
VOLUME 1: EXECUTIVE SUMMARY

Environmental Assessment, Biodiversity Impact Assessment, Integrated Pest Management, Social Assessment, Vulnerable Community Development Plan & Resettlement Planning Framework



PREFACE

This document is the first of eight volumes, which together describes the summary of Environmental Assessment (EA), Biodiversity Impact Assessment (BIA), Integrated Pest Management (IPM) and Social Assessment studies including Vulnerable Community Development Plan (VCDP) and Resettlement Plan Framework (RPF) conducted in relation to the Modernization Rani Jamara Kulariya Irrigation Scheme (MoRJKIS) in Tikapur Kailali Districts Far West in the Province Seven of Nepal. These studies were conducted by project proponent (Department of Irrigation, Rani Jamara Kulariya Irrigation Project) between April to November 2017 and finalized on December 26, 2017. The Reports have been prepared in compliance with the GoN Law and World Bank Safeguard Policies.

The report of these studies comprises eight volumes, which are arranged as follows:

- Volume 1: Executive Summary (combining the finds of EA, BIA, IPM, SA, VCDP & RPF)- **this document;**
- Volume 2: Environment Assessment (EA);
- Volume 3: Biodiversity Impact Assessment (BIA);
- Volume 4: Integrated Pest Management Plan (IPM);
- Volume 5: Social Impact Assessment (SIA);
- Volume 6: Vulnerable Community Development Plan (VCDP);
- Volume 7: Resettlement Planning Framework (RPF);
- Volume 8: Stakeholder Consultation Proceeding conducted at Tikapur on December 14, 2017.

The relevant inputs received from the stakeholders during consultation has already been incorporated in respective reports. It is enclosed for reference only.

LIST OF ACRONYMS AND ABBREVIATIONS

Agricultural Component Implementation Unit	ACIU
Area of Influence	AoI
Biodiversity Assessment	BA
Bird Conservation Nepal	BCN
Biodiversity Management plan	BMP
Biodiversity Monitoring Plan	BMoP
Bardiya National Park	BNP
Bank Procedures	BP
Command Area	CA
Command Area Development	CAD
Command Area Protection	CAP
Community Based Organization	CBO
Central Bureau of Statistics	CBS
Community Forests	CFs
Community Forest Users Group	CFUG
Convention on International Trade in Endangered Species	CITES
Dolphin Conservation Committee	DCC
District Forest Office	DFO
Direct Influence Area	DIA
Department of Agriculture	DOA
Department of Irrigation	DOI
District Water Resources Committee	DWRC
Environmental Assessment	EA
Environment, Health and Safety	EHS
Environmental Impact Assessment	EIA
Environmental Management Action Plan	EMAP
Environment Management and Monitoring Committee	LEMC
Environmental and Social Management Plan	ESMP
Environment Protection Act	EPA
Environment Protection Rules	EPR
Farmers Management Irrigation System	FMIS
Government of Nepal	GoN
Grievance Readdress Committee	GRC
High value crops	HVCs
International Development Association	IDA
Karnali River Basin	KRB
Local Environment Monitoring Committee	LEMC

Modernization of Rani Jamara Kulariya Irrigation Scheme (MoRJKIS)
Executive Summary (EA, BIA, IPM, SA, VCDP & RPF)

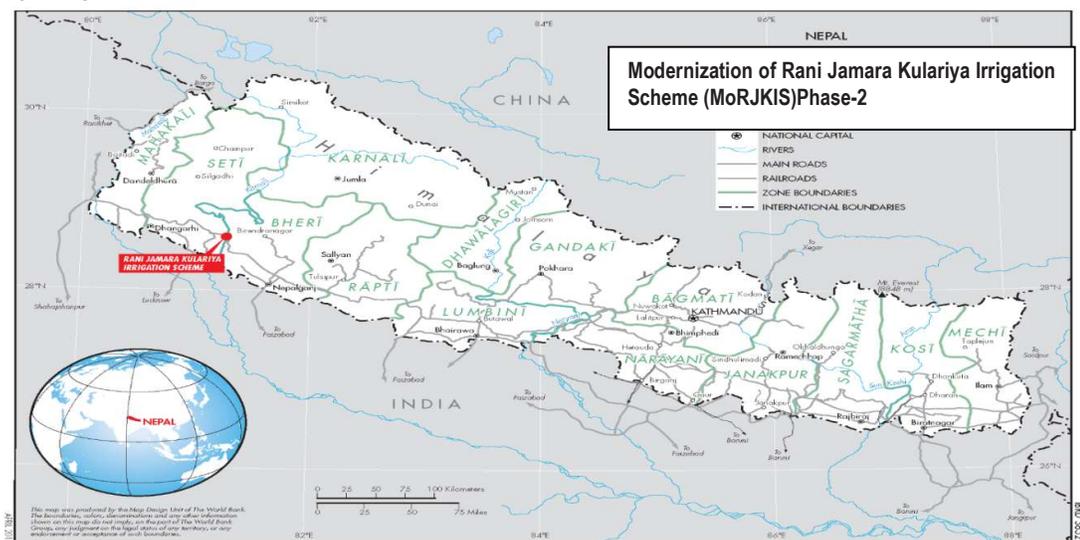
Modernization of Rani Jamara Kulariya Irrigation Scheme	MoRJKIS
Nepali Rupees	NPR
Non-timber Forest Product	NTFP
Operational Policies	OP
Project Implementing Office	PIO
Project Operation Plan	POP
Rani, Jamara and Kulariya Irrigation Project	RJKIP
Rani Jamara Kulariya Irrigation Scheme	RJKIS
Rapid Rural Appraisal	RRA
South Asian Association for Regional Cooperation Secretariat	SAARC
Suklaphanta National Park	SNP
Terai Arc Landscape	TAL
United States Dollar	USD
Village Development Committee	VDC
World Bank	WB
Water User Association	WUA
Water User Groups	WUG
World Wide Fund for Nature	WWF

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A. Background & Modernization of Rani Jamara Kulariya Irrigation Scheme (MoRJKIS) Phase-1

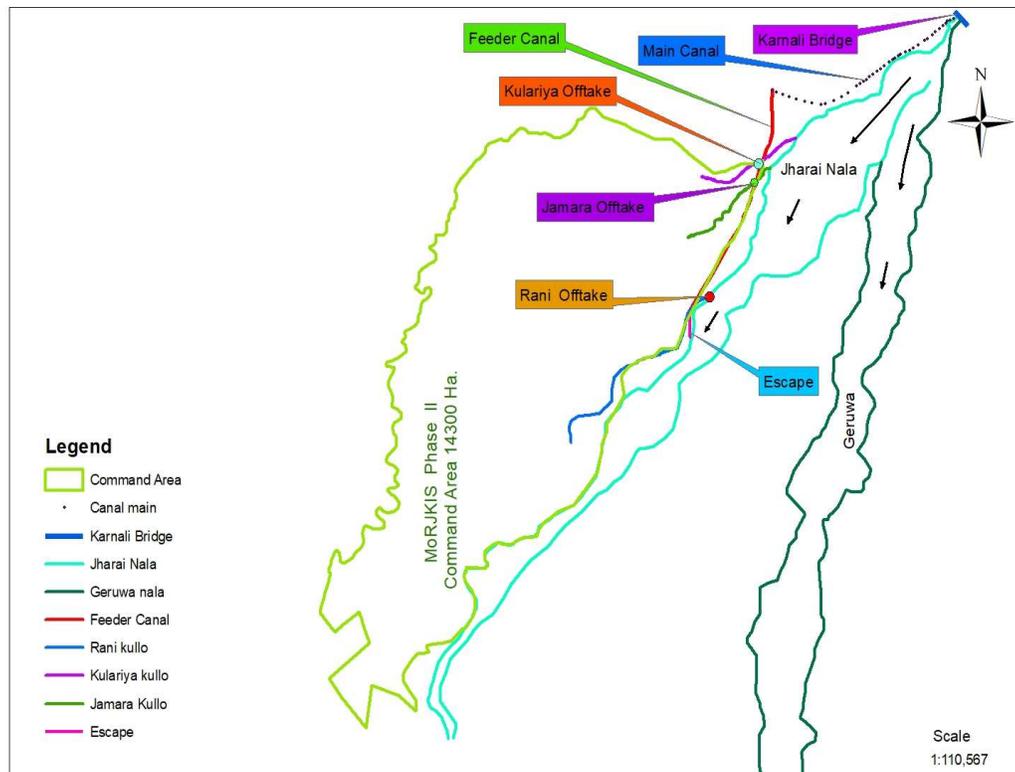
1. The Rani, Jamara and Kulariya irrigation systems are located in the Eastern part of Kailali district of the Province 7 in the Far Western Region of Nepal. These irrigation systems have been operated and maintained by indigenous *Tharu* and other communities of the area. Rani, Jamara and Kulariya irrigation systems were developed by them 118, 111, and 99 years before respectively. The intakes used to be seasonal inundation type located on the right bank of Karnali River and with no other permanent control structures except canal network. The temporary diversion structures constructed used to get washed away by flood in the river every year, resulting inundation of the adjoining command area.



2. The Feeder canal constructed by the farmers is frequently damaged by the debris deposited by crossing drains during the rainy season. The discharge in the approach channel fluctuates depending upon the water surface level in the Karnali River. The major percentage of the diverted discharge is lost in the dried course of the Karnali River and the *Jharahi Nala*. The farmer's system receives relatively small percentage of the water diverted from the Karnali River near Chisapani. The changing river morphology since last two decades, the Western watercourse has a tendency to shift towards the Eastern watercourse as a consequence farmers were facing difficulty to divert water into the canals and demanded for the modernization and improvement of the system.
3. Therefore, the World Bank, on the request of GoN, has agreed on 18 October 2011 to provide financial assistance for the modernization and further development of the project on cost sharing basis. Rani. The Phase -1 of the modernization was effective from November 2011, and is recently completed in September 2017. The Phase 1 has following four components:
 - a. Component I - Scheme Modernization (US\$ 38.6);
 - b. Component II - Strengthening WUAs (US\$ 2.2);
 - c. Component III- Agriculture Production Support (US\$ 2.9);
 - d. Component IV- Project Management (US\$4.3).

B. Modernization of Rani Jamara Kulariya Irrigation Scheme (MoRJKIS) Phase-2

4. The MoRJKIS Phase 2 complements Phase-1 because of two inter-related necessities:
 - a. First, below the main/conveyance system introduced by Phase 1, without Phase 2 the irrigation distribution and application efficiencies would continue to be very low compared to the global/regional norms.
 - b. Second, the WUA's function is not supposed to stop at the main-system level and need to utilize the immense potential for Joint Participatory Management (JPM) in the Rani-Jamara-Kulariya community, building on the creation and empowerment of WUAs attained under the Phase 1 so that the WUA can also have a major role in the O&M of the irrigation subsystem down to the farm level.
5. Therefore, the MoRJKIS Phase-2 will focus on modernization of the lower-order irrigation system (sub-branches, tertiary canals and water courses) so that irrigation water can reach farmer fields with the optimal flows, continuation of the WUA/WUG support program, and implementation of a comprehensive agricultural improvement program spreading in Tikapur Municipality Janaki Rural Municipality and part of Lamki Chuha Municipality. The Tikapur Municipality is a 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. Currently, MoRJKIS phase-2 is intended for rehabilitation of existing canals and improvement of existing farm roads and construction of minor canal structures for round the year water distribution. The proposed project is in the Terai (plain) area of Nepal.



6. The MoRJKIS Phase-2 project components are briefly discussed below:
 - a. **Component 1-** Scheme Modernization (US\$57 million, of which US\$56 million IDA);
 - b. **Component 2-** Agricultural Production Support and Strengthening Water Users Associations/Groups (WUAs/WUGs) (US\$9 million, of which US\$7 million IDA);
 - c. **Component 3-** Project Management (US\$5 million, of which US\$3 million IDA, including goods, technical assistance and capacity building).

B1 Safeguard Analysis Requirement

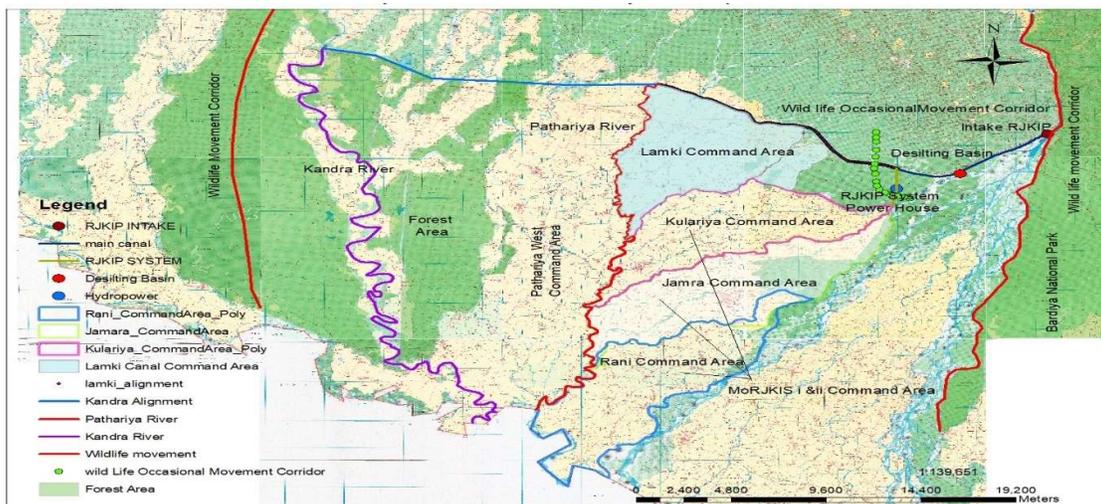
7. The World Bank requires Environmental and Social (E&S) Assessment of projects proposed for Bank financing to help ensure that they are environmentally and socially sound and sustainable, and thus to improve decision making. The Phase-2 intervention triggers following safeguard policies as briefly mentioned below:
 - a. **Environmental Assessment OP/BP 4.01-** The physical construction activities and agricultural production support likely to have potential adverse impacts on the natural environment and human health and safety;
 - b. **Natural Habitats OP/BP 4.04-** It is envisaged to have Indirect impacts on the natural habitat and biodiversity as Karnali and Mohana Rivers are known habitat of important aquatic species (such as-Gangetic Dolphin, Marsh Mugger, and Gharial crocodile). It is also reported occasional movement of wildlife in the project area from adjoining forests such as Bardiya National Park (BNP);
 - c. **Forests OP/BP 4.36-** There are small patches of forests as well as community forests in close to the Phase -2 structures and less chance of adverse impacts (insignificant) on forest compared to the Phase 1. Nevertheless, indirect impacts on forests is likely (such as loss or degradation of the forest health or quality);
 - d. **Pest Management OP/BP 4.09-** The Phase 2 emphasizes increasing and sustaining agricultural production by carrying out a series of agriculture-based activities, adopting value-chain-based approach. This is likely to introduce pesticides or increased use of pesticides (though project will not finance purchase of pesticide) and expected to have impacts on human and other living beings of project area;
 - e. **Indigenous Peoples OP/BP 4.10-** The Phase-2 will be implemented in an area with Indigenous ethnic minorities. The Tharus, indigenous to the area, are in a majority (48 percent) followed by other indigenous groups from the hill. The project areas are also comprised of other vulnerable groups such as *Dalits, Raji, Badhi and Sonaha* Communities and women-headed households etc. and issues shall be addressed in Social Assessment (SA) and vulnerable community development plan (VCDP) ;
 - f. **Involuntary Resettlement OP/BP 4.12-** In Phase-2, major issues of land acquisition are unlikely. However, the activities during construction may require small plots of land and have impacts on structures requiring relocation and have livelihood impacts. A Resettlement Policy framework (RPF) will be developed to provide a detailed planning

procedure to address possible impacts from land acquisition. During implementation of the project each system/schemes or infrastructure activities planned under RJKIP will have to be screened against the set criteria specified in Resettlement Planning Framework prepared on the basis of both GON and the WB safeguard policy provisions.

- Safeguard Assessment**-The MoRJKIS Phase-2 has commissioned various safeguard related studies to ascertain the impacts on human, flora and fauna and aquatic life surrounding the project area and recommend measures for avoidance, minimization and mitigation of potential adverse impacts related to components 1 and 2 of the MoRJKIS Phase-2 intervention. The studies shall also suggest measures to enhance positive impacts from the Phase 2. The outcome of the studies and related recommendations to minimize the impacts and enhancement measures to augment the beneficial impacts arising from MoRJKIS Phase-2 is summarized below:

B2. Environment Assessment (EA)

- As per the GoN's legal requirements stipulated in the EPA & EPR, MORJKIS Phase-2 with the scope of rehabilitation and modernization of existing irrigation systems do not require EIA or IEE. However, the World Bank safeguard policy requires Environment Assessment (EA) and other assessment of projects for its financing to ascertain and ensure that project is environmentally acceptable. The present study is guided by the ToRs for the EA, Biodiversity Impact Assessment (BIA), Integrated Pest Management (IPM) and Social Assessment (SA) including Vulnerable Community Development Plan (VCDP) and Resettlement Plan Framework (RFP) to fulfill the WB safeguard requirements.
- The major activities in the MoRJKIS Phase-2 includes Command Area Development (CAD) work, Command Area Protection (CAP) work, Rural Agriculture Road Improvement work and Agriculture Extension works. The map of MoRJKIS Phase-2 which is more than a century old Farmer Managed Irrigation System (FMIS) of Nepal is presented below:



- The proposed MoRJKIS phase-2 is intended for rehabilitation of existing canals and improvement of existing farm roads and construction of minor canal structures for round the year water distribution. Therefore, MoRJKIS intervention has minimum adverse impact in and around the project area that are temporary, site specific and insignificant. The key adverse impacts envisaged

and related mitigation measures are highlighted in table below:

Construction Phase		
Activity/Impacts	Potential Source/Causes	Possible Mitigation Measures
Pollution (Water, air, noise, land)	<ul style="list-style-type: none"> • plying construction vehicles • excavation works at canal • discharge of solid waste and effluents from the labor camps 	<ul style="list-style-type: none"> • Maintain vehicles speed, and water sprinkling; • Collect, segregate and store solid waste; • Limiting construction activities during day time in the settlements and sensitive areas; • Avoid spoil disposal in near water bodies.
Rampant quarrying of construction materials	<ul style="list-style-type: none"> • Uncontrolled quarrying may change the river regime and morphology; • smoother the spawning ground etc. 	<ul style="list-style-type: none"> • Controlled extraction of construction materials <ul style="list-style-type: none"> ○ 50 m from Right bank of river ○ depth less than 1 m ○ 500 d/s of bridge • Recycling of the construction materials; • No extraction from areas of Biodiversity significance (spawning etc.) • Afforestation along the river bank • Awareness program
Urbanization	<ul style="list-style-type: none"> • upgrading of the agricultural roads, • construction of bridges and culverts. 	<ul style="list-style-type: none"> • Low priority during implementation to the areas likely to turn into urbanization; • awareness in development of zoning.
Poaching and logging in the Forest	<ul style="list-style-type: none"> • Large number of construction workers in camps 	<ul style="list-style-type: none"> • Prohibition to workers entering into the forest; • Continuous supervision of construction camp; • LEMC to have a member from CF; • Alternative arrangements of fuel such as LPG or kerosene etc. • Awareness campaigns on conservation and biodiversity.
Wild life movement	Increment in human and animal conflict	<ul style="list-style-type: none"> • Prohibition to enter into the forest; • Construction activities during night discouraged; • Awareness program Labors, stakeholders and local communities; • Labor camps will be away from forest boundary; • Restriction on construction activities

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		<p>during peak migration period;</p> <ul style="list-style-type: none"> • Appropriate measure in occasional elephant movement route.
Aquatic life (dolphin crocodile etc)	<ul style="list-style-type: none"> • rampant fishing by and from construction worker • noise and vibration from heavy construction machinery • spillage of toxins, oils and lubricants • excessive use of sand mining 	<ul style="list-style-type: none"> • Ban illegal fishing by worker/coordination for license; • Dolphin conservation awareness/maintain water level; • Effluent to pass through series of settling ponds before disposing into the main water bodies; • Heavy machine works during migration or presence of Dolphins will be avoided; • Gill net fencing shall be prohibited
Occupational Health and Safety risk	<ul style="list-style-type: none"> • workers exposed to multiple kinds of pollution hazards and degrees 	<ul style="list-style-type: none"> • adequate toilets, sufficient drinking water supply provisions, first aid kits etc. • Use of Personnel Protective Equipments (PPE)- helmet, boots, jacket etc.
Community health, safety and conflict risk	<ul style="list-style-type: none"> • accidental risks; • exposure to toxic construction wastes and solid waste from construction camp; • transmission of STD; • free access to construction sites; • Conflict between worker and community 	<ul style="list-style-type: none"> • Structural Safety; • Traffic Safety; • appropriate material stacking & fencing; • awareness to community; • control on vehicle movement; • Restriction of thoroughfare in construction site and camps; • Code of conduct for worker • awareness to community • Grievance mechanism
Influx of in-migrant and labor forces	<ul style="list-style-type: none"> • Pressure to community infrastructures and services (school, water supply, market, fuel) 	<ul style="list-style-type: none"> • Establishment of adequate infrastructure inside labor camps; • Encourage local labor force for project employment; • Discourage outside workforce to live outside the camps.
Gender Discrimination and child labor	<ul style="list-style-type: none"> • Unavailability of labor force in and around project area 	<ul style="list-style-type: none"> • Sensitive towards gender discrimination and child labor; • Prohibition of child labor employment; • Employment on the basis of equal opportunity.

Operation Phase		
Silt accumulation in irrigation canal and field	<ul style="list-style-type: none"> Silt from the Karnali river; Silt influx from local torrent (<i>Khare in Nepali</i>) e.g Dhobini Khola etc. 	<ul style="list-style-type: none"> Carry out detailed baseline assessment of torrents such as Dhobini Khola etc. Watershed/catchment area management (wetland, erosion control, flood control etc); Coordination and preparation of joint program with Rastrapati Chure Conservation Program.
Impact to Aquatic life	<ul style="list-style-type: none"> Agriculture runoff – pesticides, municipal effluent from adjoining settlements; Injury due to rusted Gabion wire works in river protection; Entrapment in canals. 	<ul style="list-style-type: none"> Adoption of suitable river protection design in the area of biodiversity significance; River bed cleaning; Restoration of wetlands; Supply of additional water from Rani System to Pathariya; awareness program.
Safety along the canal	<ul style="list-style-type: none"> Felling of human and animal in canal system. 	<ul style="list-style-type: none"> Fencing at critical location; safety (Railing) at structures; Provisions of rope and floating tubes; awareness program

12. The MoRJKIS Phase-2 beneficial impacts on the physical, biological and socio-economical spheres of the project area far outweigh the adverse impacts. The significant beneficial impacts envisaged are listed below:

S. N.	Stage ¹	Beneficial Impacts
1	O	Optimization of GoN land and reduction in forest encroachment
2	O	Reduction in the dependency on rain fed agriculture
3	O	Strengthen Water User Association
4	C/O	Employment opportunities at local level
5	O	Productivity enhancement due to Improved Irrigation
6	O	Cropping patterns intensification in Project Areas
7	O	Flood Control by command area protection works
8	C	Revenue generation opportunities for the local government
9	C/O	Awareness on improved water management technology, silt and sediment management and erosion protection etc.
10	C/O	Awareness on Forest Management and Natural Resources Conservation
11	O	Enhanced vegetation cover due to afforestation
12	C/O	Local produce marketing/business opportunities
13	O	Irrigation Canal Acts as Natural Line of Fire

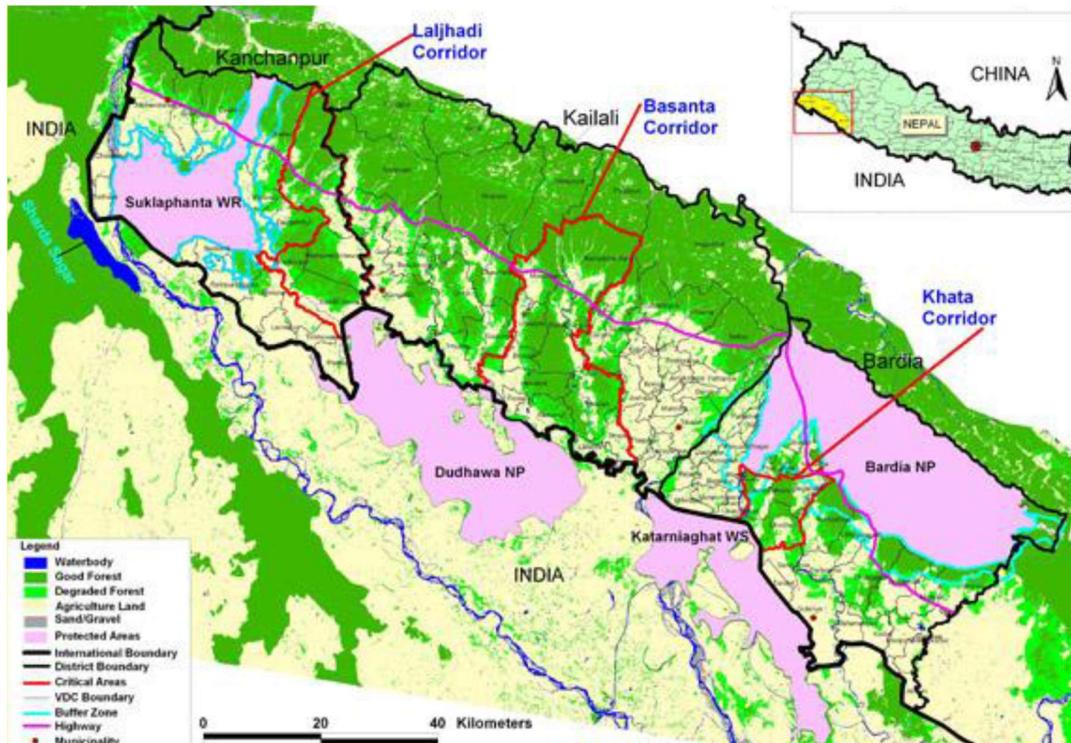
¹C: construction stage; O: Operation stage

B3. Biodiversity Impact Assessment

13. The Karnali, Mohana Rivers and their tributaries are enriched important aquatic species (Gangetic Dolphin, Marsh Muggler, and Gharial crocodile) as well area witnessed for occasional wildlife movement. These biodiversity significant locations are about 7 km outside of the project command area. and about 7 km away from project construction activities. Hence, direct impact from MoRJKIS is unlikely. Nonetheless considering the likely indirect impacts from project activities on the natural habitat and biodiversity and as part of safeguard requirement (OP 4.04 & 4.36) for the implementation of RJKIP, a separate study on Biodiversity Assessment (BA) and related Biodiversity Management Plan (BMP) has been carried out based on the Phase -2 activities of the RJKIP modernization project.
14. There are 15 Community Forests (CF)² in the project Area of Influence (Aoi). The scattered CFs have middle sized Khayar trees mixed with Saal, *Haldina Cordifolia* (*Haldu in Nepali*), Saaj and Simal trees. The presence of some medicinal plants and NTFP was observed and Pipari, Amala, Sikakai, Jamun, Gurjo, Aakasbeli, Pahelopate, Harro, Barro, Sindure are the major medicinal plants that has become scarce due to their exhaustive use. The forest status seems to be declining and large trees are not observed as the anthropogenic activities along with movement of domestic and feral cattle have already degraded these forests. Uncontrolled utilization, haphazard cutting and logging, and fragmentation of forests due to various infrastructure related development activities³ have already depleted the forest cover of the project area.
15. There are two known wildlife movement corridors in the region: the Khata corridor in the East and the Basanta corridor in the West of the Rani Jamara Kulariya Irrigation Scheme. However, no wildlife movement corridors has been identified in the Direct Impact Area (DIA) of MoRJKIS Phase 2 and these wildlife movement corridors are about 7 km away from the project sites. The Basanta Corridor, which is used by large mammals for occasional movement between Bardia NP and Dudhwa NP, is located about 5 km west of project command area.

²Community forest are: ShivashaktiPatabhar, Kailasheswor, Amarawati, Chetana, Kalika, Ranijamara, Mahunyal, Radhakrishna, Bandevi, Pashupati, Nilkantha, NyuSagarmatha, Laukaha Bhaukaha, Amarboli Kopila and Janaki.

³ Based on discussion with Community Forest User Groups



16. The MoRJKIS Phase 2 will not have direct impacts on the birds of this region and their habitat despite hosting 500 bird species in the Far Western Region and out of which more than 140 species of birds are recorded in the district.
17. The Gangetic Dolphin (*Platanista gangetica*) are the main attraction of this district at least in high water season along the Karnali, Mohana, Kadha, Kandra and Patharaiya rivers. It is an endangered species of IUCN Red data book and protected mammal by National Park and Wildlife Conservation Act 1973 of Government of Nepal. The MoRJKIS area is also known for the freshwater Dolphins that are found in the Mohana River confluence with tributaries such as Kandha, Kandra, Patthariya, even in Gahirinala during monsoon when water levels are high enough and fish diversity is plentiful. The fish species common in this area are Sedhari, Dira, Charangi, Rawa, Darahi, Kurasa, Rohu, Saunri, Singhi, Dongi, Khesati, Tengra, Bam, Parani, Dhori, Harat and Mailawa.
18. The impact of MoRJKIS development has two fold impacts on the existing biodiversity. The presence of increased water level in the canal system have positive impacts on the micro-climate within the project area such as increase in the moisture content in the air that relieves plants from "Moisture Stress"⁴ which otherwise occurs when the water in a plant's cells is reduced to less than normal levels. The regular irrigation water supply in the project command area will also have a positive effect on the biodiversity. It will enhance the productivity of natural system to support the balancing of predator–prey relation. The enhanced floral and faunal diversity will further contribute to local economy to uplift the livelihood in and around project area.
19. Therefore, based on the finding of the BA, BMP for the MoRJKIS Phase-2 has been formulated considering the wildlife (fauna and flora) profile of the region, customs and cultures of the

⁴https://en.wikipedia.org/wiki/Moisture_stress

indigenous *Tharu* community in particular and the beneficiaries of command area at large. The initiatives proposed by the Biodiversity Management Plan (BMP) are:

- a. Dolphin Conservation
 - i. River bank correction and protection;
 - ii. Cleaning of River bed;
 - iii. Garbage and effluent management in association with Tikapur Municipality and other stakeholders in RJKIP project area;
 - iv. Habitat improvement along the River Bank;
 - v. Dolphin observatory;
 - vi. Augmentation of Karnali water to Pathraiya River during Winter;
 - vii. Biodiversity conservation support to local Dolphin Conservation Committee (DCC);
- b. Linking Chure with Fragmented Forest Patches and Conservation;
- c. Afforestation and Compensatory Plantation works;
- d. Management of Feral Cattle;
- e. People Biodiversity Register (PBR)⁵;
- f. Joint Forest Protection and Management Plan/Program;
- g. Quiz Context and other Conservation related Program for Schools;
- h. Canal Safety and Turfing with grass patches along the banks;
- i. Occupational Health and Safety Programs for Safe Implementation of BMP;
- j. LEMC re-formation and activation considering Phase-2 works of RJKIP;
- k. Research on Impact of Climate Change on Pest Management and incorporation of finding in IPM implementation;
- l. Communication and Outreach Programs.

B4. Integrated Pest Management (IPM)

20. Integrated Pest Management (IPM) is a sustainable approach to managing pests by combining biological, cultural, physical and chemical tools in a way that minimizes economic, health and environmental risks." In order to minimize haphazard use of pesticides and to conserve environment, project prioritize the IPM-Farmer Field School (FFS) programs.
21. As part of safeguards requirement (OP/BP 4.09- Pest Management) for the implementation of the MoRJKIS, an assessment (refer volume- 4 detail) was carried out in the project command area with the purpose of (i) assessing the environmental issues and problems related to use of agro-chemicals, (ii) understanding the status of current use of agro-chemicals, (iii) assessing the level of awareness of farmers in handling and management of pesticides and the types of pesticides used, and (v) provide recommendations.
22. The assessment process involved literature review, field observation, consultation with WB and MoRJKIS project staff, meeting with farmers, members of water user groups, agro-vets and the staff members from the project offices at Tikapur.
23. The findings suggest that there are incidences of pest problems in the project command area. The project command area is still cereal based and the crops cultivated are rice, wheat, maize, legumes, and mustard (for oil) and some incidence of diseases were reported on selected crops. They included the late blight on potato (due mainly to the use of disease infested planting materials), yellow mosaic virus on cucurbits, fruit flies, stem borer on rice and maize, powdery

⁵Biodiversity Management Plan of Lower Siang H.E. Project (2700 MW) in Arunachal Pradesh, India

mildew, leaf spot on vegetables, leaf beetle on banana to name a few but they do not appear on regular basis (only endemic). However, with the completion of the MoRJKIS, the farming systems will become intensive with significant increase in vegetable farming which will change the pest dynamics and complex.

24. While the project promoted farmer field schools (FFS) have played a key role in disseminating the advantages and disadvantages of the use of pesticides through integrated pest management practices the farmers are yet to put full use of the knowledge they have gained.
25. There are six agro-vet dealers who are providing agrochemicals and inputs in the project command area. However, assessment revealed that only 2 out of 6 agro-vets are trained in pesticides and agro-chemicals. The need to follow safe standards to stock the harmful chemicals was noted at all the agro-vet dealers visited. Since most farmers tend to visit the agro-vet services they play a key role in agriculture value chain. The assessment team did not find the use of chemicals that are banned by the WHO and/or the Government of Nepal, however, farmers are not adopting precaution while spraying the pesticides in the field. The team also noted that farmers have yet to adopt the practice of using fertilizers based on soil test results to avoid over or under application.
26. The IPM report recommends the following in order to mitigate and address the problems associated with the use of pesticides and agro-chemicals. They include:
 - a. Promotion of integrated pest management through FFS and demonstrations;
 - b. Improve FFS curriculum to include anticipated pest problems following the change in cropping pattern;
 - c. Promote awareness on the use of pesticides i.e. toxicity labels, safe and correct use and time of application of pesticides;
 - d. Train and engage agro-vet dealers, extension agents and leader farmers to extend messages on safe use of pesticides and agro-chemicals;
 - e. Promote the use of disease/insect tolerant varieties when available, (vi) use of bio-pesticides, (vii) use of natural pests or beneficial insects;
 - f. Maintaining good soil health through use of well decomposed farm yard manure, (ix) practice crop rotation;
 - g. Companion planting;
 - h. Adjusting the planting time, and;
 - i. Follow soil test results to apply correct use of fertilizers.

C. Social Assessment (SA)

27. The project triggers the World Bank's Operational Policy on Involuntary Resettlement (OP 4.12) and Indigenous Peoples (OP 4.10) as part of safeguard requirement prior to project implement the SA has been carried out with the overall objective to collect information on the characteristics and conditions of the people living in the areas, those likely to be affected directly or indirectly by the proposed intervention and provide operational recommendations for maximizing the project benefit including mitigation measures to avoid, minimize or compensate for adverse impacts.
28. The existing data derived from Social Assessment conducted during phase-I, Development Impact Evaluation (DIME) baseline study 2017 and Pilot Area Study 2017 were largely utilized for

quantitative analysis whereas for qualitative information. Additionally, a total of 23 free, prior and informed consultations were conducted at different part of the canal system. These consultations were attended by 515 participants comprising WUA member, key informants, women and farmers concerning to occupational caste.

29. Participatory social mapping exercise was further carried out to map the areas and communities that are considered more vulnerable. The assessment intended to covers all direct and indirect impacts in both the short-term and long-term including the suggestions for feasible mitigation measures.
30. Currently, the canal network comprising three branch canals, 48 sub branch canals and 821 tertiary canal supplies water to 14300 ha cultivable area benefiting 160,612 population from 25063 HHs of Tikapur Municipality, Lamki-Chuha Municipality and Janaki Rural Municipality of Kailali District.
31. The project areas are comprised of Tharu, Bahun/Chettri, Hill Janajatis, and Dalits. The Tharu population is divided into two, those who are indigenous to the Kailali/Bardiya belt and those who migrated from Dang. Majority of the households in the project area engaged in agriculture (60%) and daily wages (22%) as main source of livelihood.
32. Majority of the household still rely on agriculture. The sizes of landholding are small. The land holding size between 0.1 ha and 0.5 ha occurs highest (45.4%) in the project command areas whereas the population having holding less than 0.1 ha are 34.1%. This higher percentage of smaller land holding indicates that agricultural land is highly fragmented thereby creating small farming. The major forms of land-tenure are 'Battaya' (50-50 share in the input costs and agricultural products) followed by 'Thekka' (pre-negotiated contract between tenant and owner) and 'Bandaki' (tenancy rights as collateral for financial obligation). Majority of the owners and tenants prefer Battaya system in the project area as landowners prefer to migrate to India for employment opportunities.
33. The three kulos have been historically managed by Indigenous Tharu Systems of governance. Under the indigenous management structure, each system had been headed by a Kulo Chaudhary, a supreme authority to deal with the managerial tasks related to the operation and management of irrigation system. In order to manage the irrigation tasks at Mauja (settlement) level, "Badghar" or "Sahayak-Chaudhary" have key roles in the implementation of the decision of Chaudharies for the management of canal system. Recent settlers have also adopted and been integrated into this system.
34. Three branch level and one system level WUAs are duly registered and renewed in accordance with government rules. All four committees (Rani, Jamara, Kulariya and Main) have their written constitutions, and all have their offices provided under WUA strengthening component of RJKIP-I. Furthermore, all Badghar from the villages are integrated into formal WUA structure who have influencing role over rules of water allocation, labor mobilization, and imposition of fines and penalties at the village and sub-branch levels. The major ethnic communities – the Tharus – are

not in disadvantaged position in terms of their participation in the current governance structure of the irrigation systems as they are more than 71% of WUA functionaries. The landless and non-title holders (9%) are directly excluded from participating in WUA activities and enjoy the project benefit because they do not own land in command area. The land ownership further affects the women as in the project area, only 11.7% women have land titles. This lead to deprive them from formally participating in WUA activities. In all WUAs of RJKIP, the representation of women is less than the requirements of the Irrigation Policy. None of the WUAs have 33% women in their executive committee. Further in key positions (chairperson, secretary and treasures) the presence of women is almost nil.

35. Vulnerable community mapping exercise revealed small and marginal farmers, female headed households, occupational Caste, people living in unregistered (*ailani*) land near forests, people from occupational castes *Mukta Kamaiya* (Freed bonded labors, HH with differently able persons, people living below the poverty line are relatively more vulnerable in project area. Recurrent natural disasters, basically droughts and floods further added number of poor in the project command areas. There are issues of low representation of women and other vulnerable groups (including landless and marginal farmers) in WUA governance and project cycle owing to lack of access to information, poor leadership quality, gender disparities, increased workload of female headed households, limited access to services that is limiting their access to benefits of the projects.
36. Potential impacts from implementation of the RJKIP could be loss of land and associated impacts. Project interventions might have impacts on structures that may require relocation and have livelihood impacts. Influx of labor could lead to adverse social and environmental impacts on local communities. Additionally, due to lack of access to information and poor leadership, magnitude of impacts on the vulnerable group could be higher.
37. Major stakeholders of the project area including indigenous, peoples project beneficiaries and WUA were consulted. Assessment found that majority of the local communities of the project areas have positive perceptions toward the project activities, Further, they have expressed their willingness and commitment to involve and participate in the project and make it success. Local farmers and WUAs members were found knowledgeable on possible positive impact of the project. The positive outcomes are increased farm productivity, increased employment opportunities both at farm level and construction sites. Similarly, small landholders, who make up the largest group, said that they could produce a lot of seasonal and off-seasonal vegetables, which they could sell in the town of Tikapur.
38. Based on the findings and World Bank requirements, Vulnerable Community Development Plan (VCDP), Gender Action Plan (GAP), Resettlement Policy Framework(RPF), labor influx management plan with Robust information dissemination and consultation strategy and Grievance Redress Mechanism shall be prepared. Additionally, WUA strengthening activities should be incorporated into the project design based on the assessment. Furthermore, institutional linkage

and coordination with local government, parcel mapping for water management and distribution, third party monitoring are also recommended.

D. Resettlement Policy Framework

39. The proposed RJKIP phase 2 involves upgrading the existing irrigation system and command area. The infrastructure activities proposed under phase 2 are unlikely to have major issues of land acquisition and other associated impacts. However, the project may require small plots of land, have impacts on structures that may require relocation and have livelihood impacts. The final technical design of the different components of the project is not available to understand the nature and scale of social impacts. Thus this framework is prepared to provide planning procedure to address such possible impacts of land.
40. It outlines measures to be adopted in instances where the following types of losses are inevitable: acquisition of private; tenancy and Guthi land; temporary loss of land/crop; loss of residential, commercial and other structures; loss of community structures/resources; loss of trees and crops; and loss of time and travel expenses. The framework also recommends strategies for the design of: resettlement action plans, information, consultation, participation and disclosure; and grievance redress mechanism.

E. Vulnerable Community Development Plan

41. Vulnerable Community Development Plan (VCDP) is developed to ensure that the RJKIP not only causes no negative impacts on the vulnerable groups including Indigenous People but that that the benefit reach the disadvantaged groups. The VCDP is based on the findings from Social Assessment carried out for the project. It has been designed in line with the World Bank's Policy on Indigenous Peoples (OP 4.10).
42. VCDP includes strategy to create an enabling environment for effective participation and engagement of the vulnerable group throughout the project cycle. It also includes activities to enhance capacity of the vulnerable groups. Other components of the VCDPs are grievance redress system and monitoring and evaluation mechanisms.
43. Based on the gender issues identified a Gender Action Plan has been developed. It recommend measures to address specific to gender problems in the project area. Some of measures recommended are:
- a. Train and engage women to enhance their capacity
 - b. Promote awareness on gender related issues
 - c. Create favorable environment to increase their participation in WUA governance and project activities

F. Institutional Arrangement and Third Party Monitoring

44. In addition to Environment Unit (EU) of MoRJKIS, the Local Environment Management and Monitoring Committee (LEMC) will be formed in coordination with WUAs for effective compliance, mitigation, and monitoring implementation performance during execution of works as stipulated in EA & EMP, BA & BMP, SA, VCDP, RFP and IPM studies under the administrative control of

*Modernization of Rani Jamara Kulariya Irrigation Scheme (MoRJKIS)
Executive Summary (EA, BIA, IPM, SA, VCDP & RPF)*

Project Director of MoRJKIS. The proposed LEMC for the implementation of MoRJKIS comprised of following members. Nonetheless the composition may be adjusted during implementation to align with the evolving new federal structures and institutions.

- a. Chairman of District Coordination committee- Chairman
 - b. Mayor of Tikapur, Janaki and Lamki Chuha Municipality-Member
 - c. Chief District Officer-Member
 - d. District Forest Officer, Agriculture Extension and Soil Conservation Officer- Chief-Member
 - e. Warden of Bardiya National Park-Member
 - f. Coordinator Terai Arc Landscape Programme (TAL)-Member
 - g. Local NGOs working on Conservation and Environment-Member
 - h. WUA Chairman—Member
 - i. Community Forest User Groups in the project area-Member
 - j. RJKIP EU Chief- Member Secretary
45. The MoRJKIS shall also provision for third party monitoring to evaluate the safeguard implementation performance during execution of works. The schedule for third party independent monitoring shall be as mentioned below:
- a. End of first year;
 - b. Middle of the project implementation (Mid-term);
 - c. 5-6 month before completion.
46. The MoRJKIS will establish three stage grievance redress mechanism to allow Project Affected People (PAPs) to appeal any disagreeable decisions, practices and activities arising from compensation for land and assets. All grievances relating to the project will be referred to the Grievance Redress Committee (GRC) at local level, Grievances Committee (GC) at central project level and formal court of appeal system (Refer SA for detail).

G. Cost Estimate for Implementing Management Plans

47. The MoRJKIS has prepared various management plans such as EMP, BMP, PMP, VCDP and RPF etc. to minimize the adverse impacts arising from project activities as well as to enhance the beneficial impacts of the project. The cost estimates is summarized in table below:

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S.N.	Management Plan	Estimated Cost (NPR)	Estimated Cost (US\$)	Remarks
1	Environmental and Biodiversity Management Implementation Cost <ul style="list-style-type: none"> • Linking of drain to the canal • Wetland Construction • Watershed Management • Detail Baseline survey for canal siltation • Master Plan for Karnali, Mohana and Pathariya Rivers • Compensatory Plantation and forest fencing • awareness program/communication & outreach activities on EMP and BMP • Implementation of BMP 	299057100.00	2990571.00	
2	Independent Monitoring	3,000,000.00	30,000.00	In three stage. Cost incorporated in Component 3
3	Special Studies such as wildlife crossing, identification and restoration of wetland, feral cattle, Aquatic and Dolphin studies, NTFP, effect of climate change on pesticides and its implication on IPM implementation etc.	8,000,000.00	80,000.00	Cost incorporated in Component 3
4	Implementation of Pest Management Plan (PMP)	30,800,000.00	308,000.00	
5	VCDP and RPF	30,528,900.00	305,289.00	
	Total	371,886,000.00	3,718,860.00	