

Terms of Reference

Detail Study of Water Lift Systems in the Project Working Areas of Developing Climate Resilient Livelihoods in the Vulnerable Watershed in Nepal (DCRL)

Type:	Consulting firm
Location:	Okhaldhunga and Khotang with travel to field
Additional Category:	Resilience and Climate Change
Starting Date:	1 October 2023
Duration:	30 days engagement till 30 Oct 2023

1. BACKGROUND

The mid-hill mountain catchments are prone to multi-hazards (drought, landslides, and floods) and impacts are magnified by the extreme changes in climatic conditions. The increased frequency of flood and landslide disasters causes extensive damage to the economy, life, properties, and consequently on livelihood. At the other extreme, water scarcity and droughts also pose a threat to agriculture-reliant livelihoods. Climate change is increasing the temporal and spatial variability of rainfall and runoff, thus intensifying the problem of excess water during the monsoon and water scarcity during the dry season, increasing economic damages to agriculture, property, and the environment, disrupting lives and livelihoods, and threatening food security. A long-term solution to this climate change problem is to rehabilitate and maintain the functional integrity of watersheds that have critical functions of water storage and release, infiltration, drainage control, and soil moisture retention. Using watersheds as organizing units for planning and implementation of natural resource management, resilient livelihood development is an approach to effectively tackle immediate and long-term climate risk reduction issues, in relation to floods and droughts.

Using an Integrated Watershed Management (IWM) approach for planning, implementation, and resilient livelihood development, GON/UNDP/GEF is implementing a pilot model project “Developing climate-resilient livelihoods in the vulnerable watershed in Nepal (DCRL)” in Lower Dudhkoshi watershed covering total 8 local Palikas of Khotang and Okhaldhunga districts of Province-1. DCRL focuses on safeguarding vulnerable communities and their assets from climate change-induced disasters by applying a long-term, multi-hazard approach with a particular stewardship role for women and marginalized communities. The project aims to address the functional integrity of the pilot watershed by capturing the policy, institutional knowledge gaps, adoption of new tools and techniques, and interventions of multiple activities including water stress management, conservation farming, and promotion of Non-timber Forest Products etc at the pilot scale. It has two major outcomes (1) Integrated watershed



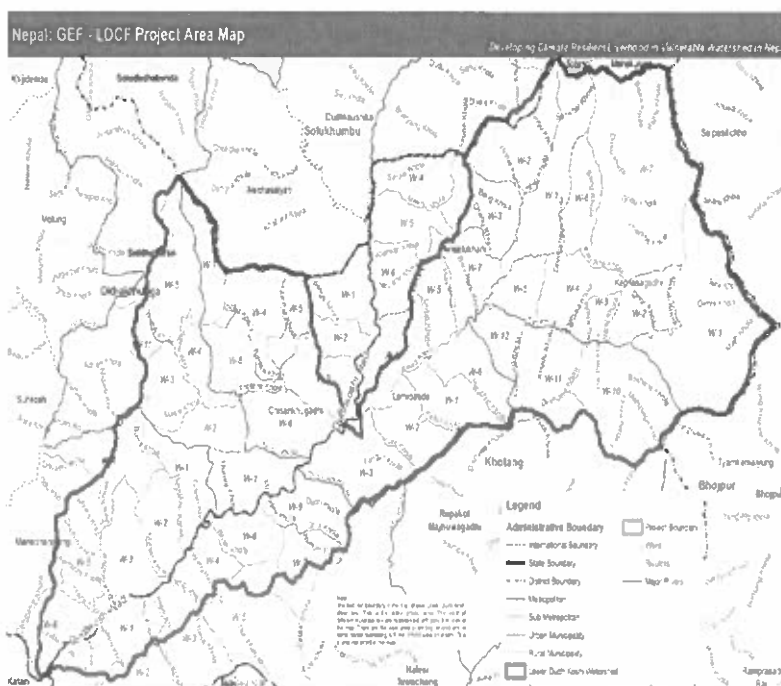
Developing Climate Resilient Livelihoods in the Vulnerable Watershed in Nepal

management framework has been established to address climate change induced floods and droughts and (2) Introduce and scale up integrated watershed management practices covering 844 sq.km of watershed areas and benefitting 121,606 vulnerable people.

The establishment of water use/reuse using water lifting in possible sites is one of the major project interventions to increase water availability for domestic as well as agricultural uses. The added value of water lifting can be ensured through making multiple use of water such as linking it with agricultural systems, artificial augmentation of recharge pits and multipurpose ponds where ever feasible. The water lifting scheme is also important for water stress management and is directly linked with livelihood promotion of vulnerable community residing in the project area through creating a systematic connection with local agriculture system livestock farming and other livelihood activities such as fisheries. Since majority of settlements are situated on uphill side of the major river system Dudhkoshi river, there are only two possibilities of water availability such as rainwater harvesting and water lifting. There are some settlements where water can be lifted from lower Dudhkoshi for multiple water uses either through water lifting by solar energy system or using an electricity grid where ever possible.

2. PROJECT AREA

The project area is the Lower Dudhkoshi watershed located in between Khotang and Okhaldhunga districts which comprise a total of 8 municipalities in both districts. The detail of the project area is shown below.



Khotang District (5: 3M, 2 RM)

1. Ainselukharka Rural Municipality
2. Haleshi Tuwachung Municipality,
3. Diktel Rupakot Majhuwagadhi Municipality,
4. Kapilasgadhi Rural Municipality
5. Rawa Beshi Rural Municipality

Okhaldhunga District (3: 1 M, 2 RM)

6. Siddhicharan Municipality
7. Manebhanjyang Rural Municipality,

D. Singh

3. RATIONAL OF STUDY

The project baseline clearly indicates increasing drought impacts in the project area with drying up of springs, reduced infiltration, and percolation due to steep and less vegetative geographic conditions, and decreased water availability and agricultural productivity. In order to maintain the functional integrity of the Lower Dudhkoshi watershed for sustainable ecological benefits, increased water availability for both domestic and agricultural uses is important. A recent study completed on potentiality of conservation farming in DCRL project area also suggest that more than 90% of agricultural land remain barren in between Oct-May due to lack of water for irrigation. It can be achieved through collection of rainwater from roof, capturing and collecting run-off water in ponds and water lifting schemes, and utilization of the available water for multiple uses in pre and post monsoon periods (dry months). The project Output 2.3 and Activity 2.3.1 have specifically mentioned about the conservation farming on 2500 ha of agricultural land as a land productivity enhancement measure.

In addition, under Project Outcome 2, Output 2.3, Activity 2.3.2, Functional water use/reuse systems; Micro-irrigation technology such as solar-powered water lifting to hillslope communities, used-water collection pond/tank, and drought-resistant crop variety promoted.

Lifting of water from river and developing micro irrigation system is one of the integral components of farming system to promote the livelihood of vulnerable communities and people in the scope areas. Pumping of water from the bank of Dudh Koshi river and collection in the tank having sufficient head to distribute command area that could be irrigated with gravity flow system is the main purpose.

In the above-mentioned circumstances, DCRL is seeking an engineering firm/consulting firm to provide engineering services for detailed feasibility study for solar water lifting system along with a collection and distribution system.

4. OBJECTIVES OF THE ASSIGNMENT

The objective of this task is to carry out a detailed feasibility study of water lifting for multiple-use and reuse in at Halesi-3, Chisankhugadhi-1, Siddhicharan-1 and Manebhanjyang-1 area. The specific objectives of the assignment are as follows:

- i. Carry out detail technical feasibility study of the solar water lifting system.
- ii. Prescribe technical specifications of equipment's and bill of quantity.
- iii. Develop an efficient system for operation and maintenance for the sustainability of scheme.
- iv. Carry out socio-economic studies to identify total water availability for various types of crops being cultivated.
- v. Prepare bid documents required for procurement of services for implementation of schemes.



5. SCOPE OF WORK

The consulting firm is expected to deliver minimum of below mentioned scope of works:

- I. Conduct detail topographical and geological investigation of site and propose appropriate structure at appropriate location for wider coverage of land for irrigation.
- II. Conduct detailed resource assessment for: -
 - a. Soil properties, soil-water relationships, type of crop and sensitivity to drought stress, stage of crop development, availability of water supply, climate factors (rainfall, temperature).
 - b. Review land resource availability and land ownership for irrigation fields and solar-PV/hydroelectric pumping components.
- III. Based on resource assessment, and community focus groups, provide suggested crop cultivation pattern which enhances the community's socio-economic livelihood and meets the environmental and social conditions of the land.
- IV. In parallel to resource assessment conduct a water resource availability assessment to ensure current and suggested crop patterns do not lead to increased water scarcity now and in future potential cultivation patterns and develop an appropriate crop calendar.
 - a. The water assessment should consider current water demand needs for irrigation, and potential future increase based on shifting cultivation and increased livelihood of the community.
 - b. Ensure irrigation water requirements do not lead to negative environmental and social impacts at the sources and downstream.
- V. Carry out the optimization analysis (both technically and economically) between Solar PV and grid supply (if available) options for electricity supply to water pump.
- VI. Develop a technical specification of equipment's with detailed design for linking to irrigation system and bill of quantities (BOQ) of Solar PV. Design should include all detailed technical specifications for irrigation conveyance systems including layout and drawing of intake, collection tank, piping system for irrigation conveyance as a whole etc.

6. METHODOLOGY

The experts must adhere the following methodology to complete the assignment: However, the consulting firm can propose any relevant methodology that fits to the scope of work.

- **Field visit and consultation:** Conduct field visit to understand the local context (geological and topographical condition of the project sites) that will guide



designing context-specific and cost-effective interventions. Consult with DCRL project team and local body/officials to explore the best option for developing appropriate designs and technologies.

- **Interaction with project beneficiaries:** Interact with Palika representatives, local communities and stakeholders to identify the need and potentials for multiple-water uses, land availability for both civil and electro-mechanical components, and its utilization for livelihood development.
- **System Design:** Design solar water lifting system comprising cost effective electro-mechanical and civil structures that best fits the site (with option for hybrid system). The data required for designing solar water lifting system must be sourced from the field investigation and where ever possible data should be verified through secondary resource.
- **Preparation of Detail Report:** Prepare a detailed narrative report with technical and economical justification for all the components. Any assumptions within the analysis must be justified through reference cases. All the collected (meeting minutes, observations, photographs etc.) and raw data must be annexed in final report.

7. Study Area

The proposed sites to be visited are those sites where there is high climate vulnerability in terms of drought and community residing alongside are highly marginalized with low-income opportunity. The sites are selected such that it provides livelihood diversification option for the climate vulnerable community and hence increase their coping capacity. These sites are proposed (but not limited to) as follows:

S.N.	Name of municipalities	Ward/Location	Estimated nos. of water lifting sites
1	Halesi	3/Bangma	1
2	Chisankhugadhi	1/Kuiveer	1
3	Manebhanjyang	1/Pankhu	1
4	Siddhicharan	1/Talluwa	1
		Total	4

8. KEY DELIVERABLES AND TIMEFRAME

S.N.	Activities	Deliverable	Timeline
1.	Inception Report	Detail methodology of the study, work plan, and content of design report.	Within the first 7 days of agreement.

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2.	Draft Report	Submission and presentation of a draft report on the design, estimates, drawings, specification and other aspect of project.	Within the first 20 days of agreement.
3.	Final Report	Submission and acceptance of final report on the design, estimates drawings, specification, and other aspect of a project incorporating feedback and suggestion	Within 30 days of agreement.

9. REQUIRED QUALIFICATIONS AND EXPERIENCE

Consulting Firm

At least 5 years of operation in the field of water lifting for domestic and agricultural use and must be registered as per the prevailing laws of the government of Nepal. At least 5 years of similar experiences in conducting assessments and/or capacity-building activities for development projects, demonstrate the analytic capacity and demonstrated ability to process, analyze and synthesize complex, technical information to produce high-quality reports.

Human Resources

- **Lead Engineer:** Must have completed Bachelor in Civil Engineering/Electrical Engineering/Mechanical Engineering with at least five years' experience in designing and installing water lifting schemes connected with irrigation systems, good analytic skills, and sound knowledge of leading technical teams for conducting feasibility studies for water lifting. Completed feasibility study, designed and technical installation of at least 10 schemes in the past and must have Experiences, knowledge and sensitivity for gender equality, social inclusion, and diversity awareness.
- **Support Engineer:** Must have completed Diploma in Electrical Engineering/Mechanical Engineering and demonstrate evidence on surveying, designing, and installation of at least 10 water lifting schemes, must be familiar with the project area. Must have knowledge of linking the water lifting with multiple uses such as micro-irrigations etc and must have Experiences, knowledge and sensitivity for gender equality, social inclusion, and diversity awareness.

Day

10. DURATION OF THE ASSIGNMENT AND REMUNERATION

The contract duration will be a maximum of 30 days from the time of signing the contract. The consultant will submit a complete work plan with a description of activities, final deliverables, and time frame in close consultation with the project team and will be shared in the inception report as per the deliverable mentioned above. The remuneration of the consultant will be paid as per the schedule of payment given below based on prevailing norms of the project.

11. COST ESTIMATE

The proposed cost estimate for the feasibility study of water lifting schemes is as follows;

SN	Particular	Unit	Quantity	Rate (NRs)	Amount	Remarks
A	HR Remuneration					
1	Lead Engineer	Days	20			
2	Support Engineer	Days	10			
	Sub-total (A)					
B	Field Visit					
1	DSA / Subsistence Allowance for experts	Days	18			9 days for each lead and support engineer
2	Vehicle for field travel	Lumpsum	9			
	Sub-total (B)					
C	Total (A+B)					
E	VAT (13%)					
F	Grand TOTAL					

Note: Additional costs proposed beyond what is stated will not be covered.

12. SCHEDULE OF PAYMENT

The payment will be delivery-based in installments as per progress of works. The mode of payment will be bank transfer or by account payee cheques.

Payments	Key description/required standard	Installment
1st Installment	Submission of an inception report with clear methodology, detailed workplan and proposed table of contents	30 %
2nd Installment	Submission of a draft report including design, drawing and cost estimates of all 4 water lifting schemes	50%
3rd Installment	Submission and acceptance of final after incorporating feedback and suggestions from the project.	20 %

13. WORKING ARRANGEMENT

The service provider/consulting firm will work under the overall direction and supervision of the National Project Director and National Project Manager respectively. They will work in close coordination with the Senior Technical Advisor, Field Coordinator, Project Officer-Soil Conservation and Watershed Management, and Project Officer-Civil Engineer for effective and efficient execution of the assignment on time and meeting a quality standard. Additionally, they will further receive guidance from UNDP's portfolio manager and policy advisor as necessary to complete the assignment. In regards to administrative and financial compliance, the service provider/consulting firm need to coordinate with the Admin and Finance Officer of DCRL.

14. SUBMISSION OF PROPOSAL

A consultancy firm/Service provider needs to submit the following documents while applying for the assignment:

- a. A clear and concise proposal with a detailed methodology that meets the scope and objective of the study.
- b. Flow-chart and timeline of activities (to be included in the technical proposal).
- c. Technical and financial proposals in two separate sealed envelopes.
- d. Firm registration and VAT registration certificate
- e. Audit report for last two years and evidence of Tax clearance
- f. Brief profile of the firm including evidence of past experiences.
- g. Signed CV of the proposed team members for the assignments.
- h. Written Self-Declaration that the service provider is not in the UN Security Council 1267/1989 List or Other UN Ineligibility List.
- i. Gender Equality and Social Inclusion Policy/Strategy/Guideline of the Organization
- j. Organization's policy on conducive work environment/prevention of harassment, sexual harassment and sexual exploitation Code of Conduct


15. EVALUATION METHOD

Applications will be evaluated on the basis of the 'Combined Scoring method' that will give due consideration where the technical proposal i.e. work experience in a relevant field, proven capacity on assessment on related work at a national level will be weighted a maximum of 70% and combined with the financial proposal offer which will be weighted a maximum of 30%.

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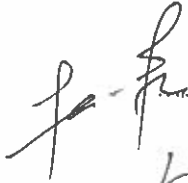
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 Date: 12/09/2023

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 Date:

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