support, potential adverse impacts on the natural environment and human health and safety are likely. The command area is defined and main and branch canals are existing (modernized in Phase 1). Hence, an EA containing an EMP has been prepared for the modernization and agricultural production activities. The EA/EMP, among others, covers issues related to labor and labor camps and environmental, health, and safety (EHS) issues (following the World Bank Group's EHS Guidelines). These requirements are applicable to the provision of farm channels, as demanded by the farmers, during implementation.

65. **Natural Habitats OP/BP 4.04** was triggered in Phase 1 due to work on the main system. Karnali and Mohana Rivers are known to have important aquatic species (Gangetic dolphin, marsh mugger, and gharial crocodile). Occasional movement of wildlife has been reported in the adjoining forests. These locations are not within, but about 7 km away from, the project command area where project activities will take place. Indirect impacts on the natural habitat and biodiversity are likely. Hence, impacts on natural habitat and biodiversity have been assessed and appropriate mitigations have been identified in the BIA, which contains biodiversity management measures.

66. **Forests OP/BP 4.36** was triggered in Phase 1 due to work on the main system. There are community forests adjoining and forest patches within the project command area. Some sections of the main/feeder canal constructed in Phase I were located in the community forests. In Phase 2, the main construction works are focused only on the subbranch canals, tertiary canals, and inter-farm watercourses. These structures are far from community forest areas. Hence, there is less chance of

adverse impacts on forests. Nevertheless, indirect impacts on forests are likely (loss or degradation of forest health or quality). The EA has assessed the potential impacts and proposed mitigations.

67. **Pest Management OP 4.09.** Emphasis of Phase 2, under Component 2, is to increase and sustain agricultural production by carrying out a series of agriculture-based activities, adopting a value-chain-based approach. This is likely to lead to the introduction of pesticides or increased use of pesticides (the project will not finance purchase of pesticides). The issue related to pesticide use and its impacts has been reviewed thoroughly and the IPMP has been prepared and includes measures to mitigate any adverse impacts from the increased use of pesticides.

68. **Climate change co-benefit.** The proposed project will contribute to both climate change mitigation and adaptation co-benefits. The climate co-benefits percentage has been assessed at 78 percent. The climate and disaster risk has been screened by the team. The exposures to climate and geophysical hazards at the project location, as identified by the screening, are flooding, drought, and earthquake. The analysis indicates that the project components will all help in reducing the impact of such potential disaster risks. Further detail is found in Annex 6.

69. **Greenhouse gas (GHG) emission.** The net emissions of the project are estimated at −1,051,719 tCO_2e over the 28-year life of the project. Gross emissions are expected to be 3,003,929 tCO_2e. Net annual average emissions are estimated at −35,142 tCO_2e. The project envisages net mitigation due to the higher soil carbon sequestration potential caused by implementing improved agricultural practices and WRM on annual crop land while also using less diesel-based energy to pump water for irrigation (see annex 6).

G. Other Safeguard Policies (if applicable)

70. **Projects on International Waterways OP/BP 7.50** was triggered with Phase 1 as it focused on works on the river and main system. In Phase 2, works on the subsystem and inter-farm levels are not expected to cause any appreciable transboundary water impact. The system modernization is expected to reduce water abstraction. The hydromodule is currently as high as 3 liters per second per ha and thus will not affect the water flowing downstream. An exception to the notification requirement under OP 7.50 was received from South Asia's Regional Vice President (RVP) on February 24, 2011. Through a similar rationale under Phase 1, the South Asia RVP has approved the exception to the notification for the proposed Phase 2 on November 28, 2017.

H. World Bank Grievance Redress

71. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit *http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service*. For

information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

VII. RESULTS FRAMEWORK AND MONITORING

Results Framework
COUNTRY: Nepal
NP Modernization of Rani Jamara Kulariya Irrigation Scheme - Phase 2

Project Development Objectives

The Project Development Objectives are to improve irrigation services and to promote improved farming practices for farmers in the irrigated areas of the Rani Jamara Kulariya Irrigation Scheme.

Project Development Objective Indicators

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
Name: Area provided with new/improved irrigation or drainage services	✓	Hectare (ha)	0.00	11,000.00	Annual	Progress reports	PIO, WUAs, Farmer groups
Area provided with new irrigation or drainage services	✓	Hectare (ha)	0.00	2,000.00	Annual	Progress reports	PIO, WUAs, Farmer groups
Area provided with improved irrigation or drainage services	✓	Hectare (ha)	0.00	9,000.00	Annual	Progress reports	PIO, WUAs, Farmer groups

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
Description: See Detailed Definitions of Indicators below.							
Name: Farmers reached with agricultural assets or services	✓	Number	0.00	7,000.00	Annual	Progress reports	PIO
Farmers reached with agricultural assets or services - Female	✓	Number	0.00	3,000.00	Annual	Progress reports	PIO
Description: See Detailed Definitions of Indicators below.							
Name: Farmers adopting improved intensified cropping promoted under the project		Percentage	0.00	50.00	Annual	Progress reports	PIO
Farmers adopting improved intensified cropping promoted under the project - Female		Percentage	0.00	50.00	Annual	Progress reports	PIO
Description: See Detailed Definitions of Indicators below.							

Intermediate Results Indicators

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
Name: Farmland area protected from disruption by the uncontrolled river bank erosion (from Patharia River and other local rivers)		Hectare (ha)	0.00	3,000.00	Annual	Progress reports	PIO
Description: See Detailed Definitions of Indicators below.							
Name Farmers adopting improved agricultural technology (a Corporate Indicator)		Number	0.00	3,000	Annual	Progress reports	PIO
Farmers adopting improved agricultural technology - Female		Number	0	2,500	Annual	Progress reports	PIO
Farmers adopting improved agricultural technology - male		Number	0	500	Annual	Progress reports	PIO
Description: See Detailed Definitions of Indicators below.							
Name: WUA training on O&M accomplished		Days	0.00	3,000.00	Annual	Progress reports	PIO

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
Of which females		Days	0.00	1,000.00	Annual	Progress reports	PIO
Description: See Detailed Definitions of Indicators below.							
Name: Number or Percentage of grievances registered, related to delivery of project benefits , that are actually addressed		Percentage	0.00	60.00	Annual	Progress reports	PIO
Description: See Detailed Definitions of Indicators below.							
Name: Share of total funds resources delegated for O&M by the target rural households and WUAs		Percentage	0.00	85.00	Annual	Progress reports	PIO
Description: See Detailed Definitions of Indicators below.							
Name: No. of women members in executive committee of WUAs maintained at 33% with at least one in key decision-making position in each WUA and with WUAs demonstrating equitable		Number	0.00	28 Rani: 10 Jamara: 9 Kulariya: 9	Annual	Progress reports, independent surveys	PIO

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
governance							
Description: See Detailed Definitions of Indicators below.							

Target Values

Project Development Objective Indicators

Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	YR6	End Target
Area provided with new/improved irrigation or drainage services	0.00	0.00	0.00	0.00	3,700.00	6,000.00	8,500.00	11,000.00
Area provided with new irrigation or drainage services	0.00	0.00	0.00	0.00	700.00	1,000.00	1,500.00	2,000.00
Area provided with improved irrigation or drainage services	0.00	0.00	0.00	0.00	3,000.00	5,000.00	7,000.00	9,000.00
Farmers reached with agricultural assets or services	0.00	0.00	1,000.00	2,000.00	3,000.00	4,000.00	5,500.00	7,000.00
Farmers reached with agricultural assets or services - Female	0.00	0.00	100.00	500.00	1,000.00	2,000.00	3,000.00	3,000.00
Farmers adopting improved intensified cropping promoted under the project	0.00	0.00	0.00	10.00	20.00	30.00	40.00	50.00
Farmers adopting improved intensified cropping promoted under the project - Female	0.00	0.00	0.00	10.00	20.00	30.00	40.00	50.00

Intermediate Results Indicators

Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	YR6	End Target
Farmland area protected from disruption by the uncontrolled river bank erosion (from Patharia River and other local rivers)	0.00	0.00	0.00	800.00	1,500.00	2,000.00	2,500.00	3,000.00
Farmers adopting improved agricultural technology (a Corporate Indicator)	0.00	0.00	0.00	800.00	1,500.00	2,000.00	2,500.00	3,000.00
Farmers adopting improved agricultural technology - Female	0.00	0.00	0.00	100	200	300	400	500
Farmers adopting improved agricultural technology - male	0.00	0.00	0.00	700	1300	1700	2100	2,500
WUA training on O&M accomplished	0.00	0.00	300.00	600.00	600.00	600.00	600.00	3,000.00
Of which females	0.00	0.00	100.00	200.00	200.00	200.00	200.00	1,000.00
Number or Percentage of grievances registered, related to delivery of project benefits , that are actually addressed	0.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00
Share of total funds resources delegated for O&M by the target	0.00	50.00	50.00	55.00	60.00	70.00	80.00	85.00

Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	YR6	End Target
rural households and WUAs								
No. of women members in executive committee of WUAs maintained at 33% with at least one in key decision-making position in each WUA and with WUAs demonstrating equitable governance	0.00	0 Rani: 0 Jamara: 0 Kulariya: 0	3 Rani: 1 Jamara: 1 Kulariya: 1	6 Rani: 2 Jamara: 2 Kulariya: 2	12 Rani: 4 Jamara: 4 Kulariya: 4	21 Rani: 7 Jamara: 7 Kulariya: 7	27 Rani: 9 Jamara: 9 Kulariya: 9	28 Rani: 10 Jamara: 9 Kulariya: 9

Detailed Definitions of PDO Indicators

PDO Indicator	Definition
Area provided with new/improved irrigation or drainage services	This indicator measures the total area of land provided with irrigation and drainage services under the project, including in (a) the area provided with new irrigation and drainage services and (b) the area provided with improved irrigation and drainage services, expressed in hectare. Modernization involves installing completely new water flow/level control works on around 2,000 ha (particularly where there is prevalent reliance on pumped groundwater in the dry and wet seasons), whereas upgrading or rehabilitating existing flow/level control works on around 9,000 ha.
Farmers reached with agricultural assets or services (gender segregated)	This indicator measures the cumulative number of farmers (gender segregated) who, as a result of project interventions, would have access to (a) improved farming tools (for example, power tiller, reapers, harvesters, threshers, tractors), (b) agricultural inputs (for example, improved seeds, fertilizers, pesticides), and (c) technical know-how and extension services. Thus, this indicator also captures (a) the number of farmers within the WUAs/WUCs, who would receive capacity building services to enable them to undertake and/or to self-finance the O&M of the irrigation and drainage canals covered by the project and (b) all farmers trained on improved water control technology and/or receiving improved irrigation services.
Farmers adopting improved intensified cropping promoted under the project (gender segregated)	This indicator measures the percentage of farmers of the total reached farmers (that is, 4,500 of the total target 7,000, of which 1,500 females of the total target 3,000), who have adopted improved intensified cropping practices in the project command area. Crop intensification will be defined as (a) change in cropping pattern (crop diversification), (b) increase in cropping intensity, (c) adoption of new or improved cultivars, and/or (d) reduction in fallow land or increase in productivity per unit area.

Detailed Definitions of Intermediate Results Indicators (IRI)

IRI Indicator	Definition
Farmland area protected from disruption by the uncontrolled river bank erosion (from Patharia River and other local rivers).	This indicator measures the farmland area that will be protected (through Component 1) from floods occuring within the project lifetime, which will otherwise cause erosion of river banks.
Farmers adopting improved agricultural technology (a Corporate Indicator)	This indicator measures the number of farmers who have adopted any improved agricultural technology as promoted by Component 2 and/or facilitated by the irrigation improvements by Component 1.
WUA training on O&M accomplished (gender seggregated)	This indicator measures the number of person days of WUA/WUC members (gender seggregated) participating in the O&M trainings, as supported by Component 2.
Number or Percentage of grievances registered, related to delivery of project benefits , that are actually addressed	This indicator measures the percentage of grievancees registerd related to delivery of project benefits or avoidance of negative impacts that are actually addressed within three months of being recorded in the GRM database. It infers the participatory and GRM activities supported by Component 2 (participatory irrigation management/JPM) as well as by Component 3 (vulnerable groups managament plan).
Share of total funds resources delegated for O&M by the target rural households and WUAs	This indicator measures the percentage of share of total funds delegated for O&M by the target rural households and WUAs/WUCs, as supported by Component 2. It will capture their cash contributions and their monetized in-kind contributions.
No. of women members in executive committee of WUAs maintained at 33% with at least one in key decision-making position in each WUA and with WUAs demonstrating equitable governance	This will measure the number of females in executive committee of WUAs maintained at 33% with at least in key decision-making position in each WUA and with WUAs demonstrating equitable govenance. This is a mandate of the revised Irrigation Policy of the GoN/MoI. The indicator will inply women's involvement in planning and design of infrastructure, in quality control, and in CDC committees for compensation. The detailed composition of each WUA is referred to annex 1.

ANNEX 1: DETAILED PROJECT DESCRIPTION

COUNTRY : Nepal
NP Modernization of Rani Jamara Kulariya Irrigation Scheme - Phase 2

Nepal Water Resources and Water Use Efficiency

1. The main water (consumptive) users in Nepal include agriculture, municipal, and industrial users, whereas the hydropower and recreation users are mostly instream users. The Ministry of Irrigation (MoI) is mandated to oversee the irrigation uses, while the Water and Energy Commission Secretariat (WECS), formed by staff from the Irrigation and Energy Ministries/Departments, oversees the cross-sectoral river basin/water resources management (WRM) aspects. Along the federalism process, the WECS proposes to become a stand-alone federal-level regulatory entity, with regional river-basin-level offices.

2. The total renewable water resources are around 220 km^3 per year; thus per capita is around 7,500 m^3 per year. Hence, on country average, Nepal is considered as naturally endowed with water resources. However, this resource endowment is largely untapped. The GDP per cubic meter of water is around US$2–3 versus a potential US$24 from the world's top producers. Much of the surface water either flows out of the country or evaporates/drains inland in 'system sinks' without being harnessed, mainly due to the lack of infrastructure for water diversion or pumping. The irrigation conveyance and on-farm/use efficiencies are low, and there is a need to balance water requirements across irrigation, hydropower, domestic, and industrial uses while maintaining the environmental flows for biodiversity and addressing the transboundary water effect.

3. Agriculture is the mainstay of the rural economy and a source of income for the majority of Nepali with 66 percent of the population engaged in agriculture (small farmers constitute 80 percent of the rural population), 32 percent contribution to the GDP (Central Bureau of Statistics, FY16), and 50 percent contribution to exports earning.

4. Despite the importance of the agricultural sector, the level of income from agriculture is low by regional and international standards, particularly for the major cereal crops (lower than their potential yield by at least 50 percent). Thus, agriculture in Nepal has yet to exploit the full potential to contribute to improving the living standards and livelihood of the people.

5. Nepal's rural population comprises mainly smallholder farmers, and about 80 percent of the rural population ages 15 and above is engaged in agriculture. The unavailability of sustainable livelihood opportunities in the rural areas has led to a large-scale exodus of the population to the cities and more recently to the Gulf region. The absence of able-bodied farm labor, continuation of traditional irrigation practice, and limited exposure to modern agriculture practices have led to reduced farm production. Existing farmers are generally unable to benefit from existing modern technologies and inputs.

6. The pressing priority is thus to improve agricultural productivity and foster diversification toward high-value products to secure food security for a growing population and to improve rural incomes.

7. Public investment in improving irrigation is becoming paramount for transforming the agriculture sector. The frail mountain terrain limits the agricultural potential area to 2.64 million ha, of which 1.77 million ha has irrigation potential. Irrigation systems in Nepal fall under four distinct

categories: (a) traditional farmer-managed irrigation systems (FMIS) developed and managed by the communities; (b) a range of small to large-scale surface systems developed with full or partial support from the Government; (c) Government-developed tube well irrigation schemes; and (d) individually owned and operated tube wells and pumps, mostly utilizing shallow aquifers, streams, ponds, and dug wells.

8. At present, the total irrigated area stands at 1.39 million ha, of which only 42 percent has year-round irrigation. There is limited new land that can be brought under farming as most of the economically suitable lands for agriculture have already been exploited, mainly because of the substantial increase in Nepal's population in the past century, with the exception of some potential horizontal expansion in newly irrigated lands of around 0.35 million ha through investing in interbasin transfers. Thus, the largest potential for increasing production is by providing better agricultural inputs and ensuring irrigation to the existing cultivated land, namely, a 'vertical expansion'. Modern agricultural practices require crop diversification, high-yielding varieties, improved fertilization, and reliable year-round irrigation.

9. Of the aforementioned improvements, improving irrigation is critical to agriculture both during the monsoon season, to overcome the periods of dry spells, and during the dry season, when rainfall is negligible. Agriculture is becoming even more vulnerable to water due to the erratic monsoon rain. Even recently, when precipitation during the monsoon reached 90–110 percent of its long-term average after two years of low rainfall, farmers got unreliable rainfall with both droughts and intense rainfall/floods often occurring in the same season. Thus, transforming the agriculture sector requires upgrading the irrigation systems to regulate the irrigation supply. Only by mobilizing public funding to invest in effective irrigation systems, farmers can focus on the complementary inter-farm/farm-level investments such as improving agricultural techniques and inputs and cropping intensity, thus transforming farming to more profitable levels.

Government Irrigation Policy and Irrigation Development Program

10. The Agriculture Development Strategy (ADS) (2015) recognizes concentrated investment in irrigation as one of the means to accelerate agricultural growth. Also, one of the key targets of the ADS is to achieve 5 percent growth in agricultural gross domestic product (AGDP) by 2025 from the current 3 percent. To achieve this, the ADS plans to expand the area under year-round irrigation from the current 18 percent to 60 percent by 2025. Thus, irrigation is seen as a critical investment for national agricultural production and economic transformation.

11. As the GoN internalized the concept of year-round irrigation through its Nepal Water Resource Strategy (2002) and National Water Plan (2005), the DoI aimed to provide year-round irrigation to vast potential areas to boost crop production, leading to food self-sufficiency, employment generation, and poverty reduction. There are four themes under this DoI goal:

(a) Rehabilitate existing FMIS

(b) Design and construct new irrigation schemes (including the Modernization of Rani Jamara Kulariya Irrigation Scheme - Phase 1 [MoRJKIP, P118179] and its proposed Phase 2)

(c) Improve the agency-managed large-scale irrigation projects (IPs) and hand over their management to beneficiary farmers (the so-called irrigation management transfer [IMT]), either fully or below the main canal level

(d) Expand the irrigation area horizontally by investing in 'interbasin water transfers'

12. Table 1.1 reflects some of the DoI target incremental areas for the next five year.

Table 1.1. DoI Target for the Incremental Irrigated Area by 2022

Activity	Unit	Status	Target Increment after 5 Years
Increment in irrigated area by surface irrigation	ha	775,000	45,335
Increment in irrigated area by groundwater	ha	409,013	206,470
Increment in irrigated area by nonconventional irrigation methods (for example, solar pumping)	ha	5,865	21,100
Rehabilitation of FMIS	ha	202,299	71,500
Required financial resources	NPR, billions	—	147

New Irrigation Schemes

13. The DoI is entrusted with planning, designing, and implementing medium to large IPs mostly in the hills and Terai region.

14. The Rani Jamara Kularia Irrigation Scheme (the ongoing World Bank-financed Phase 1 and the proposed Phase 2) is among the largest schemes in the entire country under the category of new schemes, and it benefits one of the poorest areas in the Terai in the southwest of the Karnali River basin.

Farmer Organizations and Participatory Irrigation Management

15. Nepal has a long tradition of FMIS in the hills, mountains, and the Terai. The FMIS cover about 70 percent of the 1.2 million ha of land with some form of irrigation infrastructure in the country. The hill FMIS are generally small compared to the FMIS in the medium to large irrigation systems in the Terai. A strong sense of ownership and hierarchical management system exists in the FMIS, often in some form of WUAs/Water Users Committees (WUCs), tasked with operation and maintenance (O&M) of the schemes, most of which is done through labor contribution.

16. However, improving irrigation services in the existing FMIS requires a combination of 'hardware' and 'software' solutions. There is also a need to pool funding through Government and users' contributions for O&M and asset replacement over time.

17. **Sector policy on cost sharing and participatory irrigation management (or JPM).** There is no solid nationwide policy on sector financing and irrigation service fees (ISF), as these aspects differ by the type of scheme, for example, agency managed, IMT, farmer managed, interbasin transfer, or unconventional. Generally, capital investments are borne by the GoN while farmers are expected to contribute to O&M through ISFs and in-kind. The GoN recognizes that irrigation system development and O&M cannot be duly performed without the consent and participation of WUAs/WUCs. The Irrigation Policy 2013 envisaged the farmers' participation right from the planning stage to the O&M. The Irrigation Policy 2013 stated: "Government of Nepal shall maintain the irrigation infrastructure and operate sub-secondary to secondary level canals with participation of WUAs," which clearly promulgates a participatory approach as one of its governing policies. For the development of tertiary and lower-order canals, the beneficiary farmers will have to share a certain percentage of the total development cost that can be in the form of labor, cash, or land. The WUAs/WUCs are supposed to play a vital role in disseminating the information to the general farmers regarding the irrigation and drainage system development plans and develop consensus on tentative alignment of canal network,

offtake locations, and other infrastructure. Besides, they need to coordinate on land acquisition and resettlement issues, among others.

18. **The project's existing irrigation systems.** Rani, Jamara, and Kulariya are FMIS located in the Kailali District in the Far Western Development Region of Nepal with a command area of about 14,300 ha. The systems were developed by the farmers in 1896 (Rani system), 1903 (Jamara system), and 1915 (Kulariya system). These systems receive water from the Karnali River, a major snow-fed river in the country, which forms braided channels as it emerges from the hills to the Terai plains. Jharahi Nala is one such approach channel from which the farmers divert water into the canals by constructing temporary/rudimentary diversion works. Jharahi Nala provides adequate water to the canals during the higher flows in the river, at times even causing severe flood damages. Generally, every year, under the leadership of Chaudhary of each canal system, the concerned Badghars (heads of branch canals) mobilize one person from each household having agricultural land in the canal system, which is called 'Desawar' in the local language. Desawar is mobilized twice a year, the first time before the rainy season to confirm that the water comes to Jharahi Nala during flood time. The Jharahi Nala approach channel is dug out to the required bed level by constructing temporary/rudimentary diversion works. However, during the dry period, every year, the farmers have to extend the approach channel, digging out the main braided channel of the Karnali River bed, and divert water from the main course using machinery and mostly manual labor in the form of Desawar. The situation is exacerbated when the river swings toward the east as it has been happening in recent years. The second Desawar is mostly mobilized after the rainy season in the winter time, mainly to clean the silt from the branch to main canals and up to the Jharahi Nala approach channel to bring the water for winter crops, mainly wheat, vegetables, and fruits.

19. **Project concept, project development, and the beneficiaries.** The irrigation systems lack infrastructure such as intake and control structures, drop structures, protection works, cross-drainage works, reliable road access including bridges, and escape structures that are essential for proper functioning of the canal systems of such magnitude as Rani, Jamara, and Kulariya. The main problems encountered because of such deficiencies include uncontrolled flooding, sediment deposits in the canals, difficulty to divert water, poor water distribution and management, and poor rural access during rainy seasons.

20. The concept of IDA assistance in Phase 1 was to equip the RJK irrigation systems with the necessary infrastructure in the higher-order canals to make them hydraulically more efficient, strengthen community-based irrigation management by institutional development of the beneficiary organizations, and provide limited support to agriculture development programs. Full CAD and comprehensive agriculture development were envisaged for Phase 2 of the project. An agreement was signed between the GoN and the World Bank for Phase 1 of the project on October 11, 2011, for an investment of US$43 million equivalent for a period of six years with the closing date of September 30, 2017. Phase 1 was closed as planned, achieving the PDO.

21. The proposed operation, Phase 2 of the project, will focus on modernization of the lower-order irrigation system (subbranches, tertiary canals, and watercourses) so that irrigation water can reach farmers' fields with the optimal flows, continuation of the WUA/WUC support program, and implementation of a comprehensive agricultural improvement/development program.

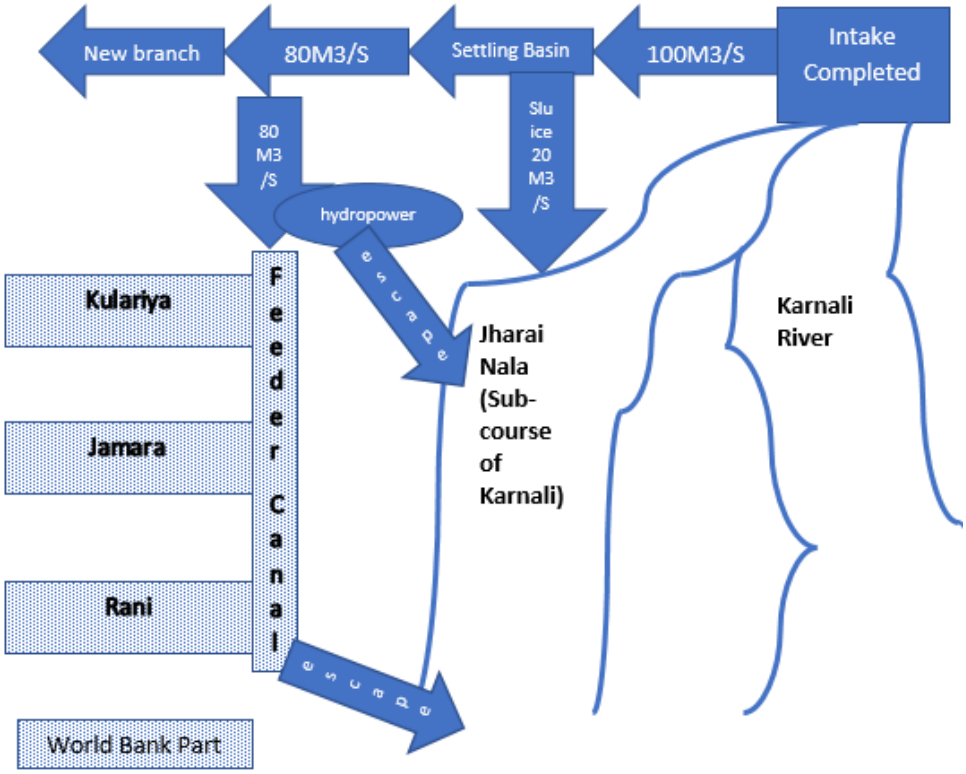
22. Phase 2 is essential in complementing Phase 1 because of two interrelated necessities:

(a) Below the main/conveyance system introduced by Phase 1, without Phase 2, the irrigation distribution and application efficiencies would continue to be low compared to the global/regional norms. Farmers draw as much as 3.9 liters per second per ha (the irrigation

'hydromodule') compared to an optimal level of around 1.5 liters per second per ha at the intake. The efficiency estimates at all canal levels are on-farm application 60–85 percent, watercourse 80 percent, tertiary 75 percent, subbranch 75 percent, and main canals 80 percent. Combining these efficiencies, the overall irrigation efficiency is very low. For instance, an estimate of crop water requirements for paddy is 1.1 liters per second per ha in November whereas the gross irrigation requirement (diversion) is about 3.88 liters per second per ha, and hence, overall efficiency is about 21 percent. At least 35 percent of the diverted water returns to Karnali River, either directly through canal excess waters (tail escapes) or indirectly through drainage runoff and percolation to groundwater (the gradient from groundwater to Karnali is relatively steep). The lack of bulk interseasonal water storage needs to be compensated by completing the modernization of the system down to the farm level, to enable the operators (WUAs/WUCs) to optimize canal storage and irrigation scheduling, thus optimize the root-zone moisture across the crop growth stages.

(b) The WUAs' function is not supposed to stop at the main system level. There is a need to utilize the immense potential for joint participatory management in the RJK community, building on the creation and empowerment of WUAs attained under Phase 1, so that the WUAs can also have a major role in the O&M of the irrigation subsystem down to the farm level (see figure 1.1).

Figure 1.1. Schematic Diagram of the Proposed Project (Phase 2), from DoI Feasibility Study



23. The proposed project will have three components. The expected co-benefits from climate adaptation and mitigation have been assessed and the detailed information is described in the annex 6.

Component 1: Scheme Modernization (US$52.9 million, of which US$51.3 million IDA)

24. The Phase 1 support for scheme modernization included (a) construction of feeder canal; (b) control/intake structures in the feeder canal for the RJK canals; (c) other required infrastructure in the feeder canal; (d) control/intake structures in the RJK canals for subbranch (secondary) canals; (e) command area protection works on Pathariya, Mohana, and Karnali Rivers; (f) improvement and upgrading of roads and construction of bridges; and (g) engineering consultancy services and so on.

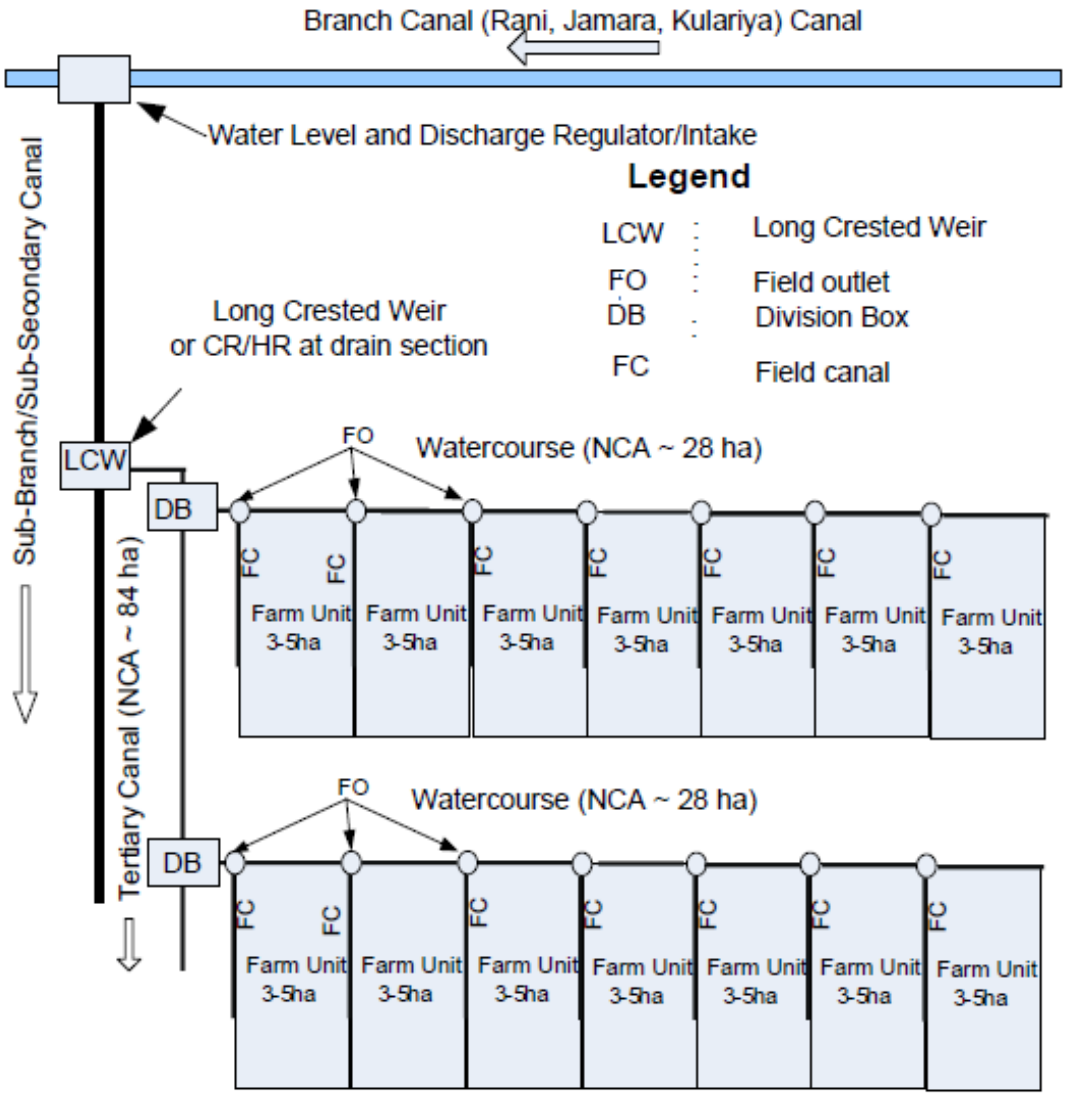
25. The RJK irrigation system consists of both canal and drainage networks developed by the farmers. Phase 1 completed the construction of feeder canal of 7.73 km with 16 structures, including the head structure/intake for RJK, three discharge regulators, bridge, syphon, drop structure, and covered canal. The feeder canal has design discharge of 55.5 m^3per second. The entire feeder canal length was lined with M20 grade concrete of 15 cm thickness on compacted soil grade. The expansion joints of 10 mm width with provision of joint filler and sealer in concrete lining were placed at 3.25 m intervals. It is suggested that for future concrete lining, geomembrane of 1.00 mm thickness be provided before placing concrete works. This geomembrane will help avoid the contact of erosive or destructive chemicals present in groundwater with concrete surface, and this will increase the life of the concrete lining. Meanwhile, the placement of weep holes and drainage pipe in slope should also be improved as per the standard code of practice, for instance, Indian Standard (IS) Code or British Standard (BS) Code for concrete lining works. In Phase 1, 15 water control structures, 33 head regulators to small canals including 11 girder bridges, nine box culverts, and other necessary infrastructure were provided in the secondary canals.

26. Thus, Phase 1 has executed construction works on intakes, main canal, feeder canal, and rehabilitation works of three branch canals. As the Phase 2 construction works proceed and all canals become operational, water would be supplied to the branch canals on a continuous basis. Since there is high variation in water level and discharge of the Karnali River with the changes in the seasons, intake discharge into the main canal varies accordingly. As long as the intake draws design discharge, water can be delivered to the fields running along the canal at the full supply level and design discharge. When the intake discharge is less than the design discharge and falls short of demand, a rotation system has to be adopted. However, all canals and related structures have to be planned and designed for the design discharge.

27. Through Phase 2, CAD activities will be implemented below secondary canals up to the watercourse level to ensure year-round irrigation with proper water management. The irrigation system below secondary canals will include sub-secondary or subbranch canal, tertiary, and watercourses to supply water to the irrigation blocks (see figure 1.2). Irrigation water will be delivered only from the watercourses to the farm level through the field outlets. There are a number of Cross Regulators/Head Regulators (CR/HR) and long-crested weirs (LCWs) in sub-secondary canals to convey water to tertiary canals. However, there are direct outlets in combination with LCWs from the sub-secondary/subbranch to convey water to watercourses.

28. Thus, the modernization investments involve installing completely new water flow/level control works on around 2,000 ha (particularly where there is a prevalent reliance on pumping groundwater in the dry and wet seasons) and upgrading or rehabilitating existing flow/level control works on around 9,000 ha.

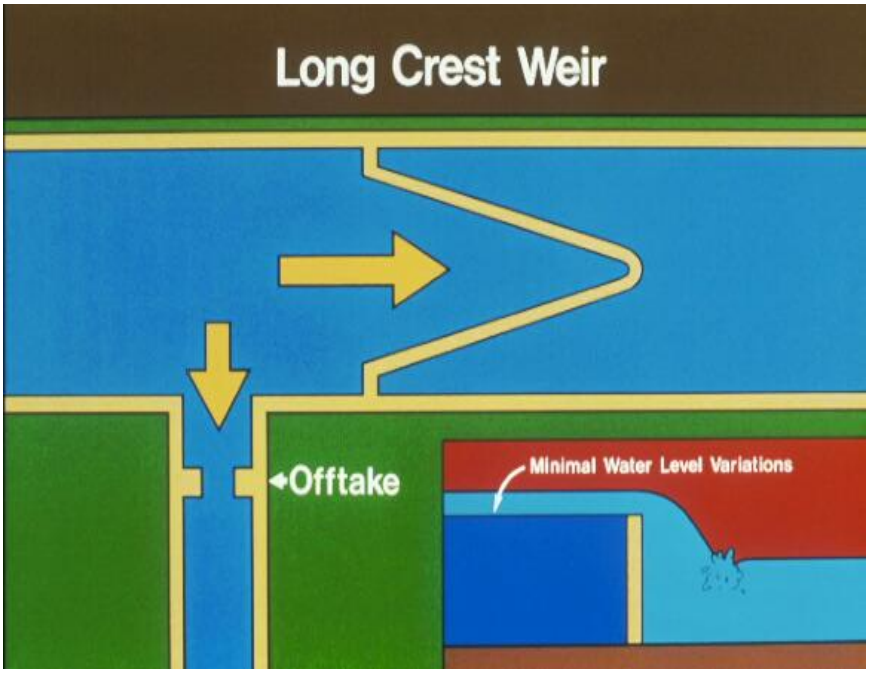
Figure 1.2. Proposed Irrigation System (source: consultation between DoI and Bank experts)



Note: NCA means the average nominal command area.

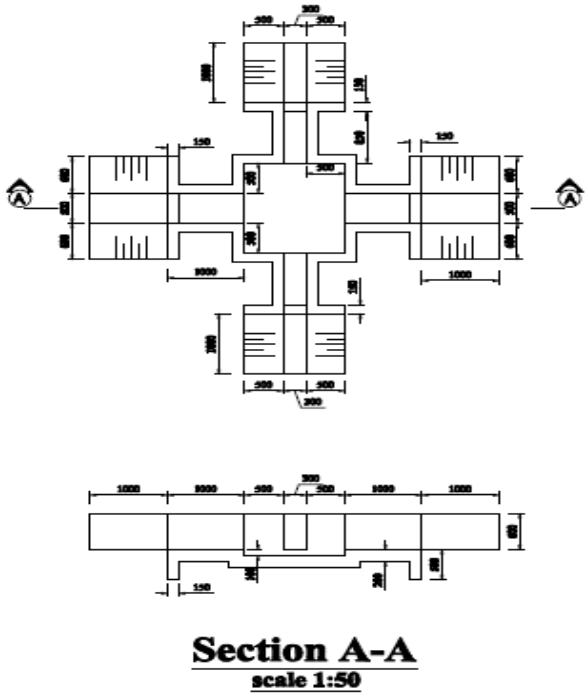
29. All the sub-secondary/subbranch canals have head regulators with control gates at their respective secondary canals. The water level can be gauged at the head regulator of each sub-secondary canal and desired flow can be maintained in these canals. After the sub-secondary canal, the control structures will be mostly LCW with a gate in the middle apex section to discharge the silt deposited in the upstream part and/or during winter period or low flow, to discharge the flow to downstream users except in cases when there is drain flow entering into the sub-secondary canals. In the drain flow condition, a combination of gated CR and HR will be constructed in sub-secondary and tertiary canals, respectively. During low flow, water is distributed on a rotation basis from the sub-secondary canals to tertiary canals. The tertiary canal outlets with LCW are provided ungated with a provision of manual control like stop logs only for emergency or maintenance purposes (see figure 1.3).

Figure 1.3. LCW



30. Division boxes will be provided in tertiary canals to convey water to watercourse canals. Field outlets are provided in watercourses to provide water to the field channels (see figure 1.4).

Figure 1.4. Division Box from the Design Report of the DoI Feasibility Study



Note: Flow divider divides the incoming flow to the canal into two branching canals. Flow divider may be a proportional divider or division boxes. Flow divider may or may not be equipped with gates. This subsystem runs automatically with no need to open, close, or adjust the flows.

31. The Phase 2 support under Component 1 will consist of the following:

(a) Rehabilitation and modernization of 14 subbranch/sub-secondary canals and 54 tertiary canals in Kulariya, 13 subbranch canals and 25 tertiary canals in Jamara, and 15 subbranch canals and 28 tertiary canals in Rani canal. The component will include construction of 64 gated CR/HR in sub-secondary canals where there is drain flow in sub-secondary canals, 43 LCWs from sub-secondary canals to tertiary canals and 391 LCWs from sub-secondary canals to watercourse, 354 division boxes from tertiary to watercourses, and 1,037 field pipe outlets from watercourse to fields in RJK canal systems. In addition, there will be 387 hume pipe culverts, 76 village road bridges, 281 vertical drop structures, 57 aqueducts, and 1 syphon in RJK canal systems.

(b) **Pilot area study.** The objective of the pilot area study is to design and construct the pilot area from subbranch/sub-secondary canals to tertiary and watercourses in close partnership with WUAs/farmers. After evaluation of the performance of the pilot area, the construction of lower-order systems up to watercourses or up to tertiary canals will be decided and accordingly, the rest of the lower-order system will be designed and constructed in the RJK systems. Since the RJK canal systems are independent systems included under the MoRJKIP, each canal system WUA has proposed one pilot area separately. In this aspect, each branch canal will have one pilot area of about 300 ha, which will include watercourses serving an average area of about 20 to 30 ha with a field outlet providing water to 4 ha. The pilot areas for Kulariya branch will be Bhagaraiya sub-secondary system with 294 ha; for Jamara branch, it will be Bhagatpur sub-secondary system with 374 ha and Simreni 1, 2, and 3 (Uttar Simreni, Dakshin Simreni, and Sati Padampur); and kulos with 309 ha will be the pilot area for Rani branch canal. The total pilot area will be 977 ha. The pilot area design will be based on the highest field crop water requirement of 1.34 liters per second per ha at the field/on-farm level. The efficiency of water use at different lower-order canal systems are as follows: watercourse 80 percent, tertiary 75 percent, and subbranch 75 percent. In this line, the water duty for watercourse, tertiary, and branch canals will be 1.68, 2.24, and 2.98 liters per second per ha, respectively. The design concept of pilot area is that the subbranch/sub-secondary canal will run in designed flow during the summer season and in available shared flow during the dry period. The flow in tertiary canal to watercourse will be at design condition even during the flow rotation. LCWs in sub-secondary canals will provide a static head to divert the design flow in tertiary canals or watercourses in the direct flow situation. The division boxes in tertiary canal will enhance the flow distribution to watercourses. The pipe field outlets in watercourses will ensure and control the designed flow to the fields. During the pilot design stage, a critical point will be the identification of location of division boxes in tertiary canals and field outlets in watercourses and use of existing watercourses. These should be decided in agreement with WUA/farmers.

(c) Command area flood protection works in the form of construction of embankment, revetment, and spurs against flooding and erosion from Mohana and Pathariya Rivers and local streams in the command area have been included in Phase 2 for 40 km. Phase 1 completed the total command area flood protection works of 23.45 km in Karnali, Pathariya, and Mohana Rivers to protect the agricultural lands and villages in front of the agricultural lands.

(d) Improvement, upgrading, and maintenance of rural roads and construction of bridges for better access to the agricultural production areas. In Phase 1, 117 km gravel roads with 55 pipe culverts and other structures have been completed to improve the access to and from the project area all year round. The completed access road will provide easy market accessibility adding value to the agricultural products and cost return/benefits to the farmers. Phase 2 includes upgrading of 120 km village road and construction of seven RCC girder bridges, including two bridges across Pathariya River.

(e) Improvement of 4 km drainage management works

(f) Engineering and other consultancy services for better monitoring of construction works and quality control

(g) Implementation of an environmental management plan and related activities

Component 2: Strengthening Water Users Associations/Committees (WUAs/WUCs) and Agricultural Production Support (US$13.4 million, of which US$11.3 million IDA)

32. Component 2 will support (a) strengthening of WUAs/WUCs to assume responsibility for MOM of the modernized system and (b) carrying out a series of agriculture-based activities in the project area to internalize the gains made in Phase 1 and to increase and sustain agricultural production through the promotion of water-smart improved farming practices, crop diversification, post-harvest support, farmer training through demonstrations and FFS, and other adaptive processes. Thus, Phase 2 will adopt a value-chain-based approach to support agricultural activities. Moreover, Component 2 mainstreams citizen engagement (CE) and gender. Detailed information is described in the annex 6.

Subcomponent 2a: Strengthening WUAs/WUCs

33. There are three WUAs, one for each of the main systems, and one central committee (WUA federation) that coordinates the three systems, especially with regard to the abstraction of water from the Karnali River. The system-level organization assumes overall responsibility for the smooth operation of the system, assisting the project team in the system modernization/construction activities, coordination with the external agencies, formulation of operational guidelines and bylaws, coordination between the branch and subbranch-level WUAs, and so on. The branch-level executive committee is formed by a general assembly consisting of (a) representatives nominated by each subbranch committee, (b) all Badghars (the Badghar is an elected chief of a village or settlement for one year and responsible to work for the welfare of the village) within the command area, and (c) representatives selected based on landholding. Tables 1.2 and 1.3 show the detailed composition.

Table 1.2. Composition of General Assembly

Sl. No.	Name of Branch System	Composition of Branch Canal General Assembly				
		Number of General Assembly Member	Based on Landholding 'Prasad'	Badghar	Representatives from Subbranch Canal	Nominated
1	Rani WUA	140	58	57	19	6
2	Jamara WUA	125	50	54	15	6
3	Kulariya WUA	126	44	41	14	6

Table 1.3. Composition of Branch Canal WUA

Sl. No.	Name of System	Composition of Branch Canal WUA			Remark
		Number of Executive Members	Key Positions[a]	Representative from Subbranch	Nominated by Elected Committee
1	Rani WUA	29	4	19	6
2	Jamara WUA	25	4	15	6
3	Kulariya WUA	25	4	14	7

Note: a. Chairperson, vice chairperson, secretary, and treasurers.

34. The main aim of Subcomponent 2a is to strengthen WUAs over time for them to assume full responsibility for the MOM of all the three irrigation systems up to the farm level. The scheme never had any hydraulic structures, so MOM will be a new experience for the WUAs. The MOM activities will initially be jointly carried out by staff of the DoI and WUAs until such time that the WUAs have full confidence and capacity to manage, operate, and maintain the infrastructure without day-to-day support from the DoI.

35. Most of the experience of the WUAs has been in mobilizing members to carry out digging of the channel for diverting water from the Karnali River near Chisapani, desilting canals, and constructing the make-shift diversion works from the forest products. Under Phase 1 higher order canals have been provided with modern control and other infrastructure. Phase 2 will provide hydraulic structures to facilitate and control the flow of irrigation water all the way up to the farm level. After modernization of the infrastructure at all levels, different types of management and operation skills will be needed. The WUAs will need to be trained in all aspects of proper and equitable distribution of water, water use, development and implementation of MOM plans, setting of ISFs, proper maintenance of records and accounts, participatory monitoring, learning and evaluation, and optimizing the water management for the benefit of all users. The training and support services will be carried out by the DoI, assisted by specialized consultants.

36. Under Phase 1, all four WUAs have been equipped with their own office buildings and initial batch of office equipment. Each WUA has now hired a staff to carry out day-to-day office work using its own resources which certainly indicates a departure from the earlier mindset of requesting such provisions from the project. Elections have been held as per the current WUA constitution(s) and elected bodies are in place and functioning well. Forty-eight subbranch committees have also been formed, thus constituting the lowest tier of the WUA organization(s). Office spaces and office equipment will be needed for those 48 committees for them to function well. The WUAs are holding regular meetings keeping the minutes, launching campaigns for registration by the landholders (users), advocating payment of irrigation service, assisting the project office in dealing with conflicts as and when they arise, and most importantly, providing huge amount of voluntary labor for digging/cleaning/reshaping and maintaining the canal systems among a host of other canal-related activities.

37. However, the WUAs need to be brought to a level where they are motivated and ready to take over the management of their three irrigation systems all the way up to the farm level, including the feeder canal containing three major regulator/control structures at the head of the RJK canals which would need careful gate operation. They would need to manage, operate, and maintain all other structures and canals and coordinate with the DoI offices for timely water availability from the main canal and distribute the irrigation water on an equitable basis in the irrigated area as per the water requirement based on crop calendar and the planted crops. The WUAs have indicated that they would need three technical persons (engineers), three agronomists, and 12 persons for the operation/control of the gates and guarding the canals. The project resources may need to be

mobilized in the beginning for recruiting and putting in place the added personnel. The DoI and the WUAs will need to agree on phasing out such assistance over a mutually agreed period so that the WUAs make full efforts to generate required funds to operate and maintain the systems with their own staff and resources. There will be, however, strong technical backstopping/advice available to the WUA organization(s) from the DoI and DoA field offices at the time of need.

38. During the construction period, the project office at Tikapur will designate a fully resourced staff to interact and coordinate with the WUA(s) for smooth implementation of construction and water-related activities. There may be some disruption in the provision of irrigation water when construction works are under way. The WUAs and the project office will jointly work on irrigation scheduling and water release issues and the DoA Tikapur office and the WUAs, in consultation with the irrigation office, will focus on all agriculture-related activities. As the entire project has been designated as a 'National Pride' project, it is imperative that the current project offices of the DoA and DoI continue to function in Tikapur and act as effective coordinators and conduits for management of the main canal and its appurtenant structures and also for further development of agriculture in this important irrigated area.

39. To carry out the functions well, Phase 2 will focus on the following:

(a) **Training of WUA members.** The focus will be on MOM training.

(b) **Training of Badghars regularly.** Badghars are the main functionaries in the villages/settlements who are elected regularly and are traditionally responsible for all village/canal activities.

(c) **Functioning of WUA offices.** Support will be continued for the upkeep of facilities created in Phase 1. The WUAs will be encouraged to generate and use the resources for proper functioning of their offices and office premises.

(d) **Establishing offices for subbranch committees and making them function.** Forty-eight subbranches have been formed.

(e) **Continuing support on office equipment and so on.** For the WUA offices to be capable of operating properly, necessary and upgraded office equipment will be made available. This will also allow the WUAs to store information on membership record, landholding record, record of rules and regulations, financial transaction records, and minutes of meetings.

(f) To facilitate the movement of WUA officials and technicians, motorbikes and bicycles will be provided to effectively and efficiently manage the irrigation infrastructure.

(g) **O&M Equipment for WUAs.** Equipment, mainly excavators, will be provided to enable WUAs to divert water from Karnali River and desilt the feeder and main branch canals. At the initial stage, the equipment will be placed under the management of the PIO, but ownership of the equipment will be gradually transferred to the WUAs during the course of the project.

(h) **Study and learning visits.** WUA committee members and selected water users will be provided the opportunity to visit irrigation schemes and successful agriculture production areas where WUAs are successfully operating and maintaining similar or more complex irrigation infrastructure.

(i) **O&M of Jharahi Nala.** Cost for the maintenance of the Jharahi Nala channel will be provided and the fund will be spent jointly by the WUA central committee and PIO through the decisions taken at their joint meetings.

(j) **Help recruit and provide resources for placement of engineers and agronomists.** Resources required for the salaries/benefits for three engineers and three agronomists for the project period will be provided through the project fund. The DoI and WUAs will sign a memorandum to phase out such assistance over five years after the project completion, with 20 percent reduction in subsidy every year.

(k) **Help recruit and keep in place the gate operators/canal guards.** The project will fund 12 such personnel from the project funds and phase out such assistance three years after the completion of the project.

(l) **No fund transfer is envisaged to WUA.** All the expenses would be paid by the PIO.

Subcomponent 2b: Agricultural Production Support

40. Subcomponent 2b will focus on increasing agricultural productivity of key crops[3] through (a) intensification of agriculture and extension services, (b) support mechanization, and (c) post-harvest support. Phase 2 will therefore adopt a value chain approach to enable farmers to realize full benefit by participating in the value chain. Subcomponent 2b will have the following interventions:

A. Intensification of Agriculture and Extension Services

41. With the availability of year-round irrigation water, the farmers in the project area will be able to take three crops a year. To pursue this, the project will make available short-duration varieties to allow triple cropping. Effort will be placed to diversify the cropping pattern to include cash crops such as lentil, potato, and vegetables in the cropping pattern.

42. New technology and best practices will be promoted through demonstrations, FFS, practical training, and cross-learning visits. Field days will be organized where farmers will be invited to observe the performance of the new varieties and technologies. Demonstrations will also include the rehabilitation of marginal lands where the landless and land-constrained households could take up activities such as vegetable farming, fruit tree farming, and planting of fodder trees in collaboration with the local government. These lands do not have settlement or squatters, but are lying unutilized and therefore do not trigger involuntary resettlement. This activity will contribute to land stewardship and rehabilitation of degraded lands. Where possible, private companies will be encouraged to partner with the ACIU to demonstrate new varieties and technologies in the project area.

43. One of the main aims of the project is to improve the seed replacement rate in its command area. To pursue this, the project will support the seven cooperatives that were developed in Phase 1 and support three additional cooperatives in Phase 2. Through the 10 cooperatives, the project will cover nearly 4,000 ha over a five-year period, which will produce sufficient certified or truthful seeds to meet the local demand for seeds. To sustain seed production and supply system, the project will test public-private-partnership approach by inviting the private seed companies to (a) directly provide the certified seeds in the project area and/or (b) produce certified seeds in partnership with the local cooperatives.

[3] For example, rice, wheat, maize, paddy, potato, lentil, and mustard.

44. Block demonstrations will be organized to scale up the successful cultivars and technologies. Farmers wishing to adopt the new varieties and technologies will be provided with the technical know-how and information on the cost of investment to make informed decisions. The project will provide a one-time limited support in the form of materials and inputs to the interested and eligible farmers, guided by the norms in the PIM.

45. To enhance technology adoption, the project will support the establishment of private fruit and vegetables nurseries to produce healthy saplings at an affordable cost. To intensify vegetable production, the project will finance the construction of 60 agri-net houses, 500 poly houses, three low-tech green houses, and two plant protection and seed testing laboratories for quality control.

46. In addition to agricultural activities, the project will also support livestock development activities. Activities to be supported will include provision in improved breeds of small ruminants and pigs, improved shed management, manure management for soil fertility, disease control, and vaccination against major diseases. The project will make deliberate attempt to include the poor and land constrained households who will be identified in consultation with the WUAs and local municipalities.

47. To the extent possible, the project will promote climate-smart agricultural practices such as the use of short-duration/drought-tolerant cultivars, mulching, mixed cropping, crop diversification, and drip irrigation, particularly for banana and vegetable cultivation.

48. Project support will also include the provision of subgrants in two subcategories: (a) competitive learning and adaptive research grant (soft activities) and (b) performance-based technology adoption support (for example, buying/leasing farm mechanization, building poly houses and collection centers [hardware]), with cost sharing of 75 percent by the project and 25 percent by the recipient, which involves signing an agreement between the ACIU and eligible beneficiaries. The competitive research grants will finance simple action/adaptive research that will lead to the identification of new innovations that are climate smart and efficient within the lifetime of the project. The recipient of such grants could come from both the private and public sectors (for example, Nepal Agriculture Research Council, universities, agriculture colleges, farmer organizations, research-based NGOs, and so on), to be selected through a competitive and transparent process. Depending on the nature and duration, the grants could range from US$5,000 to US$25,000. Matching grants will be provided to the farmer groups/agricultural cooperatives as guided by the GoN's policy. Thus, depending on the nature of support, the subsidy will range from 50 percent to 75 percent. Eligible groups for matching grants are those that are native to the project target area, registered, with at least three years of demonstrated experience in group and/or cooperative-based farming with 33 percent of women participation (in the case of seed or vegetable production cooperatives). For both, competitive research grants and matching grants will require submission of a sound proposal. The selection process will involve (a) notification of the call through the media, (b) submission of clear proposals, (c) screening of proposals through the selection committee, (d) field verification and/or reference checking as appropriate of the short-listed proposals, (e) final selection and notification, (f) signing of an agreement, and (g) notification to those that are not selected with justification. The PIM, to be prepared by effectiveness, will provide details on eligibility, selection process and criteria, grievances handling, accounting, fund flow, reporting, oversight, and procurement procedures.

49. To strengthen extension services, the ACIU at Tikapur will be equipped with a specialist in crop, horticulture, and plant protection to provide advisory services. In addition to this, the AICU will hire services of (a) a value chain and marketing specialist, (b) an extension and communication specialist, and (c) mid-level technicians on a need basis to strengthen the quality of technical and advisory services on need basis.

Agricultural Mechanization

50. To address the problem of labor shortage and reduce the cost of production, the project will promote mechanization. Phase I has already successfully tested the use of various equipment such as mini combined harvesters, mini-tractors, power tillers, rice transplanters, paddy and wheat harvester, winnowing machine, and laser land levelers. This equipment will be provided on a cost-sharing basis as per the norms established by the Ministry of Agriculture Development. The target recipients are farmer groups, agriculture cooperatives, WUAs, WUCs, and individual farmers who are involved in commercial farming in at least 5 ha of land or more.

Post-Harvest Support

51. Post-harvest losses are estimated to be between 10 percent and 30 percent in Nepal.[4] Generally, losses occur at harvesting, milling, transportation, and storage. To address this problem, the project will provide improved technologies on harvesting, cleaning, grading, packaging, storage, and transportation to minimize post-harvest losses.

52. Experience has shown that farmers can get a better price for their produce when they are organized and adopt collective marketing. When organized as a group, farmers will be in a better position to negotiate a better price for their produce. Agriculture service centers will be equipped with Internet facilities from where farmers can secure real-time information on market and commodity prices. The project will support construction of three additional collection centers, three seed storage facilities, one bananas ripening chambers, two cold storage facilities, improvement of agriculture market centers, and potentially a quality control laboratory. The land for construction of the collection centers will be made available by the local municipalities in an area that is centrally located with an easy access. The construction of cold storages will be preceded by a detailed study on the capacity, design, and location where the facility is to be built.

Human Resources

53. The project will have 13 staff seconded from the Ministry of Agriculture Development at the ACIU. They include Class II level Project Coordinator, Crop Development Officer, Horticulture Development Officer, Plant Protection Officer, Livestock Development Officer, Planning and Reporting Officer, five Agriculture Technicians, one Account Officer, and one Management Support Assistant at the ACIU in Tikapur. In addition to Government-seconded staff, the project will hire an Agribusiness Specialist, Agriculture Extension Specialist, M&E Specialist, and Procurement Specialist on a need basis for smooth functioning of project activities of Phase 2. Key activities to be implemented by the agriculture subcomponent and their respective budget are shown in table 1.4.

[4] Neupane, F. P. 1995. *Review of Agricultural Entomology Country Profile.* Agricultural Entomology in Nepal. CAB International; Ganesh, K. C. 1992. *On Farm Level Harvest and Post-Harvest Food Loss Prevention Systems in Nepal.* Ministry of Agriculture, Postharvest Loss Reduction Division, Lalitpur, Nepal.

Table 1.4. Key Activities and Investment Costs under Subcomponent 2b

	Activity	Unit	Five-Year Target	Budget (US$)
A	**Capacity development program**			
	FFS training on IPM	Number	100	117,600
	Field-based training for farmers and cooperatives	Number	100	117,500
	Training and exposure visits for farmers	Number	18	384,800
	Subtotal			619,900
B	**Extension and outreach services**			
	Block production demonstrations on cereals, vegetable, fruits, mushroom, fish, beekeeping, and flowers	ha	2,998	1,455,700
	Seed production program	ha	4,150	585,500
	Marginalized, poor, and landless specific demonstrations and support	ha	250	121,400
	Learning and innovation, competitive research grants	Number	30 - 60	587,900
	Subtotal			2,750,500
C	**Technology adoption support on a 75:25 cost-sharing basis**			
	Poly houses for vegetable production	Number	500	177,200
	Agri-net houses for commercial production of vegetables, flowers, and nurseries	Number	60	354,500
	Green houses for high-value crops	Number	3	216,400
	Technology-based demonstrations	Number	320	590,900
	Inputs and materials for demonstrations (seeds/saplings, drip irrigation systems, and other production inputs as required)	LS		221,500
	Subtotal			1,560,500
D	**Soil management, plant protection, and seed treatment**			
	Soil management program	Number	100	264,500
	Plant protection and quality control labs	Number	2	107,800
	IPM program	Number	25	158,700
	Subtotal			531,000
E	**Agricultural mechanization on a 50:50 cost-sharing basis**			
	Small-scale machinery	Number	498	1,572,600
	Large-scale machinery	Number	35	922,200
	Subtotal			2,494,800
F	**Post-harvest support on a 75:25 cost-sharing basis**			
	Collection centers and haad bazaar	Number	3	286,400
	Seed storage facilities	Number	2	118,000
	Cold storage	Number	2	1,181,000
	Banana ripening chambers	Number	1	217,600
	Subtotal			1,802,800
G	**Livestock production support**			
	Demonstrations (sheds)	LS		411,500
	Animal breed improvement	LS		178,700
	Animal nutrition, health and management	LS		278,100
	Subtotal			868,300
H	**Research and studies**			
	Thematic studies on farm economics and IPM	LS		47,800
	Business plan development training for cooperatives, training needs and study on cold storage	LS		32,100
	Subtotal			79,900
I	**Strengthening DoA office building**			210,500
	Subtotal			210,500

	Activity	Unit	Five-Year Target	Budget (US$)
	Grand Total			**10,918,300**

Note: IPM = integrated pest management; LS = lumpsum.

Component 3: Project Management (including goods, technical assistance, and capacity building) (US$5.5 million, of which US$3.4 million IDA)

54. This component will support activities to ensure effective project management, including fiduciary and safeguards compliances. The component will support overall project management, M&E, and reporting. The current project management structure with the project director and necessary technical and support staff based in Tikapur will continue to manage and coordinate the project activities under Components 1 and 2. Subcomponent 2b will be managed and coordinated by the ACIU at Tikapur. The teams are to ensure smooth implementation of project activities, monitoring of project implementation progress and outputs/outcomes achieved, learning from project experiences, communication management, implementation of good safeguard practices, and procurement and FM. Activities to be financed include, but will not be limited to,

(a) The operation of the PIO and a small liaison office in Kathmandu for coordination with the DoI, DoA, MoF, and other relevant agencies;

(b) Design and establishment of a project-specific MIS; and

(c) Project monitoring, evaluation, and learning, including the services of independent M&E organizations for surveys and other monitoring tasks.

ANNEX 2: IMPLEMENTATION ARRANGEMENTS

COUNTRY: Nepal
NP Modernization of Rani Jamara Kulariya Irrigation Scheme - Phase 2

Project Institutional and Implementation Arrangements

1. The DoI is the lead agency in Nepal tasked with developing and improving irrigation infrastructure. The primary effort of the DoI has been to design and implement irrigation infrastructure to provide irrigation to potential new areas and to intervene in existing schemes to improve their irrigation efficiency and sustainability. It maintains the main responsibility of implementing the project. The Director General will be the focal person at the departmental level.

2. The DoI and DoA have been successfully implementing Phase 1 through the PIO and ACIU, respectively. The proposed implementation arrangements are largely similar to those in Phase 1. The DoI will have the overall responsibility for implementing the proposed project. The DoA will be the implementing agency for Subcomponent 2b. The DoI will be the main implementing agency through the PIO in Tikapur, and the ACIU in Tikapur (that reports to both the PIO and DoA) will be responsible for implementing the agricultural activities. This will entail coordinated planning, implementing, and monitoring agricultural activities with the PIO, local government, and other actors in the project area; preparing financial and progress reports; and submitting audit reports.

3. The PIO will be responsible for overall contractual management of the civil works, coordination with WUAs, agricultural agencies, forestry and environment departments, wildlife conservation, local agencies for the roads, and district administration. Its main management tasks will be the following:

- Ensuring overall implementation of the project, including management of the annual work plan and budget
- Maintaining financial accounts
- Conducting day-to-day construction supervision and quality control activities
- Preparing periodic progress reports
- Monitoring WUA activities
- Monitoring and evaluating the progress and outcomes of the project
- Supervising cross-cutting issues including gender, indigenous people, and other social and environmental issues

4. The project manager will be supported by (a) a team of engineers (two senior divisional engineers, four engineers, and eight assistant or sub-engineers with various skills, including CAD and procurement; (b) one social scientist and two association organizers; (c) one environment specialist; (d) one finance officer and one Account Officer; and (e) office administration assistants. The composition of the PIO team will be reviewed by joint GoN/IDA teams regularly and will be adjusted based on the workload. The PIO will be supported by teams of consultants, for example, for third-

party construction supervision, short-term tasks to strengthen the project team on for instance procurement, and special preparation studies for the Phase 2 project.

5. The PIO will have a monitoring specialist who will have overall responsibility for planning and coordinating M&E activities. Coordination of M&E activities will take place mainly with the entities that will undertake the bulk of the data collection and analysis work. The PIO, supported by short-term consultants, will have overall responsibility for developing systems and procedures for appropriate analysis and presentation of the collected M&E data to ensure appropriate use of the indicators for project management, evaluation, and learning.

6. The Social, Environmental, and Institutional Unit of the PIO, headed by a sociologist, will have direct links with the WUAs to implement the institutional and capacity development program. It will also monitor the implementation of the EMP and coordinate closely with other agencies, NGOs, and so on that are working on environmental aspects in and around the project area. There will be an LEMC (composed of staff from local protected area agency, forest authority, NGOs, and ongoing conservation projects) for periodic inspection of the implementation of environmental management/mitigation activities and also for promoting local-level coordination. The GoN will also engage an independent party for regular independent monitoring of the project's environmental compliance, management, and performance.

7. For design review and implementation support, the PIO will recruit an individual international consultant and also national firms that will be accountable to the PIO as well as to that individual consultant. The firms will purchase their required vehicles as part of the reimbursables.

8. A liaison office will be set up within the DoI's main office in Kathmandu to facilitate approval processes, assist with the preparation of annual work plans, and communicate with other agencies, as needed, on behalf of the PIO. The DoI will post at least one officer in this liaison office.

9. Agricultural activities will be implemented by the ACIU in Tikapur, headed by a Class II level Agriculture Component Coordinator/Senior Agriculture Development Officer. The Agriculture Component Coordinator will have FM authority and operate the project account. The ACIU will support the community agriculture service centers to be established under the municipalities. The ACIU will work as a cost center for agricultural activities with the authority to manage budget. The ACIU will consists of crop development officer (1), horticulture development officer (1), plant protection officer (1), livestock development officer (1), and planning and reporting officer (1). In addition to these, the ACIU will have four Junior Technicians (JTs), one Management Support Assistant, and one Account Officer (see figure 2.1). In addition to these, the ACIU will hire a team of experts to support implementation. They include one value chain/marketing specialist, one agriculture extension/communication specialist, procurement specialist, M&E specialist, and three mid-level technicians.

10. For smooth and effective implementation, the Bank and GoN teams have agreed that the GoN should ensure that to the extent possible, the core professionals at the PIO and ACIU will not be transferred to other positions until completion of the project.

11. The main functions of the ACIU will be as follows:

- Ensure and maintain effective coordination with the PIO and other concerned government agencies, and nongovernment and private organizations, including the WUAs engaged in agriculture development in the project area.

- Organize and oversee field-based extension activities such as mobilization of farmer groups and cooperatives, agriculture trainings, setting up demonstrations, establishment and running FFS, cross-learning exposure visits and so on.

- Support in identifying appropriate sites for the establishment of collection centers, seed storage facilities, and cold storages in consultation with respective municipalities, WUAs, and the PIO to ensure that the site selected is appropriate and there are no conflicts.

- Ensure that beneficiary selection for FFS, demonstrations, block production, training and visits are fair and transparent and that any support provided by the project follows norms as stipulated in the PIM.

- Ensure that procurement of goods, services, and trainings are consistent with the World Bank policy and procedures.

- Prepare and submit timely trimester and annual progress reports to the PIO, DoA, and Ministry of Agricultural Development (MoAD).

- Manage day-to-day project activities for smooth functioning of project activities.

- Take part and organize the World Bank's six-monthly implementation support missions.

- Support strengthening of community agriculture service centers of the three municipalities in the RJK command area.

12. The main function of the community agriculture service centers is to support ACIU as appended below:

- Ensure and maintain effective coordination with other agencies and firms engaged in agriculture development in its area.

- Ensure timely implementation of planned activities.

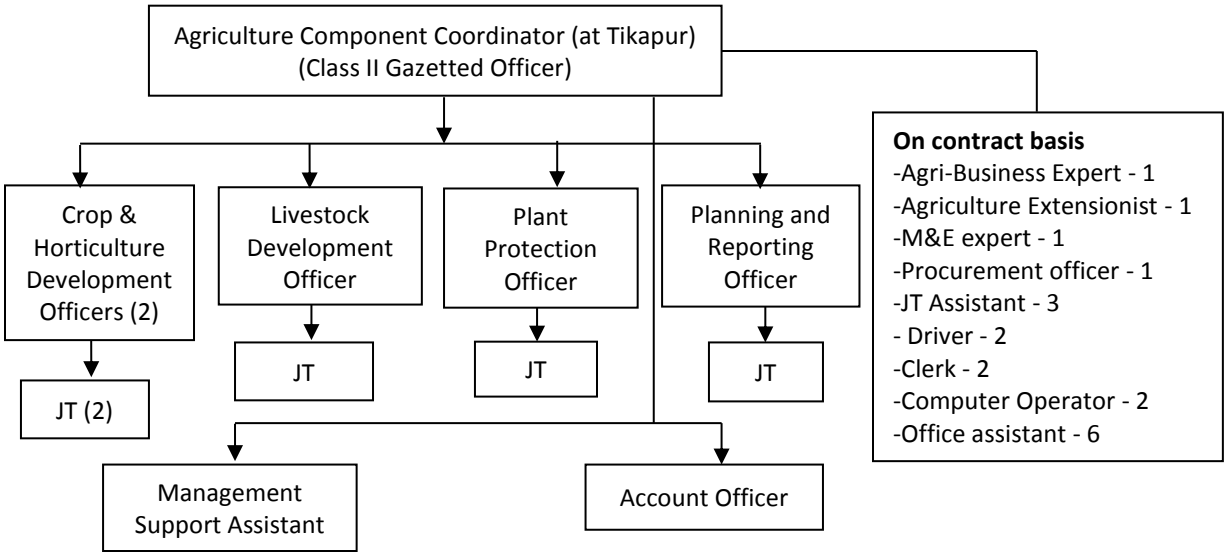
- Organize field-based extension training activities such as group organization, agricultural training, establishing demonstrations and FFS, and help in organizing and selecting farmers for training and cross-learning visits.

- Respond to queries from farmers and, where needed, undertake a field visit to understand the problems and provide solutions.

- Act as a bridge between farmers and the ACIU for flow of information, technical queries, and solutions.

- Prepare and submit monthly progress reports to the ACIU.

Figure 2.1. Organization Structure of Agriculture Component of Tikapur and Kailali



FM and Disbursement

13. The FM arrangements for Phase 2 will be similar to Phase 1. The FM capacity assessment for the DoI and DoA is found satisfactory, given the experience from Phase 1 as well as from the other ongoing World Bank-supported projects. The same processes and procedures as applicable in Phase 1 for planning, budgeting, funds flow, accounting, reporting, internal control/audit, and external audits will apply for this project as well. Overall, financial reporting, budget allocation, and fiduciary transactions will be the responsibility of the DoI through the PIO, and DoA through the ACIU at Tikapur, which is responsible for the FM of its own activities under Component 2. The staffing for accounts and finance functions at both agencies are found to be adequate and satisfactory. The Government's Financial Management Administration Regulations will be used as the basis for exercising appropriate controls over project transactions. The annual work program and budget will be based on the work program to be prepared separately by the DoI PIO and DoA ACIU for their respective components. The DoI and DoA will submit the approved annual work program and budget to the National Planning Commission and the MoF. A separate dedicated budget code will be assigned in the Government's Budget (Red Book) for recurrent and capital expenditures of both components. The MoF releases authorization for expenditure to MoI/MoAD, which in turn, releases authorization to the implementing agencies through their respective departments. The implementing agencies will prepare and maintain books of accounts on a cash basis. The PIO shall be responsible for coordination and submission of periodic consolidated financial reports. The PIO shall prepare and furnish to the IDA not later than 45 days after the end of each Fiscal quarter, IUFRs for the project covering the Fiscal quarter. The annual consolidated project financial statement will be audited by the OAG, Nepal, which is considered acceptable by IDA for this purpose, and submitted to IDA within six months after the end of the fiscal year. The PIO shall be responsible for disbursement of both components. Based on the quality and timeliness of the financial reports of Phase 1, report-based disbursements have been proposed for Phase 2. The disbursements will be in the form of reimbursement supported by IUFRs or direct payments with invoices/relevant supporting documents. For operationalization of subgrants, a PIM will be prepared satisfactory to IDA, which shall include the rules, methods, and procedures and fiduciary arrangements for managing this

activity. The expenditure related to sub grants would be reported to ACIU/PIO who will then include them in the IUFR to be submitted to IDA.

14. As of the pre-negotiations stage (January 2018) the FY16-17 audit report for Phase 1 of MoRJKIS (P118179, IDA Credit 4981-NP and IDA Grant H716-NP, which closed on September 30, 2017) had been overdue. Thus the Bank has sought an exception to proceed with the negotiations of the proposed Phase 2 in line with OP10.00, based on: (i) assurances received from DoI to enable timely submission of the outstanding audit report, and that (ii) the audit report accounting for 70.62 percent of the total target disbursement was already submitted to the Bank during previous years, while the disbursement in FY16-17 was within 15 percent of the total allocation. The FY16-17 audit report that had been overdue was submitted on January 26, 2018 and accepted by the World Bank on January 29, 2018.

15. **Retroactive financing.** The appraisal mission agreed with the PIO on the provisions for retroactive financing. Retroactive financing would be supported under the following conditions:

- The activities are included in the project description and are considered eligible under the Loan Agreement procedures.
- The payments are for the items procured in accordance with applicable World Bank procurement guidelines.
- Payments do not exceed 20 percent of the credit amount.
- The payments were made by the borrower not more than 12 months before the expected date of signing of the Financing Agreement.
- The activities comply with all World Bank fiduciary and safeguard policies and procedures.
- The payments will be reimbursed on or after the effectiveness date of Phase 2.

16. The proposed cost breakdown for retroactive finance is as follows (table 2.1).

Table 2.1. Cost Breakdown for Retroactive Finance

No.	Activity	Required Budget, US$, millions
1	Preparation of the O&M Manual (Asset Management Manual)	0.025
	Detailed household survey of phase 1	0.050
2	Rapid Benefit Survey to inform ICR for Phase 1	0.018
3	Preparation of PIM	0.020
4	Completion of command area protection works under Phase 1	
	a. CAP work at the left bank of Pathariya River Narayanpur-9, Baidi (MoRJKIP/W/NCB-18.8)	0.293
	b. Command area protection works (MoRJKIP/W/NCB-21)	1.00
	c. Command area protection works (MoRJKIP/W/NCB-27)	0.075
	Total	1.481[5]

[5] All RF activities fall under Category 1.

17. **Withdrawal table categories**. There will be separate categories in the withdrawal table in the Financing Agreement for the DoI and DoA parts, because the separate categories would help track disbursed and available allocations under both parts. Also, the small community grants under Component 2 can be divided into two subcategories, each financing different sets of activities with different financing percentages, and following joint cofinancing arrangements. The categories table is provided below table 2.2.

Table 2.2. Withdrawal table categories

Category	Amount of the Financing Allocated	Percentage of Expenditures to be Financed (inclusive of Taxes)
(1) Goods, works, non-consulting services, consulting services, Incremental Operating Costs and Training under Parts A, B.1 and C of the Project	56,112,000 in US$	93 %
(2) Competitive Learning and Adaptive Research Grant under Part B.2(a) of the Project	587,900 in US$	100% of amounts disbursed
(3) Performance-Based Technology Adoption Grants under Part B.2(b) of the Project to support: (a) Technology Adoption and Post-Harvest Support (b) Agriculture Mechanization	 2,521,300 in US$ 1,247,400 in US$	 75% 50%
(4) Goods, works, non-consulting services, consulting services, Incremental Operating Costs and Training under Part B.2(c) of the Project	5,531,400 in US$	100%
TOTAL AMOUNT	66,000,000 in US$	100%

Procurement

18. Major procurement activities to be funded under the project have been identified and stated in the draft PPSD. Table 2.3 presents the procurement risks and their mitigations, as envisaged by the PPSD. It was agreed to state that the major consulting service assignment will have design review in addition to supervision of the construction works of three major command area development works at the RJK irrigation system, the engineering designs of which are already accomplished. The PPSD, which has been approved by the World Bank, has incorporated the above change. The initial Procurement Plan covering the initial 18 months of the project was submitted to the World Bank through STEP on November 27, 2017. No further training of STEP will be required for project staff because they are conversant in using the system. Due to the manpower and capacity constraints in the DoA, it has been agreed that the PIO (DoI) will have the overall responsibility of submitting the Procurement Plans for both the DoI and DoA components to the World Bank. The project will use the e-bidding system supported by the Bank.

Procurement Risk Analysis (as from the Appraisal-Stage PPSD)

19. The major risks identified from the analysis are summarized and evaluated in table 2.3, to ascertain and minimize the likelihood of a risk and reduce the impact of the project.

Table 2.3. Risks Identified from the Analysis

Risk Description	Risk Ranking		Overall Rating (A*B)	Risk Mitigation
	Likelihood Rating (A)	Impact Rating (B)		
Procurement and implementation delays	H	H	H	(a) Appointment of a competent and experienced procurement expert to prepare bidding documents and assist the PIU in various procurement processes, (b) Appoint a competent consulting firm to supervise the performance of contractors during the implementation phase.
Contractor/consultant and client relationship	M	M	M	(a) Strictly adhere to the contractual obligations (b) Ensure timely payment (c) Establish effective communication mechanism with frequent management meetings (d) Establish functional GRM
Cost and time overrun	H	H	H	(a) Select highly qualified and experienced firms for contract management of high-value/high-risk activities.
Borrower experience, capacity and capability	S	S	S	(a) Provide training on procurement regulation and contract management (b) Provide training on STEP for the Procurement Plan (c) Receive hands-on support from the individual procurement consultant
Market analysis	S	S	S	(a) Conduct market survey before preparation of TOR and specifications of consulting and procurement assignments, respectively
Noncompetitive market for 4-wheeler vehicles: It has been observed under several World Bank-financed projects that competitive bidding for procuring vehicles (SUV, cars, and so on) is not providing a competitive price. In most of the cases, either one or no bid is received. The reason for this is that in Nepal different brands and models of vehicles have their disclosed showroom prices that are not comparable with the showroom prices of other brands and models.	H	H	H	The project will adopt a direct-national approach for procuring vehicles. A single supplier will be identified after conducting need analysis and availability of the budget. Then a price quotation is obtained and the final contract price will be settled through negotiations.

Note: Risk Rating Scale: L = Low, M= Moderate, S= Substantial, H= High; TOR = Terms of Reference

Environmental and Social (including safeguards)

20. Located in the Kailali District of the Far Western Development Region, the proposed project's command area falls within Tikapur Municipality, Jananki Rural Municipality, and part of the Lamki Chuna Municipality. Tikapur Municipality is the main market center in the project area. The existing Rani Jamara and Kulariya Irrigation Scheme consists of three independent traditional irrigation systems constructed, operated, and managed by the indigenous Tharu community. The ethnic composition of the project area includes Tharus as the dominant group (48 percent) followed by Chhetri (17 percent), Dalit (15 percent), Brahmin (10 percent), and others (7 percent). There are three WUAs and one central committee (federation) that has representations of the three WUAs.

21. The proposed project is in the Terai (plain) area of Nepal. There are community and state forests in and around the project area. The nearest protected area is the Bardiya National Park, which is located across the source river Karnali, in the east of the project area, away from the project command area boundary. The target area is 14,300 ha of the RJK command area. Under the ongoing Phase 1 which focused on the river/main system level, Natural Habitats (OP/BP 4.04) has been triggered because the Karnali River has protected and endangered aquatic species, including the Gangetic dolphin, marsh mugger, and gharial crocodile. Also, the Bardiya National Park and the Karnali River Corridor (forests) is a wildlife movement route especially for the elephant, tiger, and rhino. As some of the Phase 1 works have been aligned along the fringes of forest areas, OP/BP 4.36 on Forests was triggered and issues were addressed as part of the EMP. An EA, and a BIA of Phase 2 have been carried out which identified and assessed potential impacts and recommended measures for avoidance, minimization, and mitigation of potential adverse environmental impacts as well as enhanced positive impacts related to Components 1 and 2.

22. The scheme abstracts water from the Karnali River, a major left-bank tributary of the Ganges River. The Karnali River has its source in China and flows through Western Nepal into India (where it is called Ghaghara River before it joins the Ganges). The Karnali River is thus considered an international waterway for OP 7.50 (Projects on International Waterways). Due to uncontrolled diversion of the Karnali River water into the main canals, there is typically excessive water entry, while there is no control of the water. The scheme in its current state has very low water-use efficiency and large water losses through seepage and water logging. The proposed Phase 2 will complement Phase 1 in helping reduce water abstraction from the Karnali River, by over 40 percent of the current water abstraction. Therefore, an exception to the notification requirement under OP 7.50 has been received from South Asia's RVP on February 24, 2011. The South Asia RVP has approved the exception to the notification for the proposed Phase 2 on November 28, 2017.

23. The DoI has acquired familiarity and experience with the World Bank's social and environmental safeguard requirements through Phase 1. During the preparation of Phase 1, an SA and an EA were carried out, based on which the DoI prepared the Social Impact Management Framework (SIMF) and EMP to manage social and environmental safeguard issues. The SIMF prepared under Phase 1 includes a Policy Framework for Land Acquisition and Resettlement, along with Vulnerable Community Development Framework and Gender and Social Inclusion Framework to ensure that the benefits from the project reach the indigenous people, vulnerable people, women, and other disadvantaged groups. An RAP for the feeder canal was prepared and implemented. Under Phase 1, private land was not affected but a few private structures were affected. A VCDP was also prepared. To manage social and environmental

safeguard activities, a senior sociologist and an environmental specialist have been appointed under Phase 1, but they started work at a late stage of the project. Besides the safeguard specialist recruited under the project, an LEMC was formed. The LEMC consisted of representatives from environmental stakeholders in the area such as Bardia National Park, community forest users group, district forest group, and NGOs, played positive roles in monitoring and providing advice/guidance with regard to environmental management. However, late recruitment of environmental specialists and turnover of the specialist was one of the weak points. The absence of specialist service/support during the initial stage and later as well has affected the timely support, monitoring, reporting, and implementation of mitigation activities as well as timely coordination with local stakeholders, and regularity of the LEMC meetings and awareness activities.

24. The proposed Phase 2 has built on these existing frameworks and implementation experience to comply with the safeguard policies. Regarding OP 4.01, the command area is defined, and the main canal and branch canal have been modernized in Phase I. An EA, BIA, and IPMP have been prepared for the proposed Phase 2 which address environmental issues relevant to Phase 2.

25. The SA of Phase 2 has been carried out, which identified and assessed the issues and potential impacts and recommended measures for avoidance, minimization, and mitigation of potential adverse impacts as to maximize positive impacts from the project. Based on the SA, the Resettlement Policy framework (RPF) to provide detailed procedural guidelines for resettlement planning and the VCDP to ensure that project benefits will accrue to indigenous peoples and other vulnerable communities and any adverse impacts are mitigated have been prepared.

26. The proposed project will establish a procedure for involving women, disadvantaged, and vulnerable groups in the Participatory Irrigation Management/joint participatory management activities and for ensuring their presence in the WUA committees, building on the progress attained in Phase 1. The proposed project will continue to maintain 33 percent female membership in the WUAs/WUCs and dedicate separate sessions for women, aimed at increasing their roles throughout the subproject cycle, including administration and decision making of the WUAs. The project will organize the public events in an environment that will encourage female participation, implement a GAP, budgeted at US$50,000 as part of the VCDP. Moreover, study tours, involving at least 5 female trainees from project staff, training events on gender and social inclusion to the three branch-level WUAs and to their WUA assembly, and implement a GAP as part of the VCDP. Detailed information is provided in the annex 6.

Monitoring and Evaluation

27. The PIO and its project implementation consultants will be responsible for overall project M&E. The GoN will engage an independent party for regular independent monitoring of the project's environmental compliance and performance, as done under Phase 1. The M&E for most indicators, including on safeguards compliance, will be conducted on a quarterly basis and the results will be presented as part of the project's quadrimester progress report. The World Bank team will assist the PIO in drafting the TOR of the PIO's M&E consultants, and the PIO will use simple MIS and GRM databases, to track progress in project implementation and in CE, respectively.

ANNEX 3: IMPLEMENTATION SUPPORT PLAN

COUNTRY: Nepal
NP Modernization of Rani Jamara Kulariya Irrigation Scheme - Phase 2

Strategy and Approach for Implementation Support

1. The World Bank team will hold a project launch workshop once the project is declared effective. Afterwards, the World Bank will field semiannual supervision missions.

2. The procurement, FM, and safeguards missions may often be undertaken as part of the periodic fiduciary support done concurrently across operations of all World Bank sectors in Nepal. An exception would be the project launch workshop, midterm review, and ICR missions, where it is likely that the entire task team participates concurrently. Procurement prior reviews will be ongoing whereas post reviews will be annual.

3. The World Bank team will assist the PIO in drafting the TOR of the implementation and M&E of consultants, and the PIO will use the project MIS to track progress in project implementation. As for safeguards, the client will closely follow implementation of the safeguards documents (EA/EMP, BIA, IPMP, SA, VCDP, and RPF) through the following:

(a) Ensure that site-specific Environmental Management Action Plan(s) (EMAPs) and the scheme-specific Resettlement Action Plan(s) (RAPs) have been prepared on time and disclosed with public consultations for all new locations, in line with the EA/EMP, BIA, IPMP, SA, VCDP, and RPF.

(b) All EA/EMP, BIA, IPMP, SA, VCDP, and RPF will be included in the respective bidding documents both for construction and supervision. Contracts for construction and supervision will include provisions binding the hired party to implement the EA/EMP, BIA, IPMP, SA, VCDP, and RPF measures and/or to supervise them, with adequate reporting submitted to the client and therefore to the World Bank.

(c) The World Bank safeguards and gender and CE specialists will conduct regular implementation support of the SA, VCDP, and RPF implementation, providing comments and inputs to the client, including site visits and on-the-spot checks with both the contractor and supervisor during ongoing works.

Implementation Support Plan and Resource Requirements

Time	Focus	Skills Needed	Resource Estimate	Partner Role
First 12 months	Start of implementation: • Implementation support to priority schemes • Detailed design and RAPs for the next batch of schemes • M&E establishment	• Project management • Operational skills • Irrigation skills • Rural development skills • FM • Procurement • Environmental and social safeguards • M&E	US$120,000/year	n.a.
12–48 months	Implementation of second and third phase irrigation schemes: • Implementation support to all schemes • M&E	• Project management • Operational skills • Irrigation skills • Rural development skills • FM • Procurement • Environmental and social safeguards • M&E	US$100,000/year	n.a.
Other	• Design technical assistance • Institutional strengthening (WUAs, O&M, fees determination, and so on)	• Expert in irrigation design • Expert in institutional (WUAs O&M, and tariffs)	US$30,000/year	n.a.

Skills Mix Required

Skills Needed	Number of Staff Weeks (per year)	Number of Trips	Comments
Task Team Leader and WRM Specialist	8	2	HQ staff
Agricultural Specialist and Co-Task Team Leader	6	Local trips	Local staff
Irrigation Specialist	8	2	HQ consultant
Procurement specialist	4	Local trips	Local staff
FM Specialist	3	Local trips	Local staff
Environmental Specialist	3	Local trips	Local staff
Social Development specialist	3	Local trips	Local staff

ANNEX 4: ECONOMIC AND FINANCIAL ANALYSIS

COUNTRY: Nepal
NP Modernization of Rani Jamara Kulariya Irrigation Scheme - Phase 2

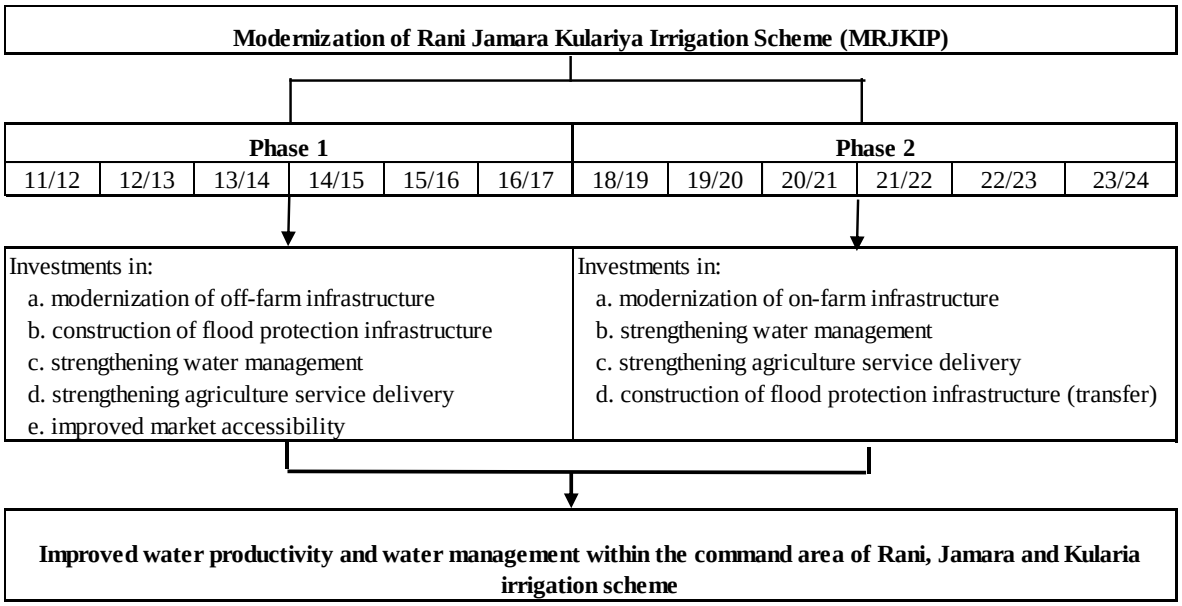
Introduction

1. Through Phase 1 and 2 investments, the MoRJKIP aims at improving water productivity, and strengthening farmer organizations within the command areas of the Rani Jamara and Kulariya Irrigation Scheme both at off-farm and on-farm levels. As presented in figure 4.1, the project is planned for implementation under two phases. Phase 1 was implemented from October 2011 to September 2017. The Phase 1 investments focused on activities that are critical for Phase 2 investments such as securing off-farm irrigation water supply, protecting the command area from annual and major flooding events, strengthening water management, strengthening O&M capacities of WUAs, improving road accessibility to improve farmers' access to agricultural inputs and outputs markets and agricultural mechanization, and strengthening agricultural extension services for extended support to farmers for adoption of improved farm practices and technologies.

2. Phase 2 will be implemented from 2018/19 to 2023/24. It will invest in (a) modernization of on-farm irrigation infrastructure, (b) continuing support to WUAs with MOM of off- and on-farm infrastructures, (c) expansion of improved agricultural service delivery; (d) scaling up of tested technologies, (e) improvements in farm profitability, and (f) further expansion of farmers' access to markets and market information.

3. Jointly, the Phase 1 and 2 investments are expected to result in protection of command areas from flooding, reliable irrigation water delivery to farmers' fields, and improved farmers' knowledge, which in turn are expected lead to increased agriculture intensification, diversification, and profitability.

Figure 4.1. Implementation Arrangements for the MoRJKIP



Methodology

4. The economic and financial analysis examined the feasibility of the MoRJKIP as a whole through consolidation of Phase 1 and Phase 2 investments and potential benefits to them. Benefits streams accounts for improvements in irrigated agriculture within the command areas resulting from Phase 1 investments (actual) and future (projected) returns to Phase 2. The analysis accounted for actual cost of Phase 1 and estimated cost of Phase 2, including incremental MOM costs of infrastructure.

5. Incremental benefits are measured through analysis of benefits in without-project (WoP) and with-project (WiP) scenarios. As shown in table 4.1, the WoP scenario is built based on actual performance of irrigated agriculture in agricultural areas adjacent to the project command areas (referred to as WoP-1) and projected benefits for the remaining project life starting from 2018 to 2051 (referred to as WoP-2). The WiP scenario considers the actual performance of irrigated agriculture within the project command areas starting from 2011 to 2017 (referred to as WiP-1) and projections for future project years (referred to as WiP-2).

Table 4.1. WoP and WiP Scenarios

Years	2011	2012	2013	2014	….	2017	2018	2019	2020	2021	……	2051
Without project	**WoP-1.** Irrigated agriculture performance (productivity, intensity & diversification) in areas adjacent to Rani, Jamara and Kulariya						**WoP-2.** Future without project scenario based on WoP-1 data and projections					
With project	**WiP-1**. Irrigated agriculture performance within command areas of Rani, Jamara and Kulariya						**WiP-2.** Future irrigated agriculture performance in Rani area based on actual and projected returns to phase 1 and 2					

6. The Rani Jamara and Kulariya Irrigation Scheme has 14,300 ha of CCAs. In the WoP-1 scenario, around 11,000 ha of command areas were linked to canal irrigation network but the canal water delivery

was unreliable and insufficient. Majority of farmers therefore used costly groundwater. The remaining 3,500 ha was not linked to the canal irrigation network and was prone to annual uncontrolled flooding during the monsoon season. The scheme lacked flood protection structures because of which major flooding with an occurrence of once in five and ten years would inundate around 75 percent of command areas. The annual and major flooding would cause desertification (sands brought from rivers) and erosion negatively affecting soil fertility.

7. In the WiP scenario, the Phase 1 investments led to crop yield increases ranging from 11 percent for paddy to 38 percent for wheat. Cropping intensity in the entire command area increased from 151 percent (WoP-2) to 208 percent (WiP-1). Crop diversification from grain crops toward high-value vegetable and fruit crops took place especially in winter and spring agricultural seasons. Around 2,500 ha of command areas were protected from annual flooding which caused soil degradation and damaged crop yields. Command protection works for another 1,000 ha did not complete by Phase 1 closure and are transferred to Phase 2 with an estimated completion of works by monsoon season in 2018.

8. As the project benefits are not monitored by the head, middle, and tail-end sections, the economic and financial returns were assessed using averages for the entire command areas. Potential benefits are measures based on 12 representative crop production models. Grain crops are represented by paddy, maize, and wheat. Cauliflower, cucumber, tomato, bitter gourd, and bottle gourd represent vegetable crops. Pulses, oil seeds, and spice crops are represented by lentil, mustard, and chilly, respectively. Fruit crops are represented by the banana production model. Representative crops also included potato.

9. The project benefits are assessed for a period of 40 years, which includes Phase 1 and 2 implementation periods, and technical life of infrastructure, at 2017 financial prices and using opportunity cost of capital at 5 percent.

10. Financial prices of locally traded outputs and inputs recorded in 2017 are converted into economic prices by adjusting for transfer payments. Economic prices for imported agricultural inputs are calculated at their border parity prices. Financial cost of unskilled labor is converted into economic cost at 0.60.

11. The analysis used the project M&E data, including agricultural data from the project baseline, midterm and thematic surveys, and cross-cutting crop surveys conducted by the DoA. Additionally, the analysis used the data of the World Bank's Development Impact Monitoring and Evaluation survey as well as information reported by farmers during the implementation supervision mission in March-April 2017 and ICR mission in November 2017. At the time that the analysis was prepared, the impact assessment survey had not been conducted.

12. The project results are tested for four sensitivity variables including (a) a 20 percent increase in costs of Phase 2 investments, (b) a 20 percent reduction in project benefits projected for the WiP-2 scenario, (c) lack of diversification projected for WiP-2, and (d) a 2-year delay in accumulation of the Phase 2 benefits.

Main Assumptions

13. **Project areas.** The RJK scheme has 14,300 ha of command area. Around 11,000 ha of command areas are currently linked to the canal irrigation network. The Phase 1 investments secured the off-farm

water source and protected the entire command area from major flooding and 2,500 ha from annual flooding. The canal water delivery to the farm field will improve with the Phase 2 investments in secondary and tertiary canals. Majority of farmers currently supplement canal and groundwater for irrigation. The remaining 3,500 ha was not linked to the canal irrigation network and was prone to annual uncontrolled flooding during the monsoon season before the Phase 1 investments. The scheme lacked flood protection structures because of which major flooding with occurrence of once in five and ten years would inundate around 75 percent of command areas. The annual and major flooding would cause desertification (sands brought from rivers) and erosion negatively affecting soil fertility. With Phase 1 investments, the off-farm water source is secured, 2,500 ha of command area is protected from annual flooding, and the entire command area is protected from major flooding risks. Parts of command area protection works, which would protect the remaining 1,000 ha out of total 3,500 ha, transferred to Phase 2 and are planned for completion before the monsoon season in 2018. With Phase 2 investments, the entire 14,300 ha will be linked to the irrigation network.

14. **Project beneficiaries.** Around 25,000 households or 157,000 people will directly benefit from the project investments, of which 70 percent are engaged in farming and remaining 30 percent depend on farm employment. Majority of project beneficiaries are marginal farmers with 34.2 percent of them operating less than 0.1 ha and another 45.4 percent of farmers operating between 0.1 ha and 0.5 ha. The average landholding size in the irrigation systems are 0.65 ha for Rani and Kulariya and 0.5 ha for Jamara systems.

15. **Project benefits.** Main project benefits expected to the Phase 1 and 2 investments are (a) increased agriculture intensification, (b) diversification toward high-value crops, (c) increased farm profitability, (d) prevented agricultural losses on 3,500 ha within the command areas to annual flooding, (e) protection of the entire command area from major flooding events, and (f) reduced CO_2 emissions. These benefits are expected to result from a combination of the following:

(a) **Improved irrigation water supply** to farmers' fields both with regard to timeliness and sufficiency of water volumes will incentivize farmers to invest in improved agricultural technologies and cash crops and help them reduce irrigation costs because surface irrigation is much cheaper than groundwater irrigation.

(b) **Improved farm knowledge** will help application of best farm management practices and technologies and increase efficiency of farm management.

(c) **Improved access to agricultural input and output markets and new technologies** will lead to higher productivity and diversification.

(d) **Increased access to agricultural mechanization services** will make speedy harvesting of winter crops and cultivation of off-season spring crops possible and will reduce harvest and post-harvest losses.

(e) **Improved access to markets, market information, and marketing infrastructure** will lead to increases in marketable shares of produce, obtaining higher than farmgate prices, reducing market-related transaction costs, reduction in storage losses, and planning farm production according to market demands.

(f) **Improved flood control capacity** will prevent productivity and production losses on 3,500 ha, which will encourage farmers to invest in improved crop production on these areas, and protect the entire command area from major flooding events that occur once in five and ten years

16. In the WoP-1 scenario, because of unreliable and insufficient irrigation water supply. crop yields were below agronomical potential even in the head section of command areas. Yields of irrigated monsoon paddy and winter paddy were 2.8 tons per ha and 2.6 tons per ha in the head and middle sections. Similarly, yields of monsoon paddy were about 10–25 percent lower in the tail section because of flooding and soil degradation. According to the baseline survey data, crop production was dominated by paddy (67 percent), wheat (12 percent), pulses (11 percent), maize (7 percent), oilseeds (7 percent), vegetables (1 percent), potato (1 percent), and fruits (0.4 percent). Cropping intensity was around 157 percent.

17. In the WoP-2 scenario (from 2018 onwards), the WoP-1 crop yields as well as cropping intensity were assumed to remain at current levels. In the monsoon season, however, production areas under rain-fed paddy are expected to increase from 10 percent to 23 percent and irrigated paddy areas expected to decline from 83 percent to 73 percent because of irrigation water unavailability and insufficiency. The scope of production losses due to flooding is also assumed to remain unchanged.

18. The WiP-1 scenario reflects actual changes in crop productivity, intensity, and diversification resulting from Phase 1 investments. As **Error! Reference source not found.**5 shows, crop yields increased f or all crops, with the lowest yield increase reported for paddy at 11 percent and 38 percent for wheat. Average yield increases for all other crops was estimated to be around 24 percent. Yields on previously flood-prone areas increased from 1.98 tons per ha to 2.4 tons per ha. Cropping intensity increased from 157 percent to 208 percent at Phase 1 closure largely because of improved access to quality and short-duration seeds and markets for agricultural inputs and outputs and adoption of production technologies. Diversification toward high-value vegetable and fruit crops occurred. Shares of paddy areas in gross cultivated areas, for instance, declined by around 24 percent, maize areas by 4 percent, and pulses by 1 percent whereas the respective shares of areas under vegetables were higher by 10 percent, spice crops by 3 percent and potatoes and pulses each by 2 percent.

19. In the WiP-2 scenario, crop yields are projected to increase further from 5 percent for fruits and tomato crops to 30 percent for early and late monsoon paddy and winter pulses. An average yield increase for all other crops was assumed to be around 18 percent. Cropping intensity too is projected to increase from 208 percent to 255 percent.

20. Key benefits and related assumptions are presented in table 4.5.

21. **Unquantified benefits.** On December 25, 2017 (after the economic analysis had been prepared), additional livestock support activities were included in the project. Benefits to livestock investments therefore are not accounted in the current analysis

22. **Benefit accumulation and scope.** All project benefits, except prevented agricultural losses to flooding, are projected to accumulate gradually over a 12-year period. The analysis assumes realization of potential benefits over 28 years starting from year 13, which is a relatively conservative assumption given that the technical life of irrigation and flood protection infrastructure can go beyond the 40-year period.

Benefits to the flood protection infrastructure are expected to reach full maturity a year following completion of flood protection structures.

23. A success rate of 70 percent is assumed for all types of benefits except those to the investment in flood control infrastructure for which 100 percent was projected.

24. **Prices.** The WiP-1 and WiP-2 scenarios present agricultural inputs and outputs in 2017 prices.

25. **Project cost.** Total project cost includes actual cost of Phase 1 at NPR 4.1 billion and base cost of Phase 2 inclusive of physical contingencies at NPs 5.5 billion, excluding costs of the livestock support program.

Financial Analysis

26. **Farm-level benefits.** When the average farm sizes in each irrigation system are accounted, annual net (undiscounted) incremental benefits are estimated in the range of NPR 38,653 and NPR 50,250 per farm household (table 4.2).

27. **Project-level results.** The project investments are expected to generate net incremental returns at NPR 44.2 billion over the 40-year period, which corresponds to NPR 3.1 million per ha. Average annual (undiscounted) incremental benefits are expected to be NPR 1.1 billion or NPR 77,300 per ha. The project is estimated to generate discounted FNPV of NPR 11.1 billion with FRR at 15.4 percent.

Table 4.2. Summary Financial Results

	Rani	Jamara	Kulariya	Total
Command area (ha)	5359	4586	4355	14300
Average landholdings (ha)	0.65	0.50	0.65	
Total (undiscounted) incremental returns (NRs million)	16571	14181	13467	44219
Total (undiscounted) incremental returns per ha (NRs million)				3.09
Average incremental returns per annum (NRs million)	414	355	337	1105
Annual (undiscounted) incremental returns per ha (NRs)	77306	77306	77306	77306
Annual (undiscounted) incremental returns to av. farm HH (NRs)	50249	38653	50249	
FIRR (%)				15.4%
FNPV (NRs billion)				11.1

Cost Recovery Analysis

28. MOM of the irrigation scheme will be carried out by the WUAs and its costs will be financed jointly by the Government and water users. The MOM funding requirements for both the Phase 1 and 2 investments will be determined through an asset management study to be carried out before the Phase 2 effectiveness.

29. Indicatively, the total MOM funding requirement for main and secondary canals and flood protection infrastructure is estimated at NPR 158.9 million, including MOM of main canals and flood protection infrastructure at NPR 78.2 million and secondary and tertiary canals at NPR 80.7 million. Of the total estimated amount, the Government will contribute NPR 12.5 million and the remaining NPR 68.4 million is expected from water users through their cash and in-kind contributions. In 2017, the water users contributed around NPR 62.0 million or 91 percent of the required amount. Water users' contributions included cash contribution at NPR 1.3 million and in-kind contribution at NPR 60.7 million.

30. The required MOM funding requirement is expected to reduce from the currently estimated amount at NPR 158.9 million to NPR 143.4 million after the secondary and tertiary canals are modernized and built. This corresponds to NPR 9,153 per ha, which is less than the current (actual) contribution of water users at NPR 9,793 per ha. However, it is critical for water users to increase their cash contribution from NPR 117 per ha (collected through the ISF on 11,300 ha, which is currently linked to the irrigation network) to NPR 727 per ha to allow the WUAs to meet the cash portion of MOM funding requirements.

Table 4.3. Estimated Current, Actual, and Estimated Future MOM Funding Requirements

	Estimated funding		Actual funding		Future estimated funding	
	total (NRs M)	per ha (NRs)	total (NRs M)	per ha (NRs)	total (NRs M)	per ha (NRs)
Main canals and flood protection infrastructure						
Water users labour contribution	60.7	4,245	60.7	4,245	42.5	2,972
Gov financing	12.5	874	12.5	874	12.5	874
Water users cash contribution	5.0	350	1.3	117	7.7	538
Subtotal	**78.2**	**5,469**	**74.5**	**5,212**	**62.7**	**4,384**
Secondary and tertiary canals						
Water users labour contribution	78.0	5,455	78.0	5,455	78.0	5,455
Water users cash contribution	2.7	189	-	-	2.7	189
Subtotal	**80.7**	5,643	78.0	5,455	**80.7**	5,643
Total	**158.9**	**11,113**	**152.5**	**10,667**	**143.4**	**10,028**

Economic Analysis

31. The ENPV of benefits to the project investments is estimated at NPR 22.4 billion with ERR at 25.1 percent. The economic returns are substantially higher than financial returns because of the economic benefits of reduced net GHG emissions which are not accounted for in the financial analysis.

Table 4.4. Summary of Economic Results

	ERR (%)	ENPV (NRs billion)
Base case	**25.1%**	**22.40**
Project cost increase by 20%	21.4%	21.13
Benefits decline by 20%	20.6%	16.65
Lack of diversification	14.9%	10.31
Benefit accumulation delay by 2 years	16.3%	18.00

Sensitivity Analysis

32. The project is moderately sensitive to changes to the project cost, benefits, and lack of diversification. For instance, a project cost increase by 20 percent will drop the base ERR from 25.1 percent to 21.4 percent. Similarly, a 20 percent reduction in the scope of benefits will drop the base ERR to 20.6 percent. The ERR will be 14.9 percent if the projected diversification is not realized. However, the project is highly sensitive to the delays in benefit accumulation with the ERR dropping to 16.3 percent when the benefit accumulation is assumed to delay by two years.

Table 4.5. Benefits Assumptions: Yields, Cropping Pattern, and Intensity

	Cropping pattern (ha)				Yields (t/ha)			
	WoP-1	WoP-2	WiP-1	WiP-2	WoP-1	WoP-2	WiP-1	WiP-2
Monsoon								
Paddy (irrigated)	8294	8294	11150	11798	2.80	2.80	3.10	3.50
Paddy (rainfed)	1430	1430	0	0	2.60	2.60	3.00	3.40
Paddy (flood, rainfed)	3504	3504	1000	0	1.98	1.98	2.10	3.50
Maize -local	644	644	135	0	1.70	1.70	2.20	2.60
Maize -improved			540	1001	2.10	2.10	2.90	3.20
Vegetables	286	286	540	0	6.5~8.0	6.5~8.0	8.0~11	12~18
Potato	123	123	135	1502	13.00	13.00	16.00	18.00
Winter								
Wheat -local	2722	2722	715	0	1.60	1.60	2.00	2.40
Wheat -improved	405	405	3575	4133	2.20	2.20	3.00	3.40
Vegetables	486	486	2860	1459	10~10.8	10~10.8	12.00	13.4~16
Potato	559	559	1430	1459	6.00	6.00	7.50	9.00
Mustard	1855	1855	2145	1459	0.82	0.82	1.10	1.20
Lentil	2021	2021	3182	2188	0.45	0.45	0.58	0.76
Banana	31	31	250	1459	15.00	17.00	18.00	21.00
Spring/Summer								
Paddy (early)	0	0	0	3504	0.00	0.00	3.10	4.10
Maize -local	0	0	100	0	1.80	1.80	2.20	2.50
Maize -improved	0	0	500	1802	2.50	2.50	2.85	3.30
Vegetables	0	0	600	3704	15.00	15.00	17.00	22.00
Chilli	0	0	800	1001	6.30	6.30	9.00	11.00
Whole year								
Sugarcane	22	22	143	122	41.84	41.84	64.00	50.00
Gross cultivated area (ha)	22380	22380	29800	36465				
Net command area (ha)	14300	14300	14300	14300				
Cropping intensity (%)	157%	157%	208%	255%				

ANNEX 5: FINDINGS AND RECOMMENDATION FROM THE PUBLIC STAKEHOLDERS CONSULTATION

The public consultation per OP/BP 4.01 was held on December 14, 2017. The participants from all stakeholders were generally supportive of the project. The public consultation presentations, outcomes, and the list of participants were disclosed in-country and in the World Bank's website. The sections below present a summary of the recommendations from the public consultation.

Kumar Raja Shahi, Chairman, WUA Main Committee

- Mr. Shahi appreciated the works of Phase 1 and suggested the following for Phase 2:
- Continuation of upgrading of farm roads in Phase 2;
- Monitoring of riverbed material extraction and prohibition of its export outside of the district;
- Dissemination of information regarding location and river stretch where the Environmental Assessment has recommended sand gravel and boulder extraction; and
- Monitoring the excessive use of pesticides.

Pradeep Choudhary, Chairman, Janaki Rural Municipality

- The project and local government should coordinate with each other during the implementation of Phase 2.
- The project should provide information about its annual plan, programs, and activities.
- The activities implemented by the project and the local government should be monitored to control duplication of the programs.

Mahadev Bajgain, Mayor, Lamki Chuha Municipality

- Concept of collective farming is a good initiative. Farmers should be provided with convenience loan, subsidy on seeds and machineries, and technical support for collective farming.
- Programs and activities of Phase 2 should be focused on maximizing the utilization of agricultural production.
- Priority should be given to the river training works of Rora, Charela, Chauri, and Pathariya Rivers.
- Special programs with services from livestock and agriculture experts should be launched for the management of feral cattle.

Tapendra Rawal, Mayor, Tikapur Municipality

- Construction of an irrigation museum will be an added benefit in the project area. Tikapur Municipality has started the preparation of a master plan for extension of the Tikapur Park, and the municipality will provide support for the construction of the irrigation museum.
- Tikapur Municipality has initiated waste water management programs to solve the problem of river and canal pollution. Furthermore, the municipality has prepared an action plan for the management of feral cattle.
- The main issue is the management of the project after its completion.
- The project should conserve the traditional Badghar system of canal operation and maintenance.
- The project should initiate activities regarding insurance of crops and livestock.

Govinda Prasad Rimal, Chief District Officer, District Administration Office, Kailali

- The public consultation program has helped increase transparency and accountability; satisfactory performance of Phase 1 activities.
- Assessment of the consequence of land fragmentation in the project area and whether the project will be able to gain benefit after its completion.
- Importance of establishment of a quarantine post and quality control in the customs office.
- Improvement in implementation of Phase 2 by incorporating lessons learned during the implementation of Phase 1.

Surya Bahadur Thapa, Chairman, District Coordination Committee, Kailali

- Negative impact on achievement of PDOs due to fragmentation of agricultural land. Need to restrict the land fragmentation process in the project area.
- The project should focus on collective farming programs.
- The project should launch a model program in the project area for industrialization of agriculture. All necessary technical support, subsidy on equipment, machineries, seeds, and fertilizers should be provided by the project.
- There should be plantation along the river banks.
- Support may need to be provided for the establishment of a soil testing lab and agriculture college in the project area.

ANNEX 6: CITIZEN ENGAGEMENT, GENDER AND SOCIAL INCLUSION, AND CLIMATE CHANGE

1. The Phase 2 features on modernization of the lower-order irrigation system (subbranches, tertiary canals, and watercourses) and makes sure the irrigation services will reach to the farmers and irrigated water will be used in a more efficient and sustainable manner in the project area. For this, the project focuses on (i) Citizen Engagement, (ii) Gender and Social Inclusion, and (iii) Climate Change.

Citizen Engagement

2. **Background.** In Nepal, the development issues gradually started getting complex during the last two decades as development paradigms shifted more toward human, societal, and environmental development aspects from traditional economic and infrastructural growth models. The governance issue became more pronounced in the development sector, which also includes water resources.

3. **CE under the proposed Phase 2.** Given the lessons from Phase 1, the community concerned has been consulted during preparation of Phase 2 for its concerns to be adequately integrated into the project design and VCDP for Phase 2. In Phase 2, CE has been incorporated through Component 2, by engaging the participation of water users in every cycle of the project from system design through implementation and the JPM in the system's O&M after completion of the CAD activities. Additionally, a GRM that involves community members in resolution of problems and disputes will be established.

4. **The Results Framework (RF) will include an intermediate indicator on CE,** measuring 'Number or percentage of grievances registered, related to delivery of project benefits, that are actually addressed.'

Gender and Social Inclusion

5. In Nepal, institutional and structural barriers exist to exclude women from playing a meaningful and equitable role in society. At the household level, division of labor by gender is inequitable as women shoulder more responsibilities than men, which include household chores and farming activities. Likewise, participation, control, and mobilization of public activities generally fall within the male domain, thus minimizing mobility of women in community roles. In the irrigated agriculture sector, lack of land ownership is one of the key barriers for women's full participation and benefit from IPs. This is because (a) land entitlement is a prerequisite to get formal membership in the WUA including formal voting right and (b) without formal membership, participation in key decisions related to the design, O&M, water management, and labor contribution is restricted. Although the constitution and subsequent laws give women equal rights over ancestral property; currently only 19.7 percent of women own around 5 percent of land throughout Nepal, and only around 11 percent have effective control over their property.

6. **Women's participation in WUAs/WUCs.** The revised Irrigation Policy of the GoN/MoI mandates the WUAs/WUCs to include women in their management by at least 33 percent. However, women membership in WUAs/WUCs of RJK remains at 22.45 percent. The policy also mandates at least one woman in key decision-making position. However, this is either unmet or is nominated for mere tokenism. In the three branch canals, there are no women in key positions and participation of women in general assemblies is at 5–7 percent with no woman as Badaghars or Chiragis. The key reason is the governing rules of membership in the WUCs that select members based on household heads, who are often men. Only those households where males have migrated for work for a long time have widowed or separated

or single females as household heads. There is no system of co-membership of females in the WUCs; thus, without membership rights, women are not able to elect committee members and voice their concerns over rules and other developments in the same way as men. Women are also prime users of irrigation systems, as they use the water for multiple purposes but their involvement in planning and design of infrastructure, in quality control, and in CDC committees for compensation is highly limited. The same applies to sharecroppers and leaseholders, and because of their inability to produce land certificates and their temporary status, they are unable to become formal members in the WUAs and have their voices heard.

7. **Gender inclusion in labor for O&M of canals.** The irrigation water rights in the project area are largely tied to farmer contribution in kind or in cash to the O&M of canals, especially for cleaning the source/approach canals. Some women often prefer contributing only in cash, as they can earn higher wages by working elsewhere and/or since digging and cleaning the source canals is too laborious and time-consuming. The WUA/WUC leaders (Badghars) would often instruct women to pay the cash equivalent for the days their households were meant to work in the main source and contribute extra labor to the maintenance of the subbranch canals. It was observed that non-Tharu women would get away from labor contribution by paying a fine of NPR 150 per day, but Tharu women are yet to exercise their decision in labor contribution as they have to abide by their communal rules and norms, which often places them at multiple disadvantage. Women felt, during focus group discussions (FGD), that labor contribution to the maintenance of source and subbranch is skewed and often does not reciprocate with the area of land versus labor contribution, especially those who own only little land or female-headed households.

8. **Gender and social inclusion in agriculture extension services component.** Women's labor contribution in agriculture is 75 percent by 2015 and more than 70 percent of livestock farmers are women. These figures are enough in themselves to justify the need for more engagement of women in the agriculture sector—particularly in training—FFS, improved technology, improved farming, demonstration and distribution of seeds, and so on. However, it was noted in Phase 1 that the operation of agriculture component of the project was less transparent, criteria for distribution of benefits were less obvious, and information dissemination was not adequate to women and the landless. Often the communication done through mobile phones reached men only and thus unintentionally excluded women and other socially excluded. Another segment that is completely excluded from accruing benefit from the project is the landless, and hence a separate component for alternative livelihood support such as mushroom farming, bee keeping, livestock, and so on needs to be explored. According to the feedback from Phase 1, women beneficiaries confirmed that though women were fewer in numbers in agriculture-related training and extension services (less than 19 percent), they could make considerable benefit from the project activities related to agriculture such as trainings, demos, and extension services.

9. **Phase 2 will build on the abovementioned insights to better incorporate women.** The proposed project will establish a procedure for involving women, disadvantaged, and vulnerable groups in the JPM activities and for ensuring their presence in the WUAs/WUCs, building on the progress attained in Phase 1. The proposed project will continue to maintain 33 percent female membership in the WUAs/WUCs and dedicate separate sessions for women, aimed at increasing their roles throughout the subproject cycle, including WUAs' administration and decision making. The project will organize the public events in an environment that will encourage female participation. Moreover, three-week-long study tours will be organized abroad, involving 15 trainees from project staff, of which at least 5 are women, budgeted at

around US$300,000. Eighty three-day training events on gender and social inclusion will be provided to the three branch-level WUAs and to their WUA assembly, budgeted at US$24,000.

10. **Results indicators on gender.** In addition to disaggregating the RF indicators which count the beneficiaries by females and males, the RF will include a stand-alone gender indicator, measuring 'No. of women members in executive committee of WUAs maintained at 33 percent with at least one in key decision-making position in each WUA and with WUAs demonstrating equitable governance'. This indicator will be measured annually, through undertaking independent surveys canvassing a representative number of females.

Project Budgets for Inclusion of Gender and CE

11. The budget for gender and CE will be mobilized from the budget for the WUA/WUC subcomponent under Component 2, as well as from the budget for safeguards management under Component 3 (the VCDP).

12. The budget for implementation of GAP is estimated at US$50,000 under the Subcomponent 2a. The revised VCDP will include the implementation of GAP. GAP includes awareness raising, capacity development trainings, FFS, agriculture-based training, small farm machinery support to women members, compensation to FHHs, and so on. It is a stand-alone action plan but it can come under the broader VCDP implementation but with a separate budget.

13. The public consultation per OP/BP 4.01 was held on December 14, 2017. The participants from all stakeholders were generally supportive of the project. The public consultation presentations, outcomes, and the list of participants were disclosed in-country and in the World Bank's website. Annex 5 presents a summary of the recommendations from the public consultation.

Climate Change

14. **Climate change co-benefit.** The proposed project will contribute to both climate change mitigation and adaptation co-benefits. The climate co-benefits percentage has been assessed at 78 percent (refer to the detailed results in a separate Memo to File). The climate and disaster risk has been screened by the team. The exposures to climate and geophysical hazards at the project location, as identified by the screening, are flooding, drought, and earthquake. The analysis indicates that the project components will all help in reducing the impact of such potential disaster risks. According to department of Hydrology and Meteorology, the annual mean temperature in the Kailali station has been slightly increased (0.13^{o}C from 2003 to 2012), while national statistics report shows the annual rainfall in the same station is irregular (2,677 mm in 2008 and 883 mm in 2012) [6]. Climate projections for the region suggest that rainfall is likely to intensify in flood-prone areas, while water-scarce regions become even more drought prone and unproductive. The project area is prone to flooding during the monsoon period, with dry winter.[7] The flood is caused either by overflow of surrounding rivers or by an inadequate discharging capacity of drainage canals. To protect from flood due to overtopping of Karnali River, Phase 1 has constructed embankments and other works along the right bank of Karnali and the left bank of Pathariya River. Phase 2 (Component 1) will continue building protection works along the banks of Mohana and

[6] GoN (Government of Nepal). 2013. Environment Statistics of Nepal, Kathmandu, Nepal.
[7] According to the Environment Statistics, 87 percent of precipitation in monsoon period in the Kailali station during 1971–2000.

Pathariya Rivers, to reduce damage to the farm land and crop. The project (Component 1) will finance water control works at the community level, thus reducing water conveyance and distribution inefficiencies, which helps adapt to climate change, especially during drought periods. Through the training (Component 2) activities, farmers will be able to plan to control water distribution both in the monsoon and winter periods. Also, farmers will be trained under the IPMP on rationalizing the use of pesticides and fertilizers, thus contributing to climate mitigation. As the project will finance irrigation-system improvements, farmers will no longer need to use expensive pumped water (approximately three times as expensive as surface water) during winter time (currently practiced on around 3,000 ha), and the reduced energy use contributes to mitigation. The project will also finance introduction of solar panels for Internet and other energy-using activities under Component 2 (US$20,000).

15. **Greenhouse gas (GHG) emission.** The net emissions of the project are estimated at −1,051,719 tCO_2e over the 28-year life of the project. Gross emissions are expected to be 3,003,929 tCO_2e. Net annual average emissions are estimated at −35,142 tCO_2e. The project envisages net mitigation due to the higher soil carbon sequestration potential caused by implementing improved agricultural practices and WRM on annual crop land while also using less diesel-based energy to pump water for irrigation (the detailed results are provided in a separate Memo to File).