



**GREEN
CLIMATE
FUND**

Meeting of the Board
4 – 6 April 2017
Songdo, Incheon, Republic of Korea
Provisional agenda item 11(e)

GCF/B.16/07/Add.08

14 March 2017

Consideration of funding proposals – Addendum VIII

Funding proposal package for FP045

Summary

This addendum contains the following three parts:

- a) A funding proposal titled “Ground water recharge and solar micro irrigation to ensure food security and enhance resilience in vulnerable tribal areas of Odisha” submitted by NABARD;
- b) A no-objection letter issued by the national designated authority or focal point; and
- c) Environmental and social report(s) disclosure.

The documents are presented as submitted by the accredited entity, and national designated authority or focal point, respectively.

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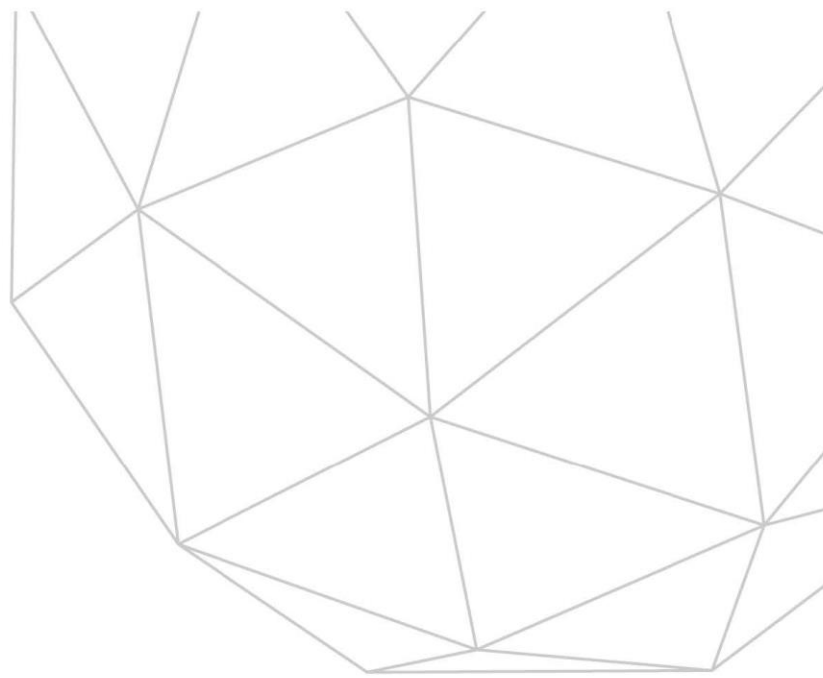
Funding proposal submitted by the accredited entity

No-objection letter issued by the national designated authority or focal point

Environmental and social report(s) disclosure



GREEN
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Funding Proposal

Version 1.1

The Green Climate Fund (GCF) is seeking high-quality funding proposals.

Accredited entities are expected to develop their funding proposals, in close consultation with the relevant national designated authority, with due consideration of the GCF's Investment Framework and Results Management Framework. The funding proposals should demonstrate how the proposed projects or programmes will perform against the investment criteria and achieve part or all of the strategic impact results.

Project/Programme Title: Ground water recharge and solar micro irrigation to ensure food security and enhance resilience in vulnerable tribal areas of Odisha

Country/Region: India/Odisha

Accredited Entity: National Bank for Agriculture and Rural Development (NABARD)

Date of Submission: 16 September 2016

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Note to accredited entities on the use of the funding proposal template

- Sections **A, B, D, E** and **H** of the funding proposal require detailed inputs from the accredited entity. For all other sections, including the Appraisal Summary in section F, accredited entities have discretion in how they wish to present the information. Accredited entities can either directly incorporate information into this proposal, or provide summary information in the proposal with cross-reference to other project documents such as project appraisal document.
- The total number of pages for the funding proposal (excluding annexes) is expected not to exceed 50.

Please submit the completed form to:

fundingproposal@gcfund.org

Please use the following name convention for the file name:

“MoEFCC-NABARD-16/09/2016-CC 20.2.2”

A.1. Brief Project / Programme Information		
A.1.1. Project / programme title		Ground water recharge and Solar Micro Irrigation to ensure food security and enhance resilience in vulnerable tribal areas of Odisha
A.1.2. Project or programme		Project
A.1.3. Country (ies) / region		India
A.1.4. National designated authority (ies)		Ministry of Environment, Forest and Climate Change(MoEF&CC), Government of India
A.1.5. Accredited entity		National Bank for Agriculture and Rural Development (NABARD)
A.1.5.a. Access modality		☒ Direct ☐ International
A.1.6. Executing entity / beneficiary		Executing Entity: Groundwater Division of Department of Water Resources, Govt. of Odisha Beneficiary: 5.2 million vulnerable populations of which 51% would be female.
A.1.7. Project size category (Total investment, million USD)		☐ Micro (≤ 10) ☐ Small ($10 < x \leq 50$) ☒ Medium ($50 < x \leq 250$) ☐ Large (> 250)
A.1.8. Mitigation / adaptation focus		☐ Mitigation ☒ Adaptation ☐ Cross-cutting
A.1.9. Date of submission		
A.1.10. Project contact details	Contact person, position	Dr. B G Mukhopadhyay, Chief General Manager
	Organization	National Bank for Agriculture and Rural Development (NABARD)
	Email address	bg.mukhopadhyay@nabard.org , fspd@nabard.org , climate.change@nabard.org
	Telephone number	+91 22 26530007, +91 9769690750; Fax: +91 22 26530009
	Mailing address	Farm Sector Policy Department (FSPD), NABARD Head Office, C-24, G Wing, Bandra Kurla Complex, Bandra East, Mumbai 400 051 (INDIA)
A.1.11. Results areas (mark all that apply)		
<u>Reduced emissions from:</u> ☐ Energy access and power generation (E.g. on-grid, micro-grid or off-grid solar, wind, geothermal, etc.) ☐ Low emission transport (E.g. high-speed rail, rapid bus system, etc.) ☐ Buildings, cities and industries and appliances (E.g. new and retrofitted energy-efficient buildings, energy-efficient equipment for companies and supply chain management, etc.) ☐ Forestry and land use (E.g. forest conservation and management, agroforestry, agricultural irrigation, water treatment and management, etc.) <u>Increased resilience of:</u> ☒ Most vulnerable people and communities (E.g. mitigation of operational risk associated with climate change – diversification of supply sources and supply chain management, relocation of manufacturing facilities and warehouses, etc.) ☒ Health and well-being, and food and water security		

(E.g. climate-resilient crops, efficient irrigation systems, etc.)

- ☐ Infrastructure and built environment
(E.g. sea walls, resilient road networks, etc.)
- ☐ Ecosystem and ecosystem services
(E.g. ecosystem conservation and management, ecotourism, etc.)

A.2. Project / Programme Executive Summary (max 300 words)

1. **Climate Context:** The state of Odisha is highly vulnerable to climate change due to high monsoon variability. This has caused drought and flood affecting the food security of agriculture dependent communities and pushed the vulnerable sections to margin. As per the climate change projection for the region, the temperature would breach 2^o C barrier by end of the 21st century. Groundwater is highly vulnerable to the impacts of climate change. Groundwater either directly or indirectly is vulnerable to the impacts of climate change and temperature is an important factor impacting the groundwater table through human stress and high evapotranspiration. The rising temperature may result in greater heat stress for people and ecosystems and it would enhance energy and water drawl, induce drought and impact food security.

Food and Water security Context: Many districts in Odisha state face multi-hazard scenario as 13 districts (out of 30 districts) are severely food insecure and 5 are extremely food insecure. Lack of adequate infrastructure for enhanced run off has implication on water conservation and overall enhancement of risk and vulnerability for the people living in the fringe. It is envisaged that annual 17 BCM replenishable ground water has to be conserved through some adaptive mechanism so that under the projected climate scenario it does not cause distress, migration and large scale social unrest. As of now as per Census 2011 in Odisha, around 38.5% families travel at least half a km to fetch drinking water in villages. The number of such families was 32.5% in 2001, which increased by 6% in 10 years.

2. To respond to these challenges the **primary objective** of this project is to enhance groundwater recharge in the community ponds through structural adaptation measures and use of solar pumps for micro irrigation to ensure water security and food security in the vulnerable areas of the state.
3. The following **results** are expected to be achieved by this project (i) **Augmentation of ground water recharge** to improve water table and water quality for health and well-being of about 5.2 million vulnerable communities through water security (ii) **Improved food security through resilient crop planning** (through irrigation) through installation of Ground Water Recharge Shaft (GWRS) in 10,000 tanks. (iii) Use of **solar pumps for irrigation is not only improve energy access but also will be part of low emission climate resilient crop planning strategy of the state¹**. In 1000 demonstration ponds to achieve energy saving of 3.27 million kWhr per year and avoided CO₂ emission of 2614 tonnes/year as mitigation co-benefit under this adaptation project. .

A.3. Project/Programme Milestone

Expected approval from accredited entity's Board (if applicable)	Not applicable
Expected financial close (if applicable)	Not applicable (the matching funds from state through state budget)

¹ Stated as a priority in the State Action Plan on Climate Change and also contributes to the solarisation agenda of India's INDC as well as solar mission under NAPCC

Estimated implementation start and end date	Start: Year 2017	End: Year 2021
Project/programme lifespan	5 years 00 months (the renovated tanks and solar pumps will have a life span of 20 years).	

B.1. Description of Financial Elements of the Project / Programme

Component	Sub-component (if applicable)	Amount (for entire project)	Currency	Amount (for entire project)	Local currency	GCF funding amount	Currency of disbursement to recipient
Component 1: Ground water recharge system for concrete Adaptation	Sub-component 1.1 Baseline study for 10,000 tanks are conducted and database developed	3.788	million USD (\$)	250.000	million INR	3.788	million USD (\$)
	Sub-component 1.2 Tank improvement plan and estimate for the recharge shaft installation developed	0.009		0.575		0.009	
	Sub-component 1.3 Standard Operating procedure for installation and maintenance developed	0.002		0.100		0.002	
	Sub-component 1.4 Ground water recharge system installed in 10,000 tanks	21.212		1,400.000		21.212	
	Sub-Total (C1)	25.010		1,650.675		25.010	
Component 2: Renovation of Community Tank (From Convergence Fund)	Sub-component 2.1 Tank water level and other assessments and renovation completed for all 10000 with necessary Dug well creation for irrigation	131.94	million USD (\$)	8,708.000	million INR	0	million USD (\$)
	Sub-component 2.2 Crop water budgeting based on agro-climatic zone prepared	0.068		4.500		0.068	
	Sub-component 2.3 Water sharing master plan developed	0.015		1.000		0.015	
	Sub-component 2.4 Livelihood improvement plan prepared	0.015		1.000		0.015	
	Sub-component 2.5 Water quality sample drawn from random wells	0.065		4.300		0.065	
	Subtotal(C2)	132.103		8,718.800		0.164	
Component 3: Integration of Solar Pumps for Irrigation	Sub-component 3.1 Identification criteria for 1000 solar pump installation developed	0.001	million USD (\$)	0.070	million INR	0.001	million USD (\$)
	Sub-component 3.2 Procurement plan and standard supplier contract for 1000 solar pumps developed	0.001		0.065		0.001	
	Sub-component 3.3 1000 solar pump installed and baseline audit completed	5.152		340.040		5.152	
	Sub-component 3.4 2000 village level para-professionals are certified in operation and maintenance of pumps	0.024		1.600		0.024	
	Sub-component 3.5 Energy saving report generated	0.148		9.750		0.148	
	Sub Total (C3)	5.326		351.525		5.326	

Component 4: Capacity Building of stakeholders	Sub-component 4.1 Training need assessment for sample households in tank command and PPs completed	0.170	<u>million USD (\$)</u>	11.250	<u>milli on INR</u>	0.170	<u>million USD (\$)</u>
	Sub-component 4.2 Training modules prepared and partners identified for both training and demonstration	0.023		1.530		0.023	
	Sub-component 4.3 Training of 500 engineer 20,000 jal sathis completed and certified	0.161		10.600		0.161	
	Sub-component 4.4 Training and demonstration organized in convergence with relevant departmental programmes of the government	1.515		100.000		1.515	
	Sub-component 4.5 Landless and women members covered under capacity building for off-farm initiatives	0.758		50.000		0.758	
	Sub-component 4.6 FPOs are linked	0.015		1.000		2.627	
	Subtotal(C4)	2.642		174.380		2.642	
Component 5: Quality Management & Monitoring	Sub-component 5.1 A geospatial tank quality management database and MIS prepared	0.131	<u>million USD (\$)</u>	8.675	<u>milli on INR</u>	0.131	<u>million USD (\$)</u>
	Sub-component 5.2 Water Quality and dynamic ground water modelling tool developed	0.015		1.000		0.015	
	Sub-component 5.3 Baseline and independent assessment report based on project objective and indicators prepared	0.303		20.000		0.303	
	Sub-component 5.4 Process monitoring report that estimates adaptation and mitigation benefit prepared	0.153		10.113		0.153	
	Subtotal (C5)	0.603		39.788		0.603	
Component 6: Knowledge Management Knowledge Management	Sub-component 6.1 Preparation of policy briefs for Odisha ground water management and development regulation, state water policy and relevant facilitation	0.023	<u>million USD (\$)</u>	1.500	<u>milli on INR</u>	0.023	<u>million USD (\$)</u>
	Sub-component 6.2 Process documentation and preparation standard operating procedure for development of solar pumping value chain	0.023		1.500		0.023	
	Sub-component 6.3 Science to policy knowledge product framework developed	0.015		1.000		0.015	

	Sub-component 6.4 Process document for convergence with other departments are developed	0.015		1.000		0.015	
	Sub-component 6.5 Quarterly project newsletter published	0.033		2.200		0.033	
	Sub-component 6.6 Ten peer learning workshops are conducted during the lifecycle of the project	0.011		0.705		0.011	
	Sub-total (C6)	0.120		7.905		0.120	
Component 7: Project Management	Sub-component 7.1 Inter departmental steering committee for the project notified	0.038	<u>million USD (\$)</u>	2.500	<u>million INR</u>	0.038	<u>million USD (\$)</u>
	Sub-component 7.2 Project Implementation plan developed and approved	0.045		3.000		0.045	
	Sub-component 7.3 Agreements for good and services signed and service providers mobilized	0.023		1.500		0.023	
	Sub-component 7.4 Seamless reporting to AE established	0.023		1.500		0.023	
	Sub-component 7.5 Fund flows, physical work progress and web based monitoring ensured	0.364		24.000		0.364	
	Subtotal (C7)	0.492		32.500		0.492	
Total project financing		166.297	<u>million USD (\$)</u>	10975.573	<u>million INR</u>	34.358	<u>million USD (\$)</u>

Co-Financing Arrangement:

The new project being formulated by Department of Water Resources (DoWR), Govt. of Odisha includes a loan component of 7.064 million USD for tank improvement for 600 tanks from World Bank support. In addition to this, Govt. of Odisha has decided to upscale the tank improvement exercise for additional 9400 tanks through convergence funding from the state's own resource. The tentative budget for tank improvement in 600 tanks funded by World Bank will be 7.064 million USD which is 4.25% of the total project cost. Government of Odisha is not considering this project as a business as usual tank investment project. It is focusing on the long term resilience of the chronically poor and drought-prone areas of the state considering both current and future vulnerability. The project is expected to be appraised in July 2017 as DEA has already cleared it. After appraisal the exact terms of this IBRD loan will be determined. After the completion of the appraisal mission the joint commitment letter from World Bank and Government of Odisha will be submitted to GCF secretariat. The community contribution under the project is as per the provision of the Pani Panchayat Act (para 17-20,22, Ch III of the Odisha Pani Panchayat Act) and will ensure long term sustainability and ownership.

B.2. Project Financing Information							
	Financial Instrument	Amount	Currency	Tenor	Pricing		
(a) Total project financing	(a) = (b) + (c)	166.297	million USD (\$)				
(b) GCF financing to recipient	(i) Senior Loans		Options	() years	() %		
	(ii) Subordinated Loans		Options	() years	() %		
	(iii) Equity		Options		() % IRR		
	(iv) Guarantees		Options				
	(v) Reimbursable grants *		Options				
	(vi) Grants *	34.357	million USD (\$)				
	Total requested (i+ii+iii+iv+v+vi)	34.357.....	Options				
(c) Co-financing to recipient	Financial Instrument	Amount	Currency	Name of Institution	Tenor	Pricing	Seniority
	Senior Loans	7.064 ²	million USD (\$)	IBRD	() years	() %	Options
	Grant	124.876	million USD (\$)	State Convergence fund and community	() years	() % IRR	Options
	Options		Options				Options
	Lead financing institution: State Government of Odisha (India) and World Bank						
(d) Financial terms between GCF and AE (if applicable)	Fee arrangement for the proposed project is aligned with the GCF Board's decision number B11/10 about the interim policy on fees for accredited entities. The same is presented in Annexure 8.						
B.3. Financial Markets Overview (if applicable)							
How market price or expected commercial rate return was (non-concessional) determined? Not Applicable							

² The likely investment only for tank improvement or 600 tanks will be 7.064 million USD (4.25%) of this project cost. Financial terms of the loan would be finalized based on the final approval and appraisal mission scheduled in July 2017. GCF would be updated on the same accordingly.

Please provide an overview of the size of total banking assets, debt capital markets and equity capital markets which could be tapped to finance the proposed project/programme.

Not Applicable

Please provide an overview of market rates (i.e. 1-year T-Bill, 5-year government bond, 5-year corporate bond (specify credit rating) and 5-year syndicate loan.

Not Applicable

Provide examples or information on comparable transactions.

Please fill out applicable sub-sections and provide additional information if necessary, as these requirements may vary depending on the nature of the project / programme.

C.1. Strategic Context

4. The variability in precipitation (especially the erratic nature of the south west monsoon) and rise in temperature has predominantly affected the ground water table. Modelled temperature for the end century (2100) scenario shows (projection based on 1986-2005) significant rise in winter temperature. This shows the reduced rainfall towards the end of August. Reduced rainfall combined with high temperature will significantly impact the water balance. The historical evidence and the results indicate that without proper consideration to variations in aquifer recharge and sound pumping strategies, the water resources of sampled aquifer could be severely impacted under a warmer climate. This is already starting to happen in several parts of south-western Odisha, uplands in Central Odisha as well as Uplands in Northern Odisha. Temperature is an important factor impacting the groundwater table which gets further compounded due to human stress and high evapotranspiration. The modeled temperature scenario has clearly shown a warmer climate for the state. The study conducted in the state by Panda et.al³ shows that in the pre-monsoon season, most of the monitoring stations experienced groundwater decline. Thus it is amply clear that ground water level is highly susceptible to impacts of climate change.
5. Susceptibility of ground water level due to climate change leads to higher probability of crop – water imbalance in the wake of higher evapotranspiration in warming climate. If the increases in evaporation is not compensated by adequate moisture, the crops will fail and livelihood of 13.86 million marginalized and resource poor population will be severely affected. As this section of population is dependent upon agriculture and highly vulnerable to impacts of climate change, their vulnerability due to climatic stress is further compounded by non-availability of ground water in the time of need. Therefore conservation of ground water in the state is of paramount importance in the state in the context of climate change.

Policies, Regulations and Institutions:

6. Under its INDC, India has mentioned to implement National Mission on Sustainable Agriculture, Prime Minister Krishi Sichai Yojana, National Initiative on Climate Resilient Agriculture, National Water Mission (particularly conservation and management of ground water recharge). Project is in alignment with Prime Minister Krishi Sichai Yojana (PMKSY) which aims to cover each farm holding with some irrigation and emphasizes water use efficiency with the slogan “more crop per drop”. It is also aligned with Water Mission under the National Action Plan for Climate Change and listed as a key priority under the State Action Plan on Climate Change (SAPCC). Proposed water management, social audits of the management proposed in the project is in line with provisions of Pani Panchayat Act of Odisha.
7. Central Ground Water Board has prepared a plan for recharge of ground water based on the ground water availability of a particular geographical location across the state. In accordance to the selection criteria (plan of CGWB), a total area of 5338.98 sq. km across 14 districts (Angul, Balasore, Baragarh, Bolangir, Dhenkanal, Gajapati, Kalahandi, Keonjhar, Khurda, Koraput, Mayurbhanj, Nayagarh, Rayagada, Sonepur), were identified for implementation of the artificial recharge structure. The technologies proposed for the ground water recharging are percolation tank, dykes, contour bunding, check weirs, flooding, induced recharge, recharge shaft. The project is in line with the objective of the CGWB which aims at augmenting the ground water level through introduction of the structural measures such as

³ [Panda, D.K., Mishra, A., Jena, S.K., James, B.K. and Kumar, A., 2007. The influence of drought and anthropogenic effects on groundwater levels in Odisha, India. Journal of hydrology, 343\(3\), pp.140-153](#)

to construct 10000 recharge structures in 15 districts viz., Baragarh, Bolangir, Boudh, Gajapati, Kalahandi, Kandhamal, Keonjhar, Koraput, Malkangiri, Mayurbhanj, Nawarangpur, Nuapada, Rayagada, Sambalpur and Sonepur, to tap the additional water available during monsoon in the tanks (public/community/private) for post monsoon augmentation of the ground water. The major focus of the project is to attain the ground water recharge objective at a comparatively lower cost in comparison to the measures proposed under CGWB plan and with least environmental impact. The project will contribute to the overall plan of the total ground water recharge of estimated at 1076.32 MCM.

8. Further, installation of 1,000 solar pumps for agricultural purposes is aligned with the Govt. of India's national target of reaching 1, 00,000 MW solar power by 2022 under the Jawaharlal Nehru National Solar Mission (JNNSM). It is also linked to the scheme for installation of 1 lakh solar pumps for irrigation and improve the drinking water security of 7.6 lakhs poor families.

C.2. Project / Programme Objective against Baseline

Baseline scenario: water security

9. As per the estimate of Central Ground Water Board (CGWB) estimate, the country would need 1,180 billion cubic meter (BCM) of water annually by 2050. India has, at present, annual potential of 1,123 BCM of 'utilizable' water with 690 BCM coming from surface water resources and remaining 433 BCM from ground water resources. Considering the fact that, Indian monsoon is the prime source of recharge, the climate change induced variability has put significant risk to the ground water affecting water security and food security.
10. In Odisha, gross groundwater recharge has been estimated as 17.77 billion cubic meter (BCM) through different sources. Rainfall contributes 71 % in gross groundwater recharge. With 1.09 BCM of natural groundwater losses, net groundwater availability in Odisha is 16.69 BCM. Out of this, only 4.36 BCM groundwater is drafted with irrigation sector extracting the highest (79.6 %). Odisha agriculture is largely rain fed and high monsoon variability in recent years has negatively impacted its main crop paddy. Paddy in itself has relatively high water demand.
11. Keeping in view of the reducing inflows from interstate rivers and spiralling water demands, it is projected that by 2050, Odisha will slip from its present water-rich status to water-stress status. This is based on both the water use and climatic models that show close to 1° C rise in temperature in several parts of the state. In addition, spatially, the state is growing at a rate of 8.5% per annum and several industrial and urban clusters are emerging in the state with higher water and energy demand.
12. In the prevailing socio-political scenario, creation of additional surface-storage through new major / medium irrigation projects is not practically possible. Alternatively, ground water which is widely accessible and less impacted by droughts and floods provides a vast scope for its recharge though community-based rainwater harvesting practices in the State, both in rural and urban sectors. Sub-surface conservation of water in aquifers is one of the best strategies to combat climate change impacts on water sector.

Baseline: Food Security

13. The World Food Programme⁴ has brought out the food security outcome indices based on three broad categories (a) Production factors (at the district level) influencing availability; (b) Household and individual access to food; and (c) Ability to absorb food. The composite index is developed based on 12 indicators across these three broad categories. The higher the figure, the region is expected to be more secure in term of food. Based on this indicators, the project districts have been chosen for the intervention so that water security and food security can be improved in these areas through the project interventions.

Baseline: Energy security

14. Odisha receives an average solar radiation of 5.5 kWh/ Sq. m. area with around 300 clear sunny days every year. The feasible potential for power generation in the Solar Photovoltaic and the Solar thermal routes have been roughly estimated as 8000 MW and 2000 MW respectively. However, the state has only 66 MW installed solar capacity so far. In addition, it has very low rate of energization in agriculture and the grid energy availability in rural areas is only for 4-5 hours in a day.

Goal and anticipated outcome against baseline scenario

15. The primary objective of this project is to enhance groundwater recharge in the community ponds through structural adaptation measures and use of solar pumps for irrigation to ensure water security and food security in the vulnerable areas of the state.

Incrementality

16. The current project fits into twin goal of poverty reduction through efficient use of water for agriculture development and making it sustainable through innovative concrete adaptation structures. It also builds a solar energy integration component to keep this energization process in the state on the low carbon path.
17. At the baseline scenario, the government has invested in decentralized system of tank based irrigation systems as the large scale dams and irrigation projects results into involuntary displacement and cropping up of socio-political disturbances. The tentative budget for tank improvement in 600 tanks funded by World Bank will be 7.064 million USD. This is only 4.25% of the total project. The remaining tanks would be supported through state resources. The GCF grant will be used for construction of Ground Water Recharge System (GWRS) as a concrete adaptation activity. This component is important for developing long term ground water reserve.

Linkage to climate change and the proposed adaptation solution

18. The projected climate change scenario (end century 2100) based on downscaled and gridded data shows the following consequences for Odisha under A2 scenario: Coastal Odisha will remain relatively less warm than the rest of the state, even though it clearly breaches the 2°C barrier. North-western, western, and southwestern Odisha show the highest rise in temperature. Following are some other 'more likely' effect of climate change. (a) Late monsoon onset and more pre-monsoon rainfall. (b) Reduced post monsoon and winter rainfall. (c) Less rainfall in February, June and October. (d) More number of cloudy days (e) Increased day and night temperatures in all the months except July. (f) Maximum increase in temperature in post- monsoon followed by summer. (g) Extended summer up to the month of June. (h) Increased number of hot, humid summer days in coastal areas. (i) Warm and short winter with fewer cold nights in western Odisha. (j) more extreme weather events such as heavy rainfall and tropical cyclones. These scenarios put tremendous pressure on ground water reserve of the state and also on energy use.

⁴ [Food Security Atlas of Rural Odisha, WFP](#)

19. A recharge shaft as concrete adaptation measure has been proposed in the community ponds to ensure the aquifer recharge. Normally shallow water bodies like tanks or ponds serve as good rainwater harvesting structures but their contribution towards ground water recharge is quite less due to the presence of low permeable soil layer in between the tank bed and underlying aquifer system.
20. Further due to sedimentation process, layers of silt / clay get deposited on tank bed rendering the tank completely unsuitable for ground water recharge. By constructing recharge wells inside the tank, the connectivity between the water body and the underlying aquifer system can be established bypassing the soil layers. It is important to note that the normal tank design in the country does not include this adaptation solution but would be transformational once the benefits are established.

Lives Impacted

21. The project will impact 5.2 million vulnerable population directly in 15 priority districts with high level of food insecurity, water scarcity and high climatic stress (present and future scenario) and with high proportion of vulnerable SC-ST population. About 2.59 million of this population are males and 2.6 million are females. They account for 12% of the entire population of the state. It will directly impact 1.54 million vulnerable SC-ST households.

22. Financial barriers

- In Odisha, Fourth State Finance Commission (2015- 2020) has recommended to empower local governing bodies to levy any tax at any rate without the prior approval of the state government except for those items for which central and state governments levy taxes. The state government has still not taken a call on this and this in turn is likely to reduce the investible surplus with panchayats to create more water bodies.
- A study by Xavier University Bhubaneswar has estimated that with each 1% rise of debt ratio, primary deficit ratio is estimated to rise by 1.71% in Odisha. Hence, more borrowing to finance such large scale public investment projects is likely to widen primary deficit and also the fiscal deficit in the long run because of disproportionate growth between the revenue and expenditure in the recent past.
- Perpetual indebtedness and poverty has been observed to be on rise at the farmer household level due to increase in agricultural input prices, less profitability, repeated crop failure, and lack of risk transfer instruments. Hence, marginalized farmers are not in the position to invest in new technologies like use of solar pumping for irrigation and advanced hybrid seeds.
- Presently, the power supply infrastructure in Odisha is chiefly coal based and hence in the pooled average cost of power generation in the state, coal based power is observed to be cheaper than solar power.

23. Institutional barriers

- The project areas has high indigenous/tribal population with complex land tenure system and archaic tenancy law making implementation of water rights issue and water pricing extremely tenuous process.
- The prevalence of traditional irrigation water governance system, institutional framework and inappropriate crop selection choices coupled with difficult terrain, poor education level and low extension outreach is observed to make full cost recovery in decentralized system a difficult process.

- There is gradual decrease in the traditional water sharing system namely “Warabandi” and increase in water related conflicts despite increase in transparency of the water policies. Also, there is incomplete understanding of rights and obligation of the farmers and Pani Panchayats (PPs) by the revenue officials who were earlier responsible for the water tax collection.

C.3. Project / Programme Description

24. The primary objective of this project is to enhance groundwater recharge in the community ponds through structural adaptation measures and use of solar pumps for irrigation to ensure water and food security in the vulnerable areas of the state. The project will be implemented in the 15 vulnerable districts viz Baragarh ,Bolangir , Boudh, Gajapati, Kalahandi, Kandhamal, Keonjhar, Koraput, Malkangiri, Mayurbhanj, Nawarangpur, Nuapada, Rayagada, Sambalpur and Sonepur. These districts were identified based on the state level consultations and meetings by Government of Odisha based on their food insecurity and future climate related vulnerability. The hunger atlas prepared by WFP showed all the eight districts in the Eastern Ghats region lie in the most food insecure categories, as also most of the Central Table land. These areas have high concentration of indigenous population. Enhanced food security in these areas will enhance their adaptive capacity. The project will have demonstration effect on SC and ST households in 15 districts. 3.6 mn persons are of Below Poverty Line (BPL) category of which 92% cases the head of the household earns < USD 75 (INR 5000) per month. Agricultural labourers are also about 3.8 million in these areas.

25. The sub-objectives of the proposal are as follows:

- Augmentation of ground water recharge to improve water table and water quality conditions in rural areas (Gram Panchayat) of the state through adoption of recharge systems in existing village ponds / tanks.
- Sustainability of ground water based (domestic / irrigation) Schemes at GP level. Revival of defunct community tank used as drinking water sources for reducing vulnerability.
- Use of solar pumps for irrigation as part of low emission climate resilient crop planning strategy.
- Create a knowledge base for enabling policy and regulatory framework for market transformation

26. It will help three concrete outputs under Green Climate Fund:

- Improved ground water table which will improve food security through resilient crop planning, water budgeting, protective irrigation) through installation of GWRS in 10,000 tanks.
- As a co-benefit - Energy saving of 3.27 million kWh per year from 1000 solar pumps and avoided CO2 emission from solar 2614 tonnes/year
- Increased resilience of health and well being of about 5.2 million vulnerable communities through water security (household use with enhanced access year round) and increased income of farming households.

27. The specific components shall be as follows:

Output 1: 10000 tanks will have Ground Water Recharge System as a concrete adaptation measure to ensure ground water conservation to reduce vulnerability in 15 water stressed districts of the state

28. In the prevailing socio-political scenario, creation of additional surface-storage through new major / medium irrigation projects is not practically possible. Alternatively, ground water which is widely accessible and less impacted by droughts and floods provides a vast scope for its recharge through community-based rainwater harvesting practices. A recharge shaft as concrete adaptation measure has been proposed in the community ponds to ensure the aquifer recharge. Normally shallow water bodies like tanks or ponds serve as good rainwater harvesting structures but their contribution towards ground water recharge is quite less due to the presence of low permeable soil layer in between the tank bed and underlying aquifer system. Further due to sedimentation process, layers of silt / clay get deposited on tank bed rendering the tank completely unsuitable for ground water recharge. By constructing recharge wells inside the tank, the connectivity between the water body and the underlying aquifer system can be established by passing the soil layers. Ground Water Recharge System (GWRS) consists of two to six recharge wells(RW) of suitable size constructed around the water body depending on the pondage area. These wells during rainy season

(June-September) provide an easy passage of excess rainwater to the underlying aquifers system through a filter pack of pebbles / gravels. The construction of RWs (made of precast RCC rings) is very simple and similar to the construction of any open well. These RWs are so designed that the excess rainwater / runoff from the tank during the rainy season will be diverted to underground aquifers for recharge. At the end of rainy season the average water level of at least 1.5 m in the tank can be maintained for pisciculture / community use. Periodic replacement of filter packs of the RWs is the only requirement as maintenance of the GWRS to ensure its efficient functioning. The constructional details of a typical RW and GWRS have been indicated in the drawings at Annexure-1. The average depth of the recharge well is 3.5 meters i.e. 2 m below the tank bed and 1.5 m above the tank bed. For construction of each well (1500 mm X 300 mm) size precast RCC rings are to be used. RWs are covered by perforated RCC covers on their top as indicated in the drawing, for entry of rainwater, in addition to lateral inlets. The estimated cost of a typical recharge well of 3.5 meter depth is USD \$ 424 (Approx) as has been indicated in Annexure-1. It justifies the cost per meter depth of RW is USD \$ 151 (INR.10, 000). The average cost of a GWRS with five RWs (3.5 m depth) has been considered as USD \$ 2121 (i.e. INR1,40,000).

29. These structures will be constructed phase wise based on the tank renovation plan given in the annexure 1 of this document. A baseline study will be conducted during the inception of the project. The purpose of this study is to review the status of various tanks, mapping of area, sensitivity and adaptive capacity related indicators. The preparedness of the local communities, nature of the cropping pattern current patterns of water use and energy use will also be covered in baseline. It is important to distinguish between baseline study and tank improvement plan. The tanks will be selected in a transparent manner after this study is completed. This study will feed into the project implementation plan and help develop clarity to the World Bank supported component. Each selected tank will have a tank improvement plan (TIMP) with a recharge structure. One of the success indicator shall be pre and post monsoon recharge in the tank and availability of life saving irrigation for the Kharif crop and some residual moisture for the rabi crop in the tank command. TIMP formulation is always done after the baseline study gets over and tanks are selected. The estimates are prepared based on TIMP. This is a participatory planning exercise. The actual works contract are issued based on the tenders has been covered in activity 2.1.
30. The state has been preparing for obtaining an IBRD assistance for the capital investment of the first phase 600 tanks under OCTMP II. The subsequent capital investment for additional tanks (9400) in 15 districts (maps enclosed) that would be renovated would be made available by the state. Only the cost for construction of recharge structure in 10,000 tanks has been requested under this component from GCF. Once the adaptation logic is established it will be expanded to all the tanks in the state (the cost norm will be revised and guideline developed) and though its own convergent budget. Government of Odisha considering the chronic poverty and recurrent drought in the identified districts has already decided to have large scale water harvesting structures through convergence and financial assistance of World Bank . The farmers are familiar with the pumping system. The problem for them is the availability of reliable power supply for irrigation. The demonstrative effect of this project will help in developing an eco-system and value chain for the solar energy for which private and individual investments will flow in without increasing carbon foot print.

Based on the study conducted in some select ponds in the state (as given in the feasibility report in Annexure 1), the quantum of recharge through recharge shaft (single unit) in pre-monsoon scenario is expected to be 13 hectare meter of ground water in a year. The aforesaid quantum of recharge will result in ground water table rise of 4.17 meter within a 500 meter radius of the tank and will positively impact an area of 25 hectare area. The proposed activity undertaken across 10000 community tank is expected to result in recharge of 131040 hectare meter of ground water in a year and benefit a total area of 250000 hectare. The cost estimate of recharge system constructed on pilot basis at Keonjhar district for one pond is estimated to be INR 140,000 (USD 2121.2) assuming 5 recharge well in a pond. The details of the design and the cost estimation are presented in the Annexure 1 i.e. Feasibility Report.

31. The following concrete adaptation activities will lead to this output:

- 1.1 Baseline study for the 10,000 tanks are conducted: The works under baseline study for the tanks would include the overall assessment of catchment area of tank i.e. upstream and down stream, drainage system, existing depth and area of tank, soil type at bed level, quantum of run off in monsoon season, identification of location for recharge

well, assessment of command area and likely beneficiaries, existing cropping pattern and water requirement of crops, etc.

1.2 Tank improvement plan and estimate for the recharge shaft for these tanks prepared – Tank improvement plan will consist of desiltation of tanks, use of soil, treatment of catchment area, tank bed, etc.

1.3 Groundwater recharge system installed in the identified tanks – GWRS would be installed in identified location of the tank to recharge the aquifer.

Standard operating procedures prepared – For identification of ponds, installation of recharge system and maintenance of tanks and solar system, etc the SOPs prepared.

Output 2: Increased resilience of health and wellbeing of about 5.19 million vulnerable communities through water security (household use with enhanced access year round)

32. Currently, the tanks those are partially derelict or derelict are not able to harvest adequate rainwater and most of these water are getting wasted as run-off. A study conducted with respect to OCTMP reveals that in 65 intervention (sample) tanks under phase I the water availability has improved from 28.7% in 2013 to 68.2% in 2016. The yield of paddy too increased from 3.5 tonnes/ha to 4.7 tonnes/ha. The increased water availability and increased income through improved productivity led to increased resilience of health and well-being.

33. As per Census⁵ in Odisha, around 38.5% families travel at least half a km to fetch drinking water in villages. The number of such families was 32.5% in 2001, which increased by 6% in 10 years. The enhanced ground water recharge at the aquifer level would help in making quality water available and would reduce drudgery and reduce disease burden. Augmented water availability would reduce risk of crop failure and enhance food security.

34. The following concrete activities will lead to this output:

2.1 Improved water availability in the tank command (where tank improvement plan has been implemented): The tank improvement plan includes design and estimate with a participatory exercise with community. This plan will be the basis for awarding the contract and the process must reflect in the execution of work. The community will involve in social audit of the work, so that water availability is not compromised in the tank command as planned. All structural aspects (e.g. de-silting, compacting, bunding, etc.) as per the plan will be part of this component.

2.2 Crop-water budget prepared: Farmers are made aware about the water requirements of various crops and water availability through various sources such as rainfall, surface water and ground water. The water losses through evapotranspiration and various methods of irrigation will be briefed to the farmers and efficient use of water by crops will be demonstrated. To enhance the water use efficiency and to reduce the vulnerabilities the crop water budget will be prepared for sustainability of the water resources.

2.3 Water sharing master plan developed: For equity distribution of water among vulnerable a detailed master plan is developed for each tanks. The preference to women headed households in the master plan is given and adequate representations of fair gender in formation of Pani Panchayat is taken care. Rotational irrigation to ensure equity and adequacy will be preferred in each tank.

2.3 Improved water quality from drawn samples : Farmers are sensitized about the quality of water and less use of pesticides, fertiliser will be advised. The organic farming in each tank areas will be promoted to minimize the health hazard.

2.4 Additional days of food available in a year as compared to baseline: The enhanced productivity of crops led to food security of each household in tank's command area.

2.5 Improved nutritional status of children in the anganwadi centres (AWC) near the tank cluster – Drinking water availability and irrigation facilities led to diversified farming system such as Crop plus livestock which improved the nutritional status of children.

Output 3: 1000 solar pumps installed in the pilot locations for demonstration in 15 districts

35. 4.3 million Rural households are yet to be electrified in Odisha⁶. Even those rural areas electrified the quality of power is poor and availability is around 4-5 hours in a day. Energization in agriculture in the state is about 10% but it is

⁵ [Census of India, 2011](#)

⁶ As on 31st May 2016

rapidly increasing. Considering that about one third of the blocks in the state receiving deficient rainfall in last five years the government want to provide 40,000 pump sets to farmers to address the problem of water scarcity. Most of these would be fossil fuel based unless an ecosystem for solar pumping system is created in the state. This project aims to align the stated objective of Odisha to align its growth aspiration in low carbon trajectory. Many of these areas (targeted 15 districts) are also having high energy poverty. As a part of low emission development strategy the state intends to pursue solar based pumping interventions to address water security not to negate the adaptation benefit through higher emission. The Solar pump set either AC/DC, comprising of PV array, Motor Pump Set (Surface or submersible), Electronics (Maximum Power Point Tracker (MPPT) and Controls / Protections) and Interconnect Cables and "On-Off" switch. The basic difference is the Motor Pump Set. The DC unit comprises of D.C. Motor Pump Set (with Brushes or Brush less D.C.) whereas AC system comprises of -A.C. Induction Motor Pump Set with a suitable Inverter that has been optimized for high efficiency operations. These pumps when maintained well last for more than 20 years on the field. Typically, the eastern states like Odisha can be served by pumps upto 3 HP while some regions in states such as Punjab, Haryana, and Rajasthan would require higher configuration pumps.

36. India has an installed base of around 17611⁷ solar agriculture pumps. Three-fourth of these pumps are in north-west regions of India. Odisha will be a new entrant and the state government has also announced incentives for this. The bigger problem of this sector is the AC pumps in the unorganized sector. The panels eligible for subsidy too have low efficiency level.
37. As per the last benchmark cost published by NABARD for 3 HP solar pumps is INR 558400 (USD 8460.6) which is followed by Ministry of New & Renewable Energy (MNRE), Govt. of India. Odisha Renewable Energy Development Authority (OREDA) is the technical partner for the project. OREDA is the single window agency to channelize subsidies related to renewable energy from MNRE to project participants. There is a well-established mechanism in place for such transfer. In addition OREDA will pre-qualify vendors who would provide the pumps. OREDA has been performing this role for more than two decades and have been co-opted to the project steering committee for this purpose for seamless integration. The procurement method followed by OREDA (given in Annexure 7) for solar pumping system for drinking water will be customized for solar pumps for irrigation.
38. Based on the stakeholder consultation with Pani Panchayats the following observations were noticed:
 - (a) The farmers have low awareness about the solar pumps
 - (b) Many are not convinced about the performance of the solar pumps as compared to the diesel pumps
 - (c) Easy availability of the subsidized diesel
 - (d) Only a small percentage (1 out of 10) wanted to have it as a second investment and rest think this can be used as a backup rather than prime irrigation equipment
 - (e) Availability of battery and other after sales services is a major concern
39. The project aims to tackle these issues as follows: (a) Technical partner OREDA has standardized the procurement process for registered channel partners. A separate agreement will be developed by the project management unit to create an interface with pani panchayats for this pilot. 1000 installations and post installation support clauses will be built into this agreement. The mobilized suppliers will provide demonstration and handholding support for certification of para professionals (jal saathis) for pump operation and maintenance. (b) Awareness and positive precedence – and development of a complete value chain will help deepening the solar market. Demonstration of a good working installations will build the confidence among the communities about the system. Conversely, any poor installation makes the entire community apprehensive and restoring confidence is very difficult. It is, therefore, important that this pilot phase demonstrates all the claimed benefit addressing all the concerns raised by the farmers. (c) Performance and quality assurance about the volume of water, less conveyance loss and saving of energy this need to be assured working closely with the suppliers and barefoot jal saathis. As per the industry estimate it is possible to replace 0.4 million diesel pump sets in Odisha. In other words these 1000 solar pump sets would help in building an ecosystem for a market of 0.4 million solar pump sets with resultant emission reduction.
40. GCF fund will be used largely as a catalytic fund to develop the solar pumping eco-system in the state and enable private sector participation in the value chain. The state will address the agricultural vulnerability still being in the low carbon path.

⁷ [MNRE as on January 2016](#)

41. The following activities are expected to lead to this output:

3.1 Identification criteria for the pilot sites for installation of solar pumps developed; The selection criteria, availability of ground water, formation of WUAs, ownership of solar pumps, O & M charges, etc will be defined properly for effective implementation of solar pumps. The process of beneficiary selection will be as follows:

- The TIMP prepared by pani panchayats or village committees will identify beneficiaries in the following order of priority and approved by gram-sabha (consist of all the adult franchise of a village):
- ✓ For individual beneficiary (based on wealth ranking and meeting the sharing criteria):
 - Vulnerable and SC-ST household
 - Female headed household
 - Others

For group

- Farmer Interest Groups/Framer producer Organisation
- Women SHGs/landless
- Village committee (for energy or water)

In each case the project and beneficiary will have a MoU to abide by water-budget norms, water sharing plan, Environment and Social Management Plan (on pesticide use). This is required to contain unauthorized abstraction of water and water contamination.

- 3.2. Procurement plan and standard contract for 1000 pumps both for channel partners and PPs developed : To ensure transparency, procurement of pumps will be done through well established procurement policy.
- 3.3. Baseline energy audit of the installed pumps established
- 3.4. 20000 village level para professionals (jal-sathis) are certified for operation and maintenance
- 3.5. Monitoring of the solar pump functioning (energy saving/avoided generation, fuel, water delivery) is documented

Output 4: Capacity Building Plans for livelihood support systems for water users and landless in the tanks command to build resilience.

The core investment for this would come from the existing programmes and projects. However to safeguard the interest of the landless people and women, the project will ensure training them in activities such as mushroom cultivation, backyard poultry and fishery.

42. The project would build on the ongoing programmes (RKBY, NFSM, NHM) etc. The project would supply catalytic support like technology transfer, input support based on area based deficiency (nutrition deficiency, soil health, etc.) (ii) promoting diversification to high value vegetable or horticulture crops through field demonstration and improved technology. (iii) Improved yield by 20-25% in cereal crops through rainfall matched sowing. (iii) Promoting less water consuming cropping system, adjusting crop schedule with volatility of the climate variables, crop-water planning, enhancement of soil organic carbon, etc.

43. Capacity building will be done for the Pani Panchayat on these aspects and relevant module will be developed and delivered by the water and land management institute of the state and its partners. The plan also will focus on the collectivization of the produce and market linkage for enhancing the farm income and value share. The jal-sathis will be trained with all aspects of the crop-water management and budgeting. DOWR will train its engineers on tank quality management and monitoring of the ground water recharge. A project management unit of WALMI will coordinate these activities.

44. GCF fund will be used to develop capacity of the para-professionals at the village level, it will also heavily invest in water institutions on aspects of water budgeting crop choice, water use efficiency and cost recovery.

45. The following concrete activities will lead to this output:

- 4.1 Training need analysis report of PP member along the tank command
- 4.2 Training plan and modules prepared partners identified to train 300000 farmers and 150000 landless population trained on fisheries and poultry
- 4.3 Training of 20000 jalasathis and 500 engineers completed and certified
- 4.4 No of training and demonstration organized in convergence with relevant programmes of the government
- 4.5 No of landless and women members covered under off-farm activities

Output 5: Quality Monitoring System for ground water governance established

- 46. It is important to monitor the programme both from adaptation and mitigation point of view. Policy briefs, knowledge products and modules would be prepared for its mainstreaming. A suitable external agency (having suitable accreditation on energy audit) and working in the agriculture and water sector would be hired for this component. In addition the Accredited Entity (AE) too would provide support in fund management and other operational support.
- 47. The monitoring shall be at three levels (a) Pani Panchayat level by the jalasathis. (b) an independent satellite based monitoring system to be used by the directorate of ground water survey and investigation for modeling the ground water development efficiency (c) a project monitoring cell responsible for tracking all the indicators of the envisaged under the project as against baseline on a concurrent basis and generate the knowledge products and policy briefs. This also includes the concurrent energy audit of the functioning pumps and their performance. The project level monitoring cell will interface with Accredited Entity (AE) i.e. NABARD and assist them in their independent assessment providing all required information.
- 48. PPs will be provided a simple set of indicators for tracking through the life cycle of the project. Similarly the satellite data obtained ORSAC. Finally project level monitoring will be undertaken by the PMU concurrently based on the standard adaptation baseline and GCF accepted indicator sets. Tools to capture that will be developed by the agency. The agency would have requisite experience in climate change field in different sectors as well as expertise in energy audit and energy management.
- 49. The following results shall be delivered through this output:
 - 5.1. A project MIS including a GIS based tank database developed
 - 5.2. Quarterly monitoring report prepared
 - 5.3. Baseline, independent assessment report prepared
 - 5.4. Report on adaptation and mitigation benefits of the project assessed

The concurrent monitoring system is integral to this project as lots of structural work is involved, The specialized wing of the DoWR will be responsible for quality monitoring and modelling the benefits. This is a scientific exercise. The adaption and mitigation co-benefits to be measured through scientific sampling. In addition a quality manual will be prepared for community level quality check and social audit. All the tanks will be geo-coordinated and its adaptation and mitigation benefit will be identified and quantified in a transparent manner.

Accredited entity will support the project in financial and physical reporting and compliance requirement for which the fee structure has been proposed. AE will also manage the fund flow. AE will work with PMU to develop a master timeline and ensure that right agencies are mobilized on time and activities conform to time schedule.

Output 6 : Knowledge management (institutional and regulatory) input provided for water and clean energy market development

- 50. The GCF funds will be used to improve the knowledge base on ground water conservation, regulatory frameworks and institutional set up governing the crop water management in 15 priority water stressed regions of the state. It will also develop knowledge products and policy brief for transforming the nascent water market and solar pumping market.

51. The project will provide a unique opportunity to develop knowledge base on adaptation benefit in a decentralized tank system. The learning and knowledge management component captured through a process document component will help in upscaling this project in a programmatic mode. In addition the department has built in IEC component and training component for this concrete adaptation initiative. It will also provide further outlook in basin planning and tank cascade planning. The Prime Minister Krishi Sichai Yojana aims to reach to each farm field and this would require a massive scale up and has potential not only in the state but across the region. The learnings from the project will be shared through regular newsletters, policy briefs and project based working papers. There will be a half yearly learning workshop each year after 2nd year to share the learning in the project. The participants and experts will be invited from the region. The process will be managed by the knowledge management unit.

52. The following results are expected from this output:

- 6.1. Preparation of policy briefs for the Odisha Ground Water Management and Development Regulation and State Water Policy
- 6.2. Process documentation for standard operating procedure for establishing solar pumping value chain
- 6.3. Process documentation for funding convergence with agriculture, fishery, rural development, health and panchayat raj departments
- 6.4. Knowledge products science to policy framework developed
- 6.5. Quarterly newsletter based on the project progress in English and Odia in digital and physical form produced
- 6.5. 10 workshops are conducted during the life cycle of the project

Output 7 : Effective project management system established

53. Effective management and timely execution of this project is vital for measuring the benefit. For e.g. the structures have to be in place before the monsoon season in each phase to measure depth to water level in both pre-post monsoon scenario and also both control and intervention scenario. Since the project is tapping into convergence fund the operating procedure and modalities to be placed to an interdepartmental steering committee would be put in place as part of the project implementation plan not to have any future delay. To ensure effective project management at the state, district, basin and sub-basin level, provide information communication and logistics support; provide project related consultancies; undertake concurrent M&E and ensuring quality supervision and monitoring of structural work. The project would engage a management unit as service provider Activities to be financed include: (i) setting up and supporting (through capacity building and equipment) project management units at the state and district levels; (ii) design and establishment of a project specific Management Information System; (iii) setting up and leading the project monitoring, evaluation and learning activities; (iv) contracting resource agencies including services of an external M&E agency to be engaged as consultants for the duration of the project; (v) providing support for emerging needs and innovations during implementation; (vi) liaison and convergence with other agencies and government departments; and (vii) documentation of project experience and its dissemination in the wider development community.

54. The following results are to be in place:

- 7.1. Inter-departmental steering committee notified
- 7.2. Project Implementation Plan developed and approved
- 7.3. Service providers mobilized
- 7.4. Modalities of engagement with other departments/agencies developed
- 7.5. Regular reporting to AE and other partners agencies and the government ensured
- 7.6. Fund flow and physical work progress, quality reports are web hosted

Provide information on how the activities are linked to objectives, outputs and outcomes that the project/programme intends to achieve. The objectives, outputs and outcomes should be consistent with the information reported in the logic framework in section H.

55. The proposed project will ensure a paradigm shift by creating an enabling framework in legislation and policy and strengthening the capacity of the grassroots level water institutions to ensure climate resilient development in crop water management in a decentralized tanks system not only in this project but also having a potential scale up in the

region in similar projects/programmes. The fund level impact will be achieved both in adaptation and mitigation pathways: (a) The proposed project will increased resilience of health and well-being, and food and water security of about 5.2 million vulnerable population in 15 food insecure districts of Odisha. (b) 2614 Tonnes of carbon dioxide equivalent (t CO₂eq)/annum in this pilot is expected to be reduced or avoided as a result of 1000 pilot solar pumps installed through this project. The details are given in section H.

C.4. Background Information on Project / Programme Sponsor (Executing Entity)

56. The main sponsor of this project is the Department of Water Resources (DoWR) of Government of Odisha (GoO). The department is the nodal agency for the Odisha state to implement the National Water Mission under National Action Plan on Climate Change (NAPCC). The DoWR has been involved in implementing climate adaptation projects in the state from ADB, World Bank and JICA. It has initiated several policy changes that improves water governance and user accountability, access, equity and inclusion. Some of the projects include Odisha Integrated Irrigated Agriculture and Water Management Programme, Odisha Community Tank Management Programme and Integrated Coastal Zone Management Programme having strong linkages to climate adaptation implemented by the State Government include the following:

Project	Objectives & geo. coverage	Amount Sanctioned	Funding Agency	Geographical Coverage	Implementation Period & Outcome
OIIAWMIP	To enhance productivity, water user efficiency and sustainability of existing major and medium irrigation systems, revival of lift irrigation systems, creek and drainage systems by realising full development of potential irrigation infrastructures	Total project Rs 1084.2 crores	ADB	North-west Odisha	2008-17 Resilience in major and minor irrigation projects
ICZMP	Coordination of activities of various stakeholders in an integrated approach for the Sustainable usages of the coastal natural resources maintaining the natural environment.	INR 227.64 crores	World Bank	Coastal districts	2010-15
OCTMP	Overarching project objective for selected tank based producers to improve agricultural productivity and water users associations to manage tank systems effectively.	127.8 million USD	World Bank	Entire state	2008-13

57. The Department of Water Resources has been successfully managing and executing these and following all relevant operation procedures, safeguards and with reasonable national and international fiduciary discipline. Considering that it will be linked to a loan proposal already in advanced stages with the World Bank for the Phase II of the Odisha Community Tank Management Programme but with its own unique adaptation solution it would follow already established procedures within the government and as per the operational guidelines of the World Bank. The design proposed to GCF is closely linked. Investments related to desilting and tank renovation are covered in World Bank financing while innovation and transformation are the focus of GCF. Both project are expected to complement each other. It will have single project directorate, same project governance. The district level structure will also be used for field level tank improvement and other project interventions. More rationalization of works streams will be done while preparing the project implementation plan developed by the World Bank project. No other changes to current result framework is envisaged at this stage. World Bank will also conduct its fiduciary risk assessment and due diligence during appraisal. The [appraisal document of OCTMP I](#) (implemented by World Bank) indicates that the financial management arrangement for the project execution is adequate. The [implementation completion report of World Bank](#) also indicated that the OCTMP I had satisfactory Safeguards and Fiduciary Compliance. From AE perspective also financial management arrangements in place or as proposed for the project, are adequate. AE has been working with Govt. of Odisha for implementation of various infrastructure projects and overall performance of the State Government in terms of financial management is satisfactory.
58. The total budget of the Department of Water Resources in 2014-15 was Rs 3939 crore (about USD 587 million @ 1 INR= USD 66). It is supplementing the resources with an Odisha Community Tank Investment Programme through a loan from the World Bank to the tune of USD 86 million. Rest is to be organized from the state budget and water user association (pani panchayat). The O&M of the tanks have been entrusted to water user associations (WUAs).

Describe the market for the product(s) or services including the historical data and forecasts.

59. Based on the long-term average annual rainfall (1482 mm) it is predicted that only 47 % of total precipitation as available and remaining 53 % flows in to the sea. Keeping in view of the reducing inflows from interstate rivers and spiraling water demands, it is projected that by 2050, Odisha will slip from its present water-rich status to water-stress status⁸. This will trigger demand for pumping and also recharge system to keep the pumping sustainable. It is projected that the level of growth of pumping in the range of 10-15 percent per annum.
60. The water market for irrigation is not well developed and this project might attempt a decentralized water market for which flexibility in the Pani Panchayat Act has been given to the user associations. Recently Govt. of Odisha has fixed the rates of water based on the class of land (Class-I to IV) and season (Kharif and Rabi) under state water policy. The rates in kharif season vary from INR 63 (less than USD 1) for Class IV to INR 250 (about USD 4) for Class I. In Rabi the figures vary from crop to crop and are determined based on per ha per year basis. The ambition of the state is to reach every farm parcel with at least two-three critical irrigation.
61. India has around 18 million grid connected pump-sets and 7 million diesel pump-sets. The market is likely to grow between 15-20% from 2015-20⁹. The leading companies operating in water pumps market in India are Kirloskar Brother Limited, Jain Irrigation, Sun Edison, Lanco Solar, Tata Power Solar Systems, Premier Solar System Pvt Ltd., OSWALS, and Shakti Pumps and also some of the international brands. Government has envisaged to install about 1 lakh solar pumps under National Mission on Sustainable Agriculture. Jain Irrigation is the market leader with about 40% of the market share under this segment.
62. The solar pumping system is eligible for capital subsidy from Ministry of New and Renewable Energy (MNRE), Govt. of India. The state also provides additional subventions. A typical 3 Hp pump and accessories cost about INR. 0.5 million (USD 8150). While MNRE specifies the standards, it is important to ensure the efficiency of the supplier of the panel. This market is commoditized and a lot need to be done to ensure proper quality and it has cascading effect in low reliability and low adoption.

⁸ [DoWR, Government of Odisha, Water Plan 2004, Odisha State Water Profile, CGWB](#)

⁹ [Shakti Foundation and MNRE estimate](#)

C.6. Regulation, Taxation and Insurance (if applicable)

63. The construction activities under the proposed project would follow the standards schedule of rates with respect to material and labour payments. For the vendors of solar pumps, apart from trade licenses and prequalifying tender criteria there is no other licensing requirement. Well documented and transparent e-tender process is followed for the procurement of solar pumping system in Odisha. The vendor has to have test certificate and qualified by MNRE. Odisha Renewable Energy Agency is nodal agency for the procurement. The vendor apart from meeting pre-qualifying criteria has to provide insurance and warranty for the pumps for five years. For the construction related activities, the project will follow the established procedures under Odisha Public Works Department Code. The procurement processes are in line with the AE's policies of procurement of goods and services for projects to be implemented. The water policy of the state has water charges and as long as that is not revised, the quantum and process of collection shall remain the same. PPs have been entrusted to collect the water taxes. This is a positive movement towards some amount of cost recovery. The project will follow the government's tariff setting policies as specified from time to time by OERC for the energy charges and other competent authorities from time to time.

Describe applicable taxes and foreign exchange regulations.

64. The pump sellers have to have VAT registration in India. The supplier has to have TIN registration no. and CST registration No. and PAN No. under the Income Tax Act and Service Tax Registration No. Many states are planning to waive the VAT on solar pumps (e.g. Karnataka) and Odisha might consider waiving it too under the new solar policy (now to be tabled as integrated renewable energy policy).

65. In case of goods and services are procured by the implementing partners necessary tax provision would be applicable in case of GCF proceeds.

Provide details on insurance policies related to project/programme.

66. The solar panel shall be warranted for ten years with rated performance. Security cum Performance Guarantee Fee for the corresponding amount for the period warranty is to be provided to OREDA. Solar submersible pumps of 2700 Wp capacity depending upon the yield of bore well will be utilized for the purpose of water supply in the village as per the requirement of the village and the vendor has to provide coverage, comprehensive maintenance for 5 years.

67. The solar pumps vendors provide five year insurance cover (it is non-battery type only) as part of the tender conditions. This is bundled as part of the tender condition. The same would be applicable for the procurements done by GCF proceeds.

C.7. Institutional / Implementation Arrangements

68. A Govt. of Odisha has notified the State Level Steering Committee for the purpose of proposed project implementation. This body will ensure inter departmental coordination for smooth execution of the project. Department of Water Resources shall be the nodal department for the execution of the project. Panchayat Raj Department / Agriculture Department (Watershed Development Mission) / Forest Department and SC/ ST Development Department would be execution partners for activities related to tank renovation, resilient livelihood development, capacity building and knowledge management. This project will play a catalytic role and only try to access the support for training the groups, provide them "how to learning modules". OREDA will be the technical agency for managing the integration of solar system into the project and would manage the tender. The directorate of ground water survey and investigation will undertake the monitoring of the GWRS. The agriculture and fishery department will converge their schematic and programmatic investment. The project management will have an agency to support energy saving assessment, support in capacity building in agriculture and livelihood streams and preparation of policy briefs and ex-ante, ex-post surveys and other knowledge management areas. This agency would have experience in the project areas related to resilience

building in agriculture and water management systems including areas related to energy and resources planning and management.

69. AE-NABARD will provide concurrent fund monitoring and operational support in the entire project implementation. The same would in the form of financial management, monitoring and evaluation, reporting to GCF as well as to NDA as per the requirement and providing of technical support in terms adherence to technical, environment and social standards, procurement processes, during implementation.
70. The project organization structure (including the integrated structure for GCF and new phase of OCTMP supported by the World Bank) has been given below. In addition to this the government will follow all established procedures for the audit of the project as rigorously applicable for the externally aided programmes. The norms of procurement as applicable to OCTMP project supported by the World Bank. However, requisite flexible mechanism as needed for speedy execution will be built in the project development stage. In addition the panchayat raj funds will be subjected to local fund audit as required under devolution procedure. However, the project will comply to World Bank operational procedures for procurement, finance and environment and and social management plan as good practices. The modalities of which will be agreed during the preparation of project implementation plan and appraisal.

Key stakeholders	Role
State Level Steering Committee	provides overall project direction, governance, approves annual work plan and budget and ensures inter-departmental coordination and policy framework
Department of Water Resources	The nodal department for project execution. Led by Principal Secretary of the department through its various wings (Ground Water Survey & Investigation - GWSI, Minor Irrigation) provides direction and administration to the project and guides its mainstreaming. It also negotiates the OCTMP-II loan with the World bank for the core investment of the 900 tanks of the 1st phase. It develops its own budgetary resources for the balance tanks for mainstreaming. Pilots the policy on state water policy and ground water. As executing entity fully responsible through Project Director for all outputs Minor Irrigation Division for C1 and C2 and related activities Ground Water Division for recharge monitoring, quality monitoring with inputs from paraworkers and Odisha Remote Sensing Application Centre (ORSAC) data C5 and related activities
Department of Energy	Provided policy backing and regulatory support for renewable energy integration (solar) in the project.
OREDA	OREDA acts as the technical partner for solar pump procurement and provides subsidy linkages available from Ministry of New and Renewable Energy (MNRE), Govt. of India. Responsible for Solar energy integration and related activities.
Line Departments (Panchayati Raj, Agriculture, Fishery & ARD, Women and Child Development, Drinking water and sanitation)	These line departments are part of the steering committee and provided convergent funds and act as implementing arms for their respective activities.
Odisha Remote Sensing Application Centre (ORSAC)	Convergence Fund and Activity stream linkage (C2 and C4) Develops satellite based monitoring system for the tanks and works with project in developing a tank database. Geospatial mapping and monitoring support to EE (Ground Water Survey & Investigation – GWSI under DoWR) under C5 and related activities.

Third Party Agency(ies)

Work as part of the PMU to coordinate the project management activity and also work on concurrent monitoring, energy audit knowledge management and facilitation of the policy and institutional change. Covers component C6 (knowledge management) and related activities.

Jal sathis and pani panchayat

Grassroots para-professionals provide the basic contours of self-management and are critical for the sustainability of the programme for enabling self-management, cost recovery, efficient water use and crop choice. Linked to C1, C2 and C4 even C5 components. They are crucial backbone of this project.

Village level women entrepreneurs

Provide linkage to solar eco-system under C3.

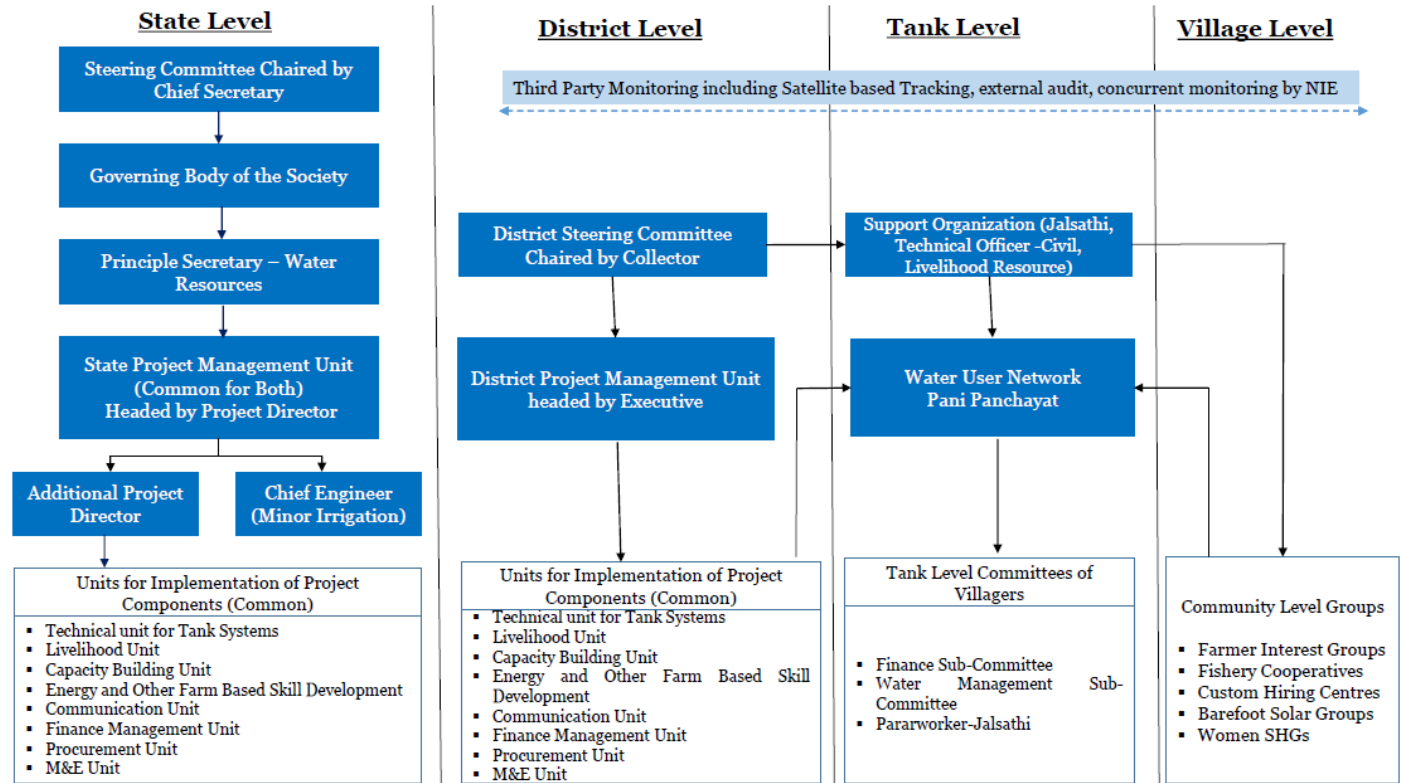


Figure 1 Integrated structure

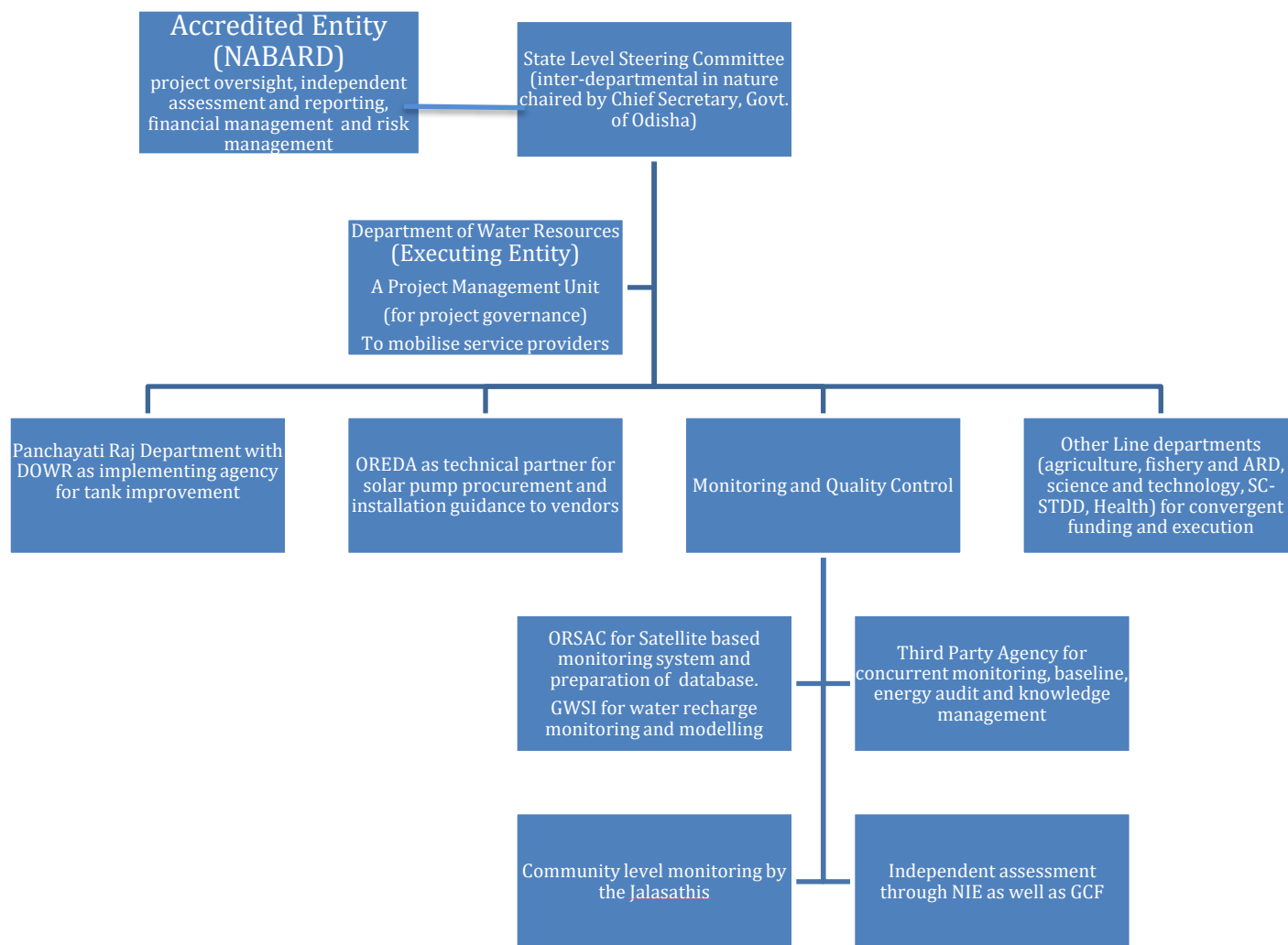


Figure 2 Project organization structure

Describe construction and supervision methodology with key contractual agreements.

71. The investment in head works shall be the responsibility of the Water Resource Department. It will also maintain the recharge shaft in the tanks. It is estimated that about 500 JEs / AEs / Officers of IDs working at Block level will be trained to construct / maintain / monitor the proposed Ground Water Recharge Systems (GWS) across 10000 tanks including preparation of DPRs. Implementing departments (e.g. Panchayati raj, etc.) in consultation with District Collectors will provide the list of engineers /officers to DoWR for training under the Scheme. Training including execution of few demonstrative GWS will be taken up by the Directorate of GWS&I in a phased manner. The training will be imparted at Bhubaneswar for duration of five working days including site visits. GWS&I shall take up all associated IEC activities to create mass awareness about the GWS including its periodic monitoring and maintenance aspects with the jal sathis. TV-Radio related publicity and preparation of associated manuscripts / audiovisuals will be done by GWS&I on behalf of DoWR.
72. . The Water Resource Department has established procedures to qualify contractors. The third party agency will be mobilized through Quality and Cost Based Selection Procedure. The agreement/MOU will be signed with other

departments. The core tank related contracts will be executed by the contractors as per the agreement. The water user associations along with line department staff monitor the progress. Directorate of Ground Water Survey and Investigation (GWS&I) will conduct some geo-physical tests (VES) through out-sourcing, in the vicinity of tank / pond, to ascertain the lithological parameters which will help in assessing the performance of the recharge system. GWS&I will monitor ground water table and water quality twice a year (May & October) near all tank locations where the GWRS have been constructed through out-sourcing. This will help in assessing impact of GWRS in the locality. The captured monitoring data is to be entered into a dedicated software / website by GWS&I for scientific use and public information. These processes are in line with the Accredited Requirements for project execution.

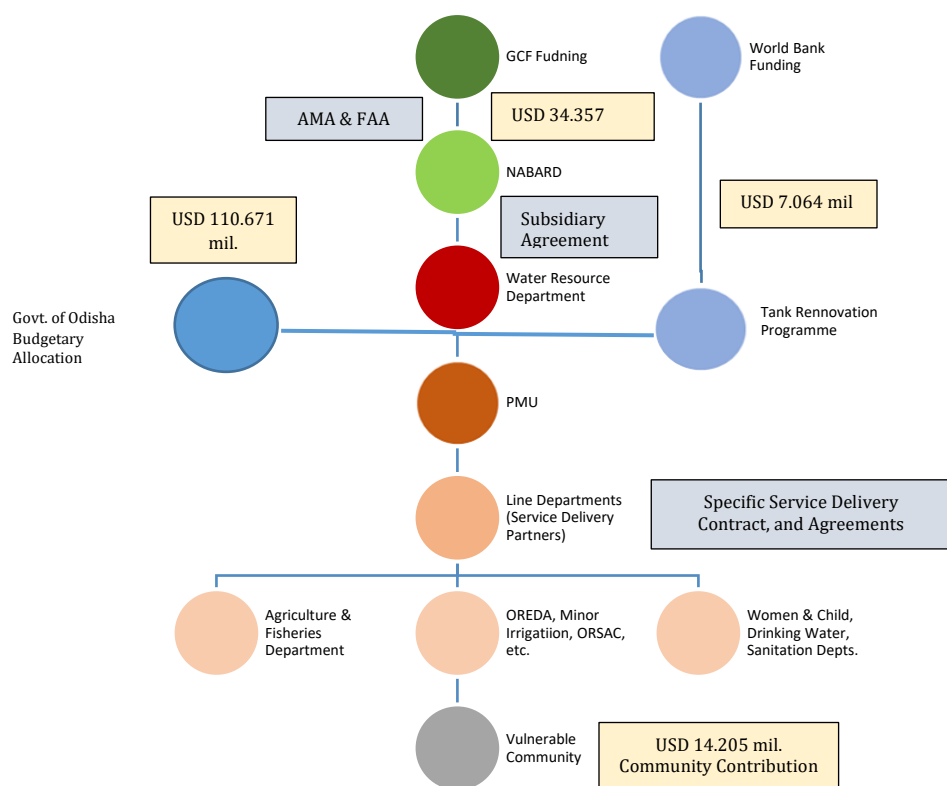


Figure 3: Contractual Arrangements and Fund Flow Structure

The project implementation would include the following fund flow mechanism and contractual arrangements:

- Based on the AMA and FAA with the GCF, the project funds would be released to AE – NABARD by GCF. NABARD in turn would enter into subsidiary agreement or execution agreement with the executing entity i.e. Department of Water Resources, Govt. of Odisha (DoWR, GoO).
- Once the arrangement with DoWR, Govt. of Odisha is finalized. Based on the action plan verification and fund released by GCF to AE the subsequent fund release would be made to EE – DoWR, GoO.
- All the execution arrangement and fund for execution would be handled by DoWR, GoO and entire accounting and procurement requirement would be handled by the DoWR, GoO with support of concerned line department (execution partner).
- The concerned line departments viz. Department of Agriculture, Fisheries, Women & Child Welfare, Odisha Renewable Energy Development Agency, Odisha Remote Sensing Application Centre, etc. would support project activities. The fund release to the line department or service delivery partners

would be based on the specific agreement or contracts between EE and the concerned line department/execution partners.

- e. Similarly, the project funds under World Bank funding would be handled by DoWR, GoO, once the project is sanctioned World Bank. The State Government contribution would be through budgetary allocations on annual basis as per phasing of tank improvement plan. Govt. of Odisha would communicate commitment letter in this regard once the GCF project is sanctioned.
- f. The Project Management Unit (PMU) would be overall coordinating agency and would help in effective and timely implementation of the project.
- g. NABARD as AE would be the administrator of GCF funds guide this entire process so that the necessary fiduciary requirements in terms of project execution as well monitoring, reporting and verification are fulfilled.

The list of Contracts (including Subsidiary Agreements) are as under:

1. Funding Activity Agreement (FAA) between AE and GCF
2. Subsidiary Agreement between Executing Entity (Dept. of Water Resources, Govt. of Odisha) and AE i.e. NABARD
3. Contractual arrangements between EE and executing partners at ground level.

C.8. Timetable of Project/Programme Implementation

This time table will be further rationalized during the project preparation of the World Bank loan. The appraisal for which is scheduled to be in July 2017.

Task	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
Output 1.																				
Baseline study for 10,000 tanks are conducted and database developed	X	X					X	X			X	X								
Tank improvement plan and estimate for the recharge shaft installation developed		X						X				X								
Standard Operating procedure for installation and maintenance developed		X	X					X	X			X	X							
Ground water recharge system installed in 10000 tanks			X	X	X				X	X	X		X	X	X					
Output 2.																				
Tank water level and other assessments and renovation completed for all 10000 with necessary Dug well creation for irrigation	X	X					X	X			X	X								
Crop water budgeting based on agro-climatic zone prepared			X	X					X	X			X	X						
Water sharing master plan developed				X	X					X	X			X	X					
Livelihood improvement plan prepared					X	X					X	X			X	X				
Water quality sample drawn from random wells			X	X					X	X			X	X						
Activity 2.6.				X	X	X				X	X	X		X	X	X				
Output 3.																				
Identification criteria for 1000 solar pump installation developed		X	X				X	X				X	X							
Procurement plan and standard supplier contract for 1000 solar pumps developed			X	X				X	X				X	X						
1000 solar pump installed and baseline audit completed					X	X				X	X				X	X				
2000 village level para-professionals are certified in operation and maintenance of pumps					X	X				X	X				X	X				
Energy saving report generated										X				X				X		



Task	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
Output 4.																				
Training need assessment for sample households in tank command and PPs completed		X	X					X	X			X	X							
Training modules prepared and partners identified for both training and demonstration			X	X					X	X			X	X						
Training of 500 engineer 20,000 jal sathis completed and certified			X	X	X	X			X	X	X	X	X	X	X	X				
No of training and demonstration organized in convergence with relevant departmental programmes of the government						X	X	X				X	X	X		X	X	X		
No of landless and women members covered under capacity building for off-farm initiatives						X	X	X				X	X	X		X	X	X		
FPOs are linked									X	X					X	X			X	X
Output 5.																				
A geospatial tank quality management database and MIS prepared								X	X	X				X	X	X		X	X	X
Water Quality and dynamic ground water modelling tool developed								X	X	X				X	X	X		X	X	X
Baseline and independent assessment report based on project objective and indicators prepared				X			X			X X			X	X		X	X			X
Process monitoring report that estimates adaptation and mitigation benefit prepared					X	X	X	X	X	X	X	X	X	X	X X	X X	X	X	X	X
Output 6.																				
Preparation of policy briefs for Odisha ground water management and development regulation, state water policy and relevant facilitation	X	X																	X	X
Process documentation and preparation standard operating procedure for development of solar pumping value chain							X	X					X	X			X	X		
Science to policy knowledge product framework developed									X	X					X	X			X	X
Process document for convergence with other departments are developed	X	X	X																	
Quarterly project newsletter published	X	X	X	X	X	X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X	X	X	X
Ten peer learning workshops are conducted during the lifecycle of the project		X		X		X		X		X		X		X		X		X		X
Output 7.																				
Inter departmental steering committee for the project notified	X						X				X									
Project Implementation plan developed and approved	X	X					X	X			X	X								
Agreements for good and services signed and service providers mobilized	X	X					X	X			X	X								
Seamless reporting to NIE established	X	X	X	X	X	X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X	X	X	X
Fund flows, physical work progress and web based monitoring ensured	X	X	X	X	X	X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X	X	X	X

Project would include conducting of inception workshops at the beginning of project implementation at State as well as district level. Further, the project implementing would include independent mid-term / interim evaluation after two and half years from start of the project. The final independent evaluation would be conducted in six months after project completion. The project duration is five years. The details on the same are provided under Section H2. The project calendar and expected dates are given below:

Milestones	Expected Dates
Start of Project/Programme Implementation	01 st May 2017*
Mid Term / Interim Evaluation (2.5 years after project start)	31 st October 2019
Project/Programme Completion (5years after project start)	31 st May 2022
Final Evaluation (in six months after project completion)	31 th December 2022

*(*project start date depends on the execution of Funding Activity Agreement (FAA) and Subsidiary Agreement/s of the project)*

D.1. Value Added for GCF Involvement

Please specify why the GCF involvement is critical for the project/programme, in consideration of other alternatives.

73. The project is tightly woven into the adaptation logic for fund objective and also has mitigation co-benefits. It promotes investment that is climate resilient and addresses long term adaptation to climate change in food insecure tribal areas of a state which is amongst the poorest. It also promotes institutional and regulatory system for low emission planning and development through the integration of solar pumping system in agriculture sector. The former is directly and indirectly likely to touch the lives of 5.19 million vulnerable population in the 15 food insecure districts of the state. The project also balances regional inequality, as many multi-lateral projects and irrigation projects have historically been in the coastal region of the state and mostly disaster centric (e.g. ICZM, ADB project). However as per the climate projections, the water resources of the state in south, south western and central and northern Odisha are at the highest risk. This project would help in addressing these issues in a systemic manner.
74. The proposed project uses (a) an innovative **concrete adaptation measure** through a recharge shaft integration to improve recharge and reduce run off (run off is increasing as the climate change has induced heavy rains in too few days) and to improve ground water recharge, a resource use only in scarcity (b) it tries to resolve the institutional barrier by integrating Pani Panchayat and Jal sathis for gradual cost recovery and preparing ground for climate smart agriculture through water use efficiency (c) it is trying to remove financial barrier through directing the subsidies through convergence in climate resilient development and vulnerability reduction with this fund providing a catalytic support not as a core investment. It also avoids regressive capital intensive large dam paradigm affecting many lives negatively (through displacement). (d) it addresses social inclusion by integrating indigenous communities and also women and landless by off-farm income generation options and providing leasing rights to SHG groups. The project also integrates the climate resilient water resources and livelihood strategies at the grassroots level through involvement of community based organisations (CBOs) such as Water Users Associations and Gram Panchayats (Village level democracy structure in India).
75. Odisha has less than 10% energization and the ecosystem for solar energy integration is negligible. A successful demonstration of this project will open up the private market for solar energy integration. The project plans to train barefoot para-professionals (women) for assembling and maintenance of the solar panels and accessories. This will help in resolving the last mile maintenance problem. Pre-qualified channel partners will have a mobile app based system to integrate these trained hands on ground. The penetration of solar energy is closely linked to the resilience building and energy access for vulnerable communities

D.2. Exit Strategy

76. The ground water recharge system is a concrete adaptation option. This is not a standard specified for the tank systems. This design aims at reducing ground water vulnerability and improve the water regime. This would help in reduced vulnerability and sustain the tank as an economic asset. The enhanced income will help empowering user associations to recover the O&M cost. The solar energy integration leveraged through GCF support would help in wider replication, opening of the private market for solar pumps and large scale adoption.
77. The project has been designed in the principle of self-management and cost recovery of various services. It is quite clear that the capital investment made by the fund on recharge structures are not difficult to recover and the maintenance of the structures can be easily handled by the PPs and Jal saathis from the devolution that they receive at the end of the project period. The capital investment in tanks however, would be by public agencies and its O&M will be by the PPs. The goal of the tank system project is not to cover the capital investment but in the long term to transfer the asset so that the operation and maintenance cost will be taken care of by the water user associations. The pani panchayat act empowers water users for this. The trained para professionals will have capacity to act as bridge between community institutions like pani panchayat, user groups, farmer producer groups. The corpus generated as part of the project activities, levies on water and devolutions will help them at least meeting the O&M expense in the long run.

78. The certified professionals will reduce the transaction cost and develop the ecosystem for the channel partners/distributors of the solar pumps and they will also have gainful engagement based on the experience they gain from the project. The trained jal sathis can act as formal investigator for CGWB and other government and private agencies engaged in research. The non-farm sector economic enterprises will continue to thrive as the collectivization of produces and market linkage is a stated goal of the capacity building under agriculture and allied sector in this project.
79. The policy environment created will ensure gradual cost recovery and reduced dependence on risk transfer doles and subsidies.
80. Under solar mission, the Government has declared solar financing to be covered under priority sector and this would require lower provisioning and lower cost of funds (for banks). It will also open up an ESCO market under the private sector in solar. Government will leverage funds from RKVY and enhance market access for produces. This will help in price stabilization and livelihood enhancement. It will also leverage a flagship scheme under Prime Minister Krishi Sichai Yojana for training and empowering pani panchayats.

In this section, the accredited entity is expected to provide a brief description of the expected performance of the proposed project/programme against each of the Fund's six investment criteria. Activity-specific sub-criteria and indicative assessment factors, which can be found in the Fund's [Investment Framework](#), should be addressed where relevant and applicable. This section should tie into any request for concessionality made in [section B.2](#).

E.1. Impact Potential

Potential of the project/programme to contribute to the achievement of the Fund's objectives and result areas

E.1.1. Mitigation / adaptation impact potential

81. The project will impact 5.19 million vulnerable population directly (about 1.03 million HHs) in 15 priority districts with high level of food insecurity, water scarcity and high climatic stress (present and future scenario) and with high proportion of vulnerable SC-ST population. 2.59 million of this population are males and 2.6 million are females. They account for 12% of the entire population of the state.

	Categories of population	In Million	%age
A	Total Population (Odisha)	41.97	
B	SC-ST (vulnerable section) Population (Odisha)	16.78	40%
C	Total Population (15 districts)	17.22	41%
D	Female (Odisha)	20.76	49%
E	Male (Odisha)	21.21	51%
F	Agricultural labourers (15 districts)	3.85	
G	SC-ST (vulnerable section) agri-labourers	1.54	
H	Marginal workers (15 districts)	3.83	
I	No of BPL (15 dists)	3.60	
J	Higher of (F,H,I)	3.85	
K	Assumed 25% BPL are from other work	0.72	
L	Cultivators (15 districts)	2.06	
M	30% Cultivators vulnerable due to water scarcity	0.62	
L	Total vulnerable population	5.19	12%
	Male (15 districts)	2.59	49.90%
	Female (15 districts)	2.60	50.10%

Figure 4 The break up of the vulnerable population in target areas

The indirect beneficiaries would be 10.78 million population i.e. about 2.16 million HHs (out of 15.97 million total population of 2846 gram panchayats in project areas - based on the average gram panchayat pupation of 5611 per GP as per 2011 census).

As per the OCTMP – I studies about 293 HH are benefitted per tank. Considering variable sizes of tanks the actual beneficiaries will be arrived during the tank level surveys during project implementation. However, this project also benefits water security and food security and inclusive in nature both direct and indirect beneficiaries would be more as the livelihood plan, health and nutrition plan may cover land-less, women and additional recharge can augment net sown areas and reduce marginalization and migration.

The 1000 solar pump installations will avoid emission 2614 tonnes of CO₂ per year and would ensure 3.27 million kWh of energy saving during its life time.

E.1.2. Key impact potential indicator

Provide specific numerical values for the indicators below.

GCF core indicators	Expected tonnes of carbon dioxide equivalent (t CO ₂ eq) to be reduced or avoided (Mitigation only)	Annual	As Co-benefit: Avoided CO ₂ emission from solar 2614 tonnes/year. Energy saving of 3.27 million kWh per year from 1000 solar pumps.
		Lifetime	Lifetime energy saving shall be 65 million kWh from this pilot only. Assuming that government of Odisha converts 40,000 pumps to solar it will have potential energy saving of 130.68 million kWh per year.
	- Expected total number of direct and indirect beneficiaries, disaggregated by gender (reduced vulnerability or increased resilience); - Number of beneficiaries relative to total population, disaggregated by gender (adaptation only)	Total	5.19 million most vulnerable people are going to be directly of which 1.5 million are from SC-ST (vulnerable) community and 50.1 % are women ¹⁰ . The indirect beneficiaries would be 10.78 million population i.e. about 2.16 million HHs
		Percentage (%)	12% of the total population of the state.
Other relevant indicators	82. There are 3.6 million below poverty line (BPL) households where monthly Income of highest earning household member < INR 5000 (USD 76) (that's 92% of all BPL households), 3.8 million marginal workers who Mostly depends on agriculture and highly vulnerable. About a third of cultivators too loose their crops due to water scarcity. Of the total 49% are female, food insecure and vulnerable. However, the ground water in these area will cater to 17.22 million population of which 8.62 million are male and 8.63 million are female and cater to 40% of the total population of the state.		
	83. The food security to 5.1 million food insecure households can be ensured through this project. The water quality for this area is certainly likely to improve as the access to drinking water. Currently 4.1 million people have access to drinking water in these 15 districts.		
	84. Other indicators proposed are as follows: % increase in groundwater recharge rate - Groundwater quality improvements as against the applicable standard (OPSCB) % increase in cropping intensity % increase in number of days of food availability in a year for the targeted household % reduction in water borne diseases - Amount of energy/fuel saving		
85. There are overlap between marginal workers and agriculture laborer. Similarly there is also BPL census does not distinguish category wise. It is most of the BPL category would be either, landless, marginal/agricultural laborer. Therefore highest of 3 categories have been taken with an assumption that about a quarter of BPL population are possibly from the landless and are part of other workers category. Similarly about one fifth of the cultivators who are also part of pani panchayats (Water Users Associations) are extremely vulnerable due to climate change related vagaries even though they are landed and spend more than 180 days in a year in agriculture activity but move/depend to other professions. These figures have been added together to compute food related vulnerability. This figure roughly matches the WFP estimate adjusting for decadal growth rate of population in the region.			

¹⁰ [The share of women employment in marginal and agricultural labor is higher as compared to male in Odisha](#)

86. The calculation for the 1000 solar pumps and mitigation and additional livelihood benefit from irrigation has been given in annexure 2. For this region 3 HP pumps and the head and discharge for these pumps and their diesel consumption has been considered. The diesel subsidy has been estimated at Rs 10 per litre. But this is a declining subsidy regime and to that extent the quantum of subsidy may reduce in future. The grid baseline has been assumed to be 0.8 tCO₂/Mwh. For computing the mitigation cost or avoided CO₂ cost (194 USD/t CO₂)¹¹ the cost for the solar pump component has been taken in to consideration (with 40% from Gol).
87. There has been no such comparable project on climate change adaptation of this nature. However some related project on tribal livelihood which tried to enhance the adaptive capacity in the same region has the following outreach and investment.
88. The Odisha Tribal Empowerment and Livelihood Programme (OTELP)¹² had been financed by the DFID support of USD 40 million contributing 44 percent of the total programme cost as grant; and the IFAD loan of USD 20 million which contributed 22 percent of total programme cost as soft loan. WFP contributed USD 12 million in the form of food assistance. The contribution from the Government of Odisha was USD 9.6 million. The project reached out to 0.6 million people in 7 districts of Odisha of which 10% were vulnerable/destitutes.
89. Phase I of the Odisha Community Tank Management Project (OCTMP) that deals with decentralized irrigation system and close to the proposed project had an outlay of US Million \$ 127.8 or INR 546 crores. Of which World Bank Loan was 112 mn USD, Government of Odisha contribution was 11 mn USD and balance through community/PPs. The project covered 1.3 mn people in 29 districts of Odisha.
90. In terms of targeting and per capita investment and the diversity the proposed project is far better than the above projects as well as the disaster related projects in the coastal zone that is largely capital investment in infrastructure. The proposed project far higher climate relevance, better resilience focus and aimed towards cost recovery and market transformation (both water market and solar market).

E.2. Paradigm Shift Potential

Degree to which the proposed activity can catalyze impact beyond a one-off project/programme investment

E.2.1. Potential for scaling up and replication (Provide a numerical multiple and supporting rationale)

91. This a dual pathway project having paradigm shift potential both in adaptation and mitigation.

Adaptation Logic: Enhanced climate resilient development in the most vulnerable areas of the state to ensure water security and food security.

Mitigation Logic: Shift to a low emission pathway from the business-as-usual method of water supply to agriculture through a large number small solar pumps to ensure energy and water use efficiency. This will be the co-benefit in this predominantly adaptation project.

92. The proposed project primarily is an adaptation project focused on climate resilient development. The recharge shaft integration is a business-as-usual tank improvement programme improves ground water recharge, therefore is a concrete adaptation activity. Ground water is mostly used in the climate stressed condition and is equivalent of a family silver. It has critical importance for future climate stress as much it has at present. Its result areas are closely linked to (a) enhanced water availability through recharge (b) enhanced food security through livelihood diversification

¹¹ Estimated against the total net investment and amount of GHG mitigated total project for its lifetime of 10 years

¹² <http://www.archive.india.gov.in/citizen/agriculture/viewscheme.php?schemeid=1208>

agriculture fishery as well as off-farm activities for land less and women (c) reduced disease burden (water-borne) diseases due to improvement in water quality. (d) capacity of the communities enhanced for better operation management and providing last mile linkage (e) learning and informing the policy makers providing input for water policy, ground water regulation and as well as water budgeting and sharing (f) better project governance and mainstreaming through policy and operational guidance.

93. The mitigation logic is established through a pilot project of 1000 solar pumps. It is quite possible to adopt to diesel based pumping system which the farmers are familiar with. The ecosystem is already in place. However a rigorous demonstration and success of this pilot will not only help in avoiding about 2614 tonnes of CO₂ per year but also develop an eco-system for solar market. This avoided emission is a mitigation co-benefit. This will be achieved by mobilizing right vendor who train the barefoot para professionals (especially the women) in solar panel, battery maintenance and management. These people will be the vehicle of market transformation. The stability of the system and demonstration thereof will help development of the private market for a potential replacement of 2.88 million¹³ pump sets in the state which has low energization.
94. At the baseline scenario the government has invested in decentralized system of tank irrigation as the large scale dams and irrigation projects results in involuntary displacement and unsustainable socio-politically. The GCF grant will be used for ground water recharge system as concrete adaptation activity. In addition grant will be used for solar pump integration (with capital subsidy), capacity building and monitoring of energy saving and adaptation benefit to show case the project for mainstreaming across the state/region/country.
95. The learning and knowledge management component captured through a process document component will help in upscaling this project in a programmatic mode. It is expected that some of the adaptation action proposed under this project may be mainstreamed to other programs when the dissemination takes place, new guidelines may evolve. , In addition the department has built in IEC component and training component for this concrete adaptation initiative. This can be achieved by building a case on emission reduction through systematic measurement of energy saving by an accredited agency. It will also capture the cost of adaptation. The policy briefs would enable the state to mark higher budget allocation for a state wide programme (conceptualized as Bhutal Jal Sangrahan Yojna). The state has already started amending the acts for water users giving them power for collection of water tax and inclusive representation in the governance.
96. The element of GWRS as a concrete adaptation measure is not part of the current practices and would get mainstreamed after its adaption benefits are documented scientifically. This will enhance scientific learning. Ensuring livelihood enhancement support to landless families in the tank command will ensure equity and inclusion.
97. The solar pumping system and additional income thereon would create additional demand for such systems and the scale would help in reducing the price further. In addition the state has already prepared a draft solar policy and that would form part of the ambitious Integrated Renewable Energy Policy to boost solar pumping (and other solar products) devices market in the state.
98. A declining subsidy regime and increasing cost recovery from this adaptation investment is one of the positive macro-economic outcomes. This project will show through a mixture of policy interventions and project interventions the essence of adaptation (water security and food security), emission reduction (energy saving), saving of subsidy and foreign exchange for mainstreaming and replication.
99. The project will provide input to upcoming state water policy especially on issues relating to water pricing and cost recovery. It will help in providing right legitimacy of pani panchayat as implementing agency/ partners in the panchayats and take benefit of the higher devolution. It will help in providing input to Odisha Ground Water Regulation which is in draft stage.
100. In this way the project is expected to address the all relevant barriers technical, institutional, financial and social for rapid upscaling.

¹³ [CDM potential of SPV pumps in India Pallav Purohit, Axel Michaelowa, HWWI Research Programme International Climate Policy](#)

Technical Barrier	Large scale training of the departmental engineers and jal sathis (para professionals)
Financial Barrier	Tariff setting criteria and guidelines developed by the project will enable transparent and predictable tariff policy and feed into state water policy, ground water legislation, PP Act and also renewable energy policy. It has been established during consultation that people are willing to pay higher tariff if the supply is assured in right volume at the time they need.
Institutional barrier	This can be overcome by developing the skills of jal sathis, barefoot para-professionals on pump maintenance. The three level M&E system from satellite based, web based tracking system, tank based recharge monitoring and quality monitoring, concurrent monitoring and project development objective & component tracking and AE independent assessment will ensure proper project governance risk management and fund management effectiveness. The high level steering committee will create platform of convergence as well inter-departmental coordination
E.2.2. Potential for knowledge and learning	
101. There are three kinds of learning envisaged in this project: • Technical learning: To be achieved by installation, maintenance of recharge shaft as well systematic recording of the recharge in the tanks and benefits by the village level jal sathis. This will enhance their conviction for larger replication. It will also develop a trained cadre of par-hydrologists for participatory water management. Certified professional in solar panel assembling and pump maintenance will follow a set of maintenance schedule and SOP developed through this project and provide last mile linkage to an emerging solar market eco-system. • Monitoring protocol and database for process learning: The satellite based M&E system of the tanks and database, the app-based integration of recharge data and on field concurrent monitoring of the livelihood and other social benefits would serve a major input to scientific literature and dynamic modeling of the ground water. The water quality can be correlated with water borne disease burden. The food security can be correlated with the ground water recharge. There will be science to policy briefs aimed at mainstreaming the project knowledge to region and country scale. • Participatory learning methods: The self-management of the water, water sharing, cost recovery, crop water budgeting would go a long way in ensuring that water is managed efficiently and right crop choices are made including market linkage through collectivization of produces and better negotiating power when aggregated into FPOs).	
E.2.3. Contribution to the creation of an enabling environment	

Describe how proposed measures will create conditions that are conducive to effective and sustained participation of private and public sector actors in low-carbon and/or resilient development that go beyond the program.

102. The project ensures three kinds of enabling framework (a) **proactive policy framework** allowing effective use of water and its conservation, cost recovery and self-management by the trained para-professionals cadres of the pani panchayats. The inputs from the project would make both State Water Policy and Odisha Ground Water Regulation and Control policy transformative (b) **enhancing resilience through better appreciation of the climate stress**: enhancing ground water recharge through concrete adaptation structures and forward looking management of water resources to reflect climate change impacts on rainfall and temperature in the region and enhance water use efficiency matching aquifer abstraction rates to match sustainable aquifer yields. Based on the learning from the project future tank improvement programmes are expected to integrate this concrete adaptation structure in the tank systems to improve ground water recharge. (c) **Solar pumping market transformation**: eastern region has much lower energization in agriculture, the solar market is nascent and in Odisha only less than 10% use regular diesel pump sets. The project will develop a full-ecosystem so that the government moves to low emission solar powered pump sets for future replacements. It is also possible that the private sector will show interest due to larger volumes.
103. The project will ensure financial sustainability through gradual cost recovery, reduced public expenditure on water provisioning through other costly means, enhanced income from supplemental life-saving irrigation and possible income diversification. Since solar energy is close to achieving grid parity it will also lower the energy cost in future and reduce the fuel subsidy on account of diesel. It will also reduce carbon footprint of the state through avoided fossil fuel based generation which has long term cost.

E.2.4. Contribution to regulatory framework and policies

Describe how the project/programme strengthens the national / local regulatory or legal frameworks to systematically drive investment in low-emission technologies or activities, promote development of additional low-emission policies, and/or improve climate-responsive planning and development.

104. The National Water Policy 2002 and subsequently in the "Odisha State Water Policy-2007" laid down emphasis on Participatory Irrigation Management (PIM) to be adopted as an essential strategy for improving performance of all irrigation projects, management of irrigation systems; and particularly in water distribution and collection of water charges. This has been concretized in the Pani Panchayat Act, 2008 and subsequent rules. Where the PPs have been authorized to collect water charges. The evidences of collection has been very little so far. This project is expected to build momentum.
105. The project is in line with the objective of *Pradhan Mantri Krishi Sichai Yojna* objective of har khet ko pani (water to every farm field) and more crop per drop. The integration of solar component is also in line with low emission development strategy that the state is pursuing as enshrined in SAPCC.

E.3. Sustainable Development Potential

Wider benefits and priorities

E.3.1. Environmental, social and economic co-benefits, including gender-sensitive development impact

106. Overall the project will have the following benefits:

(i) Enhanced water security which in turn will raise environmental and social wellbeing and economic productivity; (ii) Lowered disease burden on account of water contamination (avoided livelihood disruption to help in economic wellbeing, reduced drudgery for women and enhanced water security for livestock and fishers (iii) Reduced greenhouse gas emissions through the avoidance of diesel or electric pump sets in solar pumping system pilot areas as demonstration (iv) reduced run-off through improved rainfall capture and diversion capacity, including enhanced ground water recharge (v) enhanced knowledge of ground water recharge structure its maintenance as well as water budgeting and distribution, learning modules for livelihood options for the land less to ensure social inclusion (vi) lower overall economic and social costs for water security and food security.

- Economic co-benefits

- Total number of jobs created:

In a decade (2001-11) the proposed districts have lost 0.4 mn jobs in agriculture sector¹⁴. Most of the migration has been from the SC-ST community and are either marginal workers or agricultural laborers They account for about 1.5 million people. With a focused targeting it is possible to retain at least 1 million of these people in the state in the sector with better opportunity in agriculture. Through this intervention it will be possible to stabilize at least 0.25 mn jobs in these districts per year and in four years 1 million jobs would have been stabilized in 15 districts.

- Amount of foreign currency savings

The opportunity cost saving will be 3.6 million USD on account of diesel in 20 years due to use of solar pumps.

- Amount of government's budget deficits reduced

It will also reduce the subsidy on account of diesel to the tune of 1.8 million USD in 20 years that contributes to the budget deficit.

- Social co-benefits

- Improved access to education

2-3 percent of workers move out of agriculture per year and migrate outside to low value added service sector. The same will stay and their children being rooted in village will have continued access to education, enhanced economic wellbeing and will reduce dropout rate.

- Improved regulation or cultural preservation

The social norm on water sharing by users (pani panchayat) and cost recovery (through water tax) and crop water budgeting will enhance sustainability and reduce social conflict; special support to landless also would ensure inclusion, Tanks are also at the helm of a socio-cultural and economic system of a village and this will help in its conservation.

- Improved health and safety

The women members who are the primary users of tank water for cooking are worst affected along with children due to water contamination. Shortage of ground water too increases drudgery.

- Environmental co-benefits

- Improved air quality

This will improve through the avoidance of diesel.

- Improved soil quality

¹⁴ [Census of India 2011](#).

- The recharge system will improve the soil health.
- Improved biodiversity
 - The plantation in tank catchment and improved water regime will help in maintaining the bio-diversity.
- Gender-sensitive development impact
 - Proportion of men and women in jobs created
 - The project is trying to stabilize the job in agriculture which is declining at the rate of 2-3 percent per year. 50% of the workers are women marginal workers who form mostly the agricultural labor force and their jobs will be stabilized. In addition the capacity building investments in backyard poultry, mushroom and food processing for the landless will help the women household.

E.4. Needs of the Recipient

Vulnerability and financing needs of the beneficiary country and population

E.4.1. Vulnerability of country and beneficiary groups (Adaptation only)

Describe the scale and intensity of vulnerability of the country and beneficiary groups, and elaborate how the project/programme addresses the issue (e.g. the level of exposure to climate risks for beneficiary country and groups, overall income level, etc.).

107. As per the IPCC 5th Assessment report¹⁵ the regional impact of climate change on India shall push the poor to margin. There will be decrease in food security, reduced bio-mass availability will affect livestock productivity and also may affect energy security due to less water availability thus impacting irrigation in stressed conditions. Drought and flood events¹⁶ will be more frequent thus pushing poor to margin and reducing the economic development in the region. Diseases burden (diarrhea and malaria, etc.) will rise due to drought and flood and resultant deterioration in water quality.
108. India accounts for 250 million food insecure people. Based on the review of literature, the findings have been as follows. The mean temperature in India is projected to increase by 0.1–0.3°C in kharif and 0.3–0.7°C during Rabi by 2010 and by 0.4–2.0°C during kharif and to 1.1–4.5°C in Rabi by 2070. Similarly, mean rainfall is projected not to change by 2010, but to increase by up to 10% during kharif and rabi by 2070. At the same time, there is an increased possibility of climate extremes, such as the timing of onset of monsoon, intensities and frequencies of drought and floods.
109. The state of Odisha has been constantly at the receiving end of climate events such as drought, flood and cyclone due to high monsoon variability. As a result of this several areas of the state are food insecure¹⁷ as shown in the figure below:

¹⁵ [Change, I. C. \(2013\). The Physical Science Basis: Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. New York: Cambridge University Press, 1, 535-1.](#)

¹⁶ [Chaturvedi, Rajiv Kumar, et al. "Multi-model climate change projections for India under representative concentration pathways." *Current Science* 103.7 \(2012\): 791-802.](#)

¹⁷ [Food Security Atlas of RURAL ODISHA, UN World Food Programme](#)

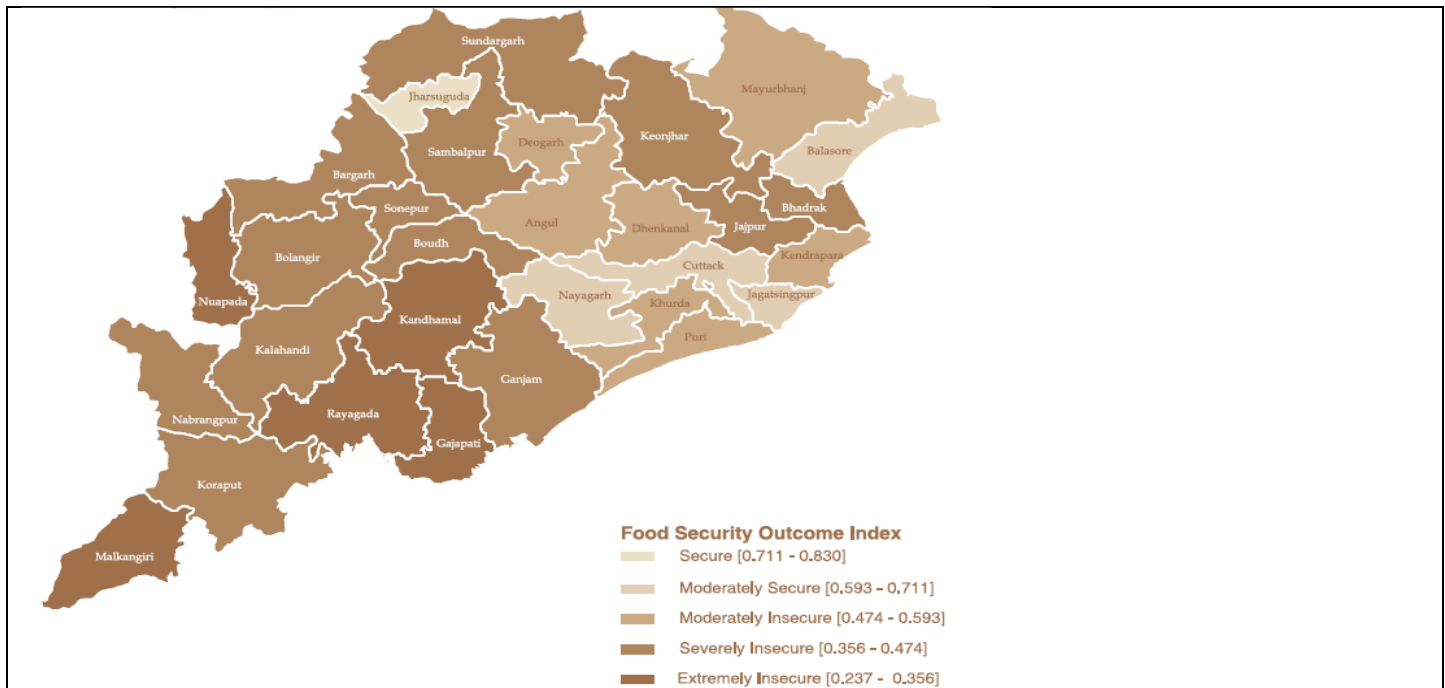


Figure 5 Hunger atlas of Odisha, WFP

110. The high level steering committee has identified 15 priority districts having high poverty, high proportion of indigenous communities and significant climate stress for the implementation of this project.

111. **The climate scenario:** As per the State Action Plan on climate change (SAPCC 2015-20) under the A2 scenario the projected mean annual temperature increase by 2100 is given below:

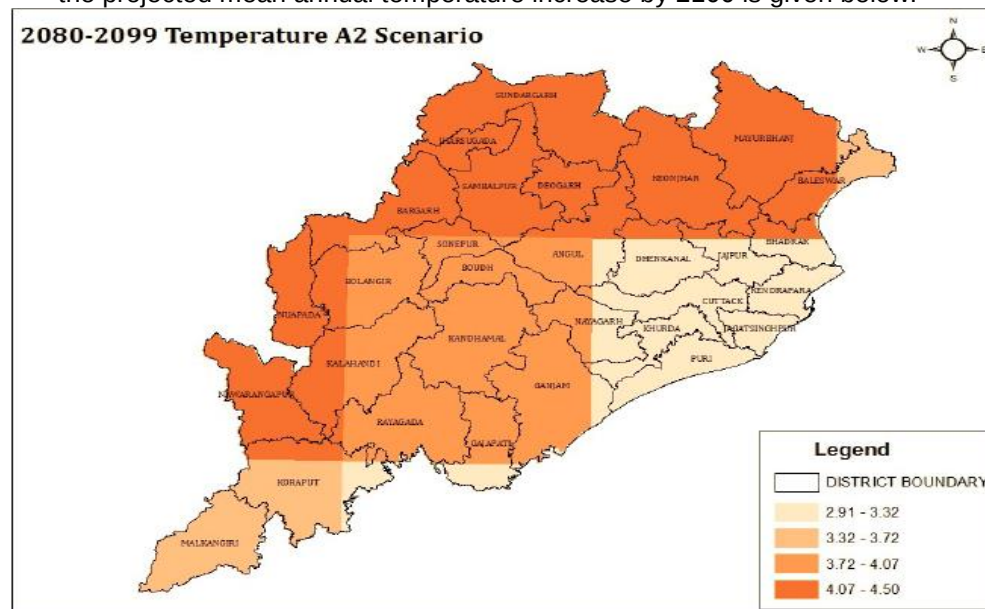


Figure 6 Spatial distribution of temperature rise in end century scenario (A2 scenario)

112. According to figure 7, coastal Odisha will remain relatively less warm than the rest of the state, even though it clearly breaches the 2°C barrier. Northwestern, western, and southwestern Odisha show the highest rise in temperature. This temperature rise is certainly at an unsustainable level, assuming the current challenges of global

warming are not mitigated. This factor will have an increasingly larger impact on ecosystems. This will put a stress on terrestrial as well as ground water system and cause faster depletion. Therefore, the project largely focuses on the north-west, west and southwest Odisha districts.

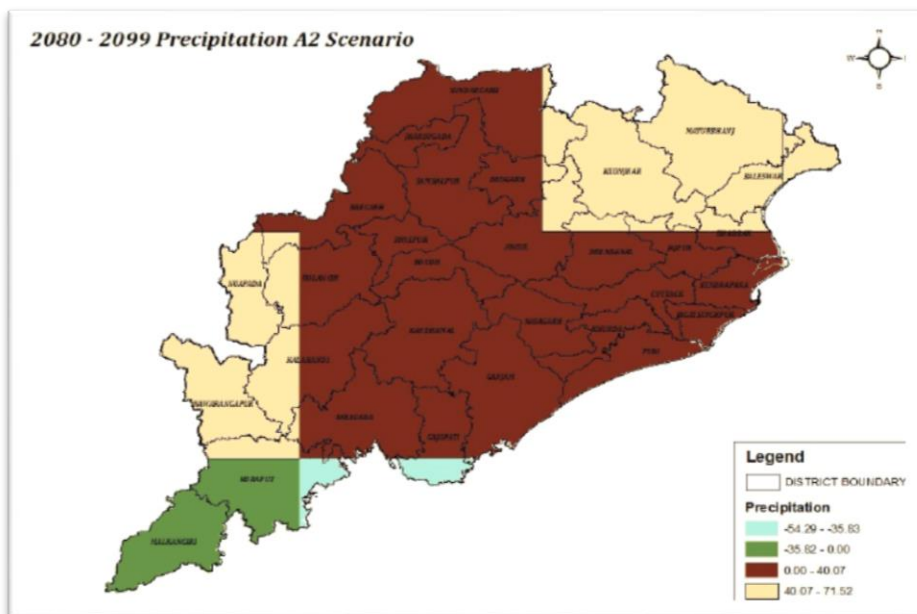


Figure 7 Spatial distribution of precipitation –end century scenario (A2 Scenario)

113. This figure above shows no change to +40 millimeters of excess annual average rainfall by the end century in several parts of coastal and western Odisha. Southern Odisha will have less rainfall (–35 millimeters to no change). The main problem is this rainfall will not be well distributed. While the quantum of rainfall may remain same, this will be available for a limited number of days with many dry spells. Thus the ground water conservation to ensure aquifer yield at the water stressed scenario in future is a critical resilience factor for this project.
114. The very fact that the area is food insecure and has high concentration of indigenous population makes them highly vulnerable to climate change. *The project aims to target about 5.2 million vulnerable population in 15 districts having current and future climate stress. Out of this about 3.8 million are marginal workers and mostly work 2-3 months in a year in agriculture. 1.5 million are scheduled caste or scheduled tribe communities and most of them are below poverty line. They are 12% of the total population of the state. More than 50% of this population are women.*
115. The key barriers include access to water, high poverty and stressed livelihood, financial barriers to use alternative mode of irrigation and key institutional barrier include heavy dependence on monocrop rice and lack of collectivization of produce and poor market access. The water institutions are in nascent stage. A minor climatic stress arising out drought and flood pushes them to margin, hunger and force them for distress migration leading to social unrest.

E.4.2. Financial, economic, social and institutional needs

Describe how the project/programme addresses the following needs:

- Economic and social development level of the country and the affected population
- Absence of alternative sources of financing (e.g. fiscal or balance of payment gap that prevents from addressing the needs of the country; and lack of depth and history in the local capital market)
- Need for strengthening institutions and implementation capacity.

116. The fiscal deficit for 2014-15 touched 4.1 percent of the gross domestic product missing the target by 0.6 percentage point. The fiscal weakness was partly from structural factors. Lower per-capita incomes of around \$1,700 limit the government's tax base and raise pressure for subsidies and development spending. Moreover, interest payments absorb almost a fifth of Indian government revenues, a consequence of high debt, which is estimated at

63.8 percent of GDP in fiscal 2016, down from 83.1 percent in fiscal 2005. This situation restricts the government's fiscal flexibility. The prolonged recession in Europe and exit of UK from EU will have deep impact on Indian economy affecting its effort on investment in irrigation and market infrastructure and may even lower social sector spending.

117. India accounts for 2.4% of the world surface area, but supports around 17.5% of the world population. It houses the largest proportion of global poor (30%), around 24% of the global population without access to electricity (304 million), about 30% of the global population relying on solid biomass for cooking and 92 million without access to safe drinking water. India is a developing country with a per capita GDP nominal) of around USD 1408 per annum. However, this doesn't reflect the wide disparities amongst its people and regions. Around 363 million people (30% of the population) live in poverty, about 1.77 million people are houseless and 4.9% of the population (aged 15 years and above) are unemployed. The per capita electricity consumption stands low at 917 kWh, which is barely one third of the world's average consumption.
118. In case of Odisha, on the macro economic front, revenue receipts of the state as a percentage of GSDP have increased from 15.40 per cent in 2002-03 to 18.65 per cent in 2011-12. While the own revenue receipts of the state as a percentage of GSDP has increased from 7.03 per cent to 9.21 per cent, revenue transfer from Centre to state which includes state's share in central taxes and grants-in-aid, as a percentage of GSDP remained more or less constant. The state has seen buoyancy in its tax collection due to the slowdown of the mining activity. Odisha's tax - GSDP ratio remains much lower compared to other major general category states, except Bihar, Jharkhand and West Bengal. Fiscal deficit of the state has remained below two percent of GSDP from the year 2004-05 onwards. Odisha would have a fiscal deficit of INR 14,532.39 crore (USD 2.201 billion) during 2016-17 fiscal which is 3.79 per cent of the gross state domestic product (GSDP)¹⁸. The high rate of fiscal deficit, however, violates provisions of Fiscal Responsibility and Budget Management (FRBM) Act, 2005 that allows for fiscal deficit of only 3.5 per cent of the GSDP. Year-end debt stock for 2016-17 is estimated at INR 64991.83 crore (USD 9.84 billion) which is 16.96 per cent of the GSDP. With this pattern macro-economic fundamentals the problem has been its poverty construct that fails in its redistributive impact to build resilience.
119. Odisha is one of India's poorest states. Although poverty levels fell from 57 percent in 2004/05 to about 33 percent in 2011/12, the proportion of poor in Odisha remains well above the national average of 22 percent. Odisha, along with Madhya Pradesh, has the highest percentage of rural poor in the country (Odisha Economic Survey, 2013-14). The 2011-12 poverty estimates for Odisha are based on poverty lines of INR 695 (USD 11) and INR 861 (USD 13) per month for rural and urban areas, respectively. Poverty among the scheduled tribe (ST) and scheduled caste (SC) communities has been falling at a faster rate; however, the ST communities remain poorer than other social classes (Odisha Economic Survey Report, 2013-14).
120. The water institutions (Pani Panchayats) are nascent and do not have adequate capacity and even financial literacy. They need sufficient capacity building. Collectivization of produce to better negotiate with market (input suppliers and output marketers) has just made a beginning in the region and has a long way to go. The project cannot address all the structural inequity present in the state. It will make an attempt through this catalytic fund to enhance the adaptive capacity of the most vulnerable segment (marginal workers, women, SC-ST communities and mostly below poverty line) intervening in the ground water regime (for food and water security) through livelihood diversification and integrate solar energy as a low emission solution in the irrigation and agriculture sector.

E.5. Country Ownership

Beneficiary country (ies) ownership of, and capacity to implement, a funded project or programme

E.5.1. Existence of a national climate strategy and coherence with existing plans and policies, including NAMAs, NAPAs and NAPs

121. Section C1 of this document clearly show the various levels of alignment and country, state and community ownership of this project. This is described below:

The alignment and contribution INDC has been given in figure1 above. In addition:

¹⁸ <http://timesofindia.indiatimes.com/business/india-business/Odisha-projects-fiscal-deficit-of-3-79-in-2016-17/articleshow/51462002.cms>

- It confirms to the components of the National Action Plan on Climate Change “**water mission**” objectives: (a) comprehensive water data base in public domain and assessment of impact of climate change on water resource; (b) promotion of citizen and state action for water conservation, augmentation and preservation; (c) focused attention to over-exploited areas; (d) increasing water use efficiency by 20%, and (e) promotion of basin level integrated water resources management.
- Fully aligns with the key objectives of the Pradhan Mantri Krishi Sichai Yojana “har khet ko pani” and more crop per drop.
- It conforms to the key priorities relating to water use efficiency (KP4) creation of water harvesting structures (KP5), strengthening the pani panchayats for water management (KP8) and integrated water management (KP9) of the Odisha State Action Plan on Climate Change.
- Odisha Pani Panchayat act envisions a self-managed water institutions and creation of a cadre of skilled para professionals for energy and water would create a transformational eco-system.
- The project has been duly vetted by the state level council of climate change at PCN state and subsequently the DPR has been approved after taking the stakeholder inputs on 12th of July 2016. It has been duly vetted by the multi-disciplinary empowered committee at the Government of India level.

E.5.2. Capacity of accredited entities and executing entities to deliver

122. NABARD is the Accredited Entity (AE) for the overall project monitoring and implementation of climate change projects under the three funding mechanisms, viz. Green Climate Fund (GCF), Adaptation Fund (AF), and National Adaptation Fund for Climate Change (NAFCC). NABARD has been accredited as AE (Direct Access) of GCF in July 2015. It has been playing a pivotal role in scrutinizing, prioritizing, and strategizing climate change projects including aspects of finances and reporting aligned with national climate policies. NABARD in the capacity as AE of Adaptation Fund has generated several feasible proposals on climate change adaptation, six of which, amounting to US \$ 9.8 million, have been sanctioned by the AF. These projects are at various stages of implementation. NABARD as AE for implementation of adaptation projects under NAFCC by MoEF&CC, GoI facilitates identification of project ideas/concepts from State Action Plan for Climate Change (SAPCC), project formulation, appraisal, sanction, disbursement of fund, monitoring and evaluation and above all capacity building of stakeholders including state governments. Sixteen projects with an amount of INR 326.22 crore (49.43 million USD) were sanctioned under NAFCC. NABARD, with its head office at Mumbai has pan India presence. NABARD has offices of District Development Managers (DDMs) in almost all the districts and 31 Regional offices across the country including Odisha. NABARD has trained manpower at Regional Office level for implementation of Climate Change projects. NABARD officials/teams at district and state level would be involved in project guidance, steering, monitoring, auditing, co-ordination with State, District officials for resolving any bottlenecks in project implementation. Further details (if any) may be referred from NABARD corporate website <https://www.nabard.org/>

123. The capability of the executing entity is outlined under section C.4 para 77,78 and 79

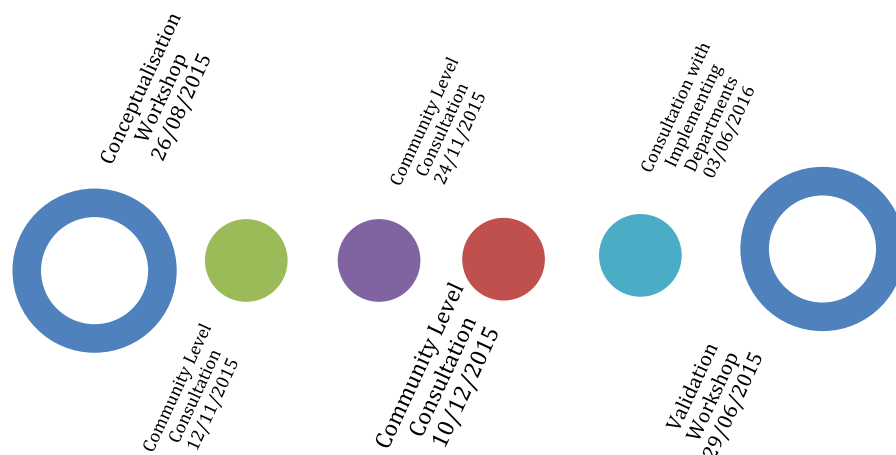
E.5.3. Engagement with NDAs, civil society organizations and other relevant stakeholders

Please provide a full description of the steps taken to ensure country ownership, including the engagement with NDAs on the funding proposal and the no-objection letter.

124. The project has been formulated in prior consultation with critical stakeholder. This has been duly approved by high level steering committee of the Odisha state. The Project Concept note has been technically appraised by the AE and placed to the Empowered Committee constituted by NDA which involves all the concerned line Ministries which are part of National Action Plan on Climate Change. Empowered Committee meeting held on 17 March 2016 cleared the proposal and NDA provided its No-objection certificate.

Please also specify the multi-stakeholder engagement plan and the consultations that were conducted when this proposal was developed.

125. The project formulation has taken into account consultation all the field level primary and secondary stakeholders. Series of consultation meetings involving farmers, pani panchayat members and experts as well as line department officials during the formulation of the project. Apart from informal consultations and feedback 6 structured stakeholder consultations were conducted during the formulation of the meeting.
126. Separate consultation meetings were arranged with vulnerable communities including small and marginal farmers, landless laborers. However, meeting attendance as a practice not recorded caste wise. The stakeholder consultation meetings, involving about 50 farmers from the target districts, another 50 people from line departments, academic institutions, experts, civil society organizations, bankers and private sector was also organized during July 2016. The project concept and components were deliberated and indicators were discussed with the participants. Their inputs have been used to refine the activities and components. The details of stakeholder meeting held are given in the Annexure 9



E.6. Efficiency and Effectiveness

Economic and, if appropriate, financial soundness of the project/programme

E.6.1. Cost-effectiveness and efficiency

Describe how the financial structure is adequate and reasonable in order to achieve the proposal's objectives, including addressing existing bottlenecks and/or barriers; providing the least concessionality; and without crowding out private and other public investment.

127. Water is a public good and basic entitlement and hence the output from this project does not envisage capital cost recovery from the project's direct and indirect beneficiaries during the project duration. Hence, a detailed financial analysis to compute financial returns is not required. However, the Government of Odisha has already made efforts to recover the cost of O&M from Pani Panchayats as envisaged under the act. The grid availability is low in many places and the availability of water combined with solar pumping will help in development of a private water and energy market in future.

- Estimated cost per t CO₂ eq (total investment cost/expected lifetime emission reductions)

With respect to the solar pumping system component: is **194 USD/t CO₂**

- Economic and financial rate of return from the project activity

The financial and economic analysis of the project is arrived based on the total project costs and benefits including the components supported through co-funding (World Bank and state Govt.) and by GCF. The financial and economic rate of return from the project are presented in the table below:

IRR of the Project Considering Grant Fund	17.07%
EIRR of the Project Considering Grant Fund	17.75%
IRR of the Project Considering Debt Fund	15.93%
EIRR of the Project Considering Debt Fund	16.64%

The effectiveness in terms of economic benefits under the project are clearly established and can be seen from the table above. The same is presented in the feasibility study report (Annexure 1).

Proposed expenditure and proposed financing mode

The project is proposed to be supported as grant funding USD 34.357 million from GCF and the same will be utilized from concrete adaptation measure. The debt funding under the project is not feasible as proposed interventions are mainly innovative in nature and of public goods nature. The activities does not result in direct cash flow to service the debt.

E.6.2. Co-financing, leveraging and mobilized long-term investments (mitigation only)

Please provide the co-financing ratio (total amount of co-financing divided by the Fund's investment in the project/programme) and/or the potential to catalyze indirect/long-term low emission investment.

- *Co-financing ratio (total amount of the Fund's investment as percentage of project)*

128. The new project being formulated by DoWR has got clearance from Department of Economic Affairs (DEA) has an outlay of 236.36 million USD. The project will have a loan component of 165.45 million USD that will include tank improvement (for 600 tanks) basin improvement, climate resilient value chain investment in agriculture and allied sectors. Rest will be the share of Government of Odisha. In addition GoO has decided to upscale the tank improvement exercise for additional 9400 tanks through convergence funding from the state's own resource. The tentative budget for tank improvement in 600 tanks funded by World Bank will be 7.064 million USD. This is only 4.25% of the total project. The GCF support is sought for 34.357 mn USD of the total project cost of USD 166.297 million. **Co-financing to GCF support ratio is 4: 1. The GCF will invest around 20.66% of the project cost.**

E.6.3. Financial viability

129. The expected financial internal rate of return is 17.07% for this project, which exceeds 12%, the assumed discount rate. Under all test cases including scenario of 25% deficit rain fall every year and increase in cost of capital up to 15% the Benefit to Cost ratio of the project is remains around 1.

130. GCF contribution is being asked mostly for the concrete adaptation intervention which is not in practice as of now for recharging the grown water artificially. This intervention facilitates the incremental benefit to beneficiaries with availability of additional water which can be used for agricultural purpose for higher yield and higher income. The present value of incremental benefit due to interventions from GCF fund over a 20-year period after completion of project is expected to be \$180.47 million.

131. The project is self-sustainable beyond the intervention period. The benefits can be ripped perpetually with a little expense on operation and maintenance of recharge wells by Pani Panchayat after the project period.

E.6.4. Application of best practices

Please explain how best available technologies and practices are considered and applied. If applicable, specify the innovations/modifications/adjustments that are made based on industry best practices.

132. Odisha has experimented with two key livelihood programmes Odisha tribal empowerment and livelihood programme in empowering tribals and Western Odisha Livelihood programme dealing with watershed and livelihood as a key strategy for reducing poverty and vulnerability. The Odisha community tank management project phase 1 has already exposed the state to deal with community, water institutions and address water stress in a decentralized mode. An independent assessment conducted by CTRAN has clearly established additional life irrigation providing livelihood security to farmers, successful interventions in fishery and some household enterprises like growing mushrooms and poultry providing income to landless and women. The state has been running a successful national adaptation fund project to rejuvenate a dying stream in Jonk basin. Some of the best practices and design success have been factored in here. These include (i) groundwater recharge through a recharge shaft acting as concrete improvement schemes, interconnected and structurally improved in a cascade and linked to basins or sub-basins (iii) energy efficient solar pumps to use conserved ground water to provide lifesaving irrigation in kharif and additional moisture for rabi crops (iv) Beyond the technological good practice standard, the project will apply the international good practice for the water resource management in the context of anticipated impacts of climate change. The state specific climate stress envisaged for future under A2 scenario has been used to identify vulnerable areas.
133. The state is also creating cadre of barefoot para-hydrologists to closely monitor the tanks and water quality. Another set of certified village level women entrepreneurs will be available for maintenance of solar panels and batteries. These people will serve as critical link for the last mile and enhance the sustainability of the project and its upscaling.
134. The process documentation and inputs to policy to be provided through this project would help in creating a market for water and renewable energy and create an enabling environment for public private partnership in this critical areas to build resilience and promote low emission development.

E.6.5. Key efficiency and effectiveness indicators

	Estimated cost per t CO ₂ eq, defined as total investment cost / expected lifetime emission reductions (mitigation only)
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Solar Project

(a) Total project financing	Million US\$ 8.460
(b) Requested GCF amount	Million US\$ 5.07
(c) Expected lifetime emission reductions overtime	10 tCO ₂ eq
(d) Estimated cost per tCO₂eq (d = a / c)	US\$ 323.69 / tCO₂eq
(e) Estimated GCF cost per tCO₂eq removed (e = b / c)	US\$ 194 / tCO₂eq

Describe the detailed methodology used for calculating the indicators (d) and (e) above.

Particulars	Value	Unit
Capacity of the solar pump	3	hp
Total water supply 3 hp solar pump	121,500	lpd
Water supply by 2.2 kw grid connected pump	5.00	lps
Hourly water supply	18000	lt/hr
Average operational hour per day	6.750	hr
Average power consumption	2.2	kWh
Average daily power consumption	14.85	kWh
Annual days of operation	220	days
Annual energy savings	3267	kWh
Annual energy savings	0.0033	MkWh
No of pumps	1000	No
Energy saving for 1000 pump set	3.27	MkWh
CO ₂ emission per kWh electricity generated through diesel	0.8	tCO ₂ /MWh
Total CO ₂ avoided/ annum for 1000 pumps	2614	tCO ₂ e
Total CO ₂ avoided for 1000 pumps for entire cycle of 20 years ©	52272	tCO ₂ e

Please describe how the indicator values compare to the appropriate benchmarks established in a comparable context.

Not Applicable

Expected volume of finance to be leveraged by the proposed project/programme and as a result of the Fund's financing, disaggregated by public and private sources (mitigation only)

GCF
core
indicators

	<i>Describe the detailed methodology used for calculating the indicators above.</i> Not applicable <i>Please describe how the indicator values compare to the appropriate benchmarks established in a comparable context.</i> Not applicable
Other relevant indicators (e.g. estimated cost per co-benefit generated as a result of the project/programme)	

* The information can be drawn from the project/programme appraisal document.

F.1. Economic and Financial Analysis

Please provide the narrative and rationale for the detailed economic and financial analysis (including the financial model, taking into consideration the information provided in [section E.6.3](#)).

Annualized benefit from agricultural activity

Particulars	Annualized Benefit (Million USD)				
	Year-1	Year-2	Year-3	Year-4	Year-5
Incremental Benefit due to project			9.36	20.69	21.11
	Year-6	Year-7	Year-8	Year-9	Year-10
	33.12	33.79	34.46	35.15	35.85
	Year-11	Year-12	Year-13	Year-14	Year-15
	36.57	37.30	38.05	38.81	39.58
	Year-16	Year-17	Year-18	Year-19	Year-20
	40.38	41.18	42.01	42.85	43.70

Socio Economic Viability of the proposal has been worked and the same is presented as part of feasibility report (Annexure 1). The Internal Rate of Return (IRR) and Economic Internal Rate of Return (EIRR) of the project are summarized in the table below:

IRR of the Project Considering Grant Fund	17.07%
EIRR of the Project Considering Grant Fund	17.75%
IRR of the Project Considering Debt Fund	15.93%
EIRR of the Project Considering Debt Fund	16.64%

The analysis was further subjected to two sensitivity parameters viz. rainfall deficit and cost overrun. The project returned with positive net worth and benefit cost ratio of more than 1.0. The detailed analysis is presented in the feasibility report.

The project benefits anticipated are mainly on account of following:

1. Protective irrigation during the lean period of water availability.
2. Increase in productivity of existing crops
3. Change in cropping pattern.
4. Fisheries activities
5. Increase in cropping intensity

Detailed assumption for arriving at the benefit from above activities are presented in the feasibility report.

156. The expected financial internal rate of return is 21.76% for this project, which exceeds 12%, the assumed discount rate. Under all test cases including scenario of 25% deficit rain fall every year and increase in cost of capital up to 15% the Benefit to Cost ratio of the project is remains around 1. The project gives an internal rate of return of 15.17% even with the increase in project cost by 40%. In case of the full project (GCF+Non-GCF) the expected financial internal rate of return is exceeding 12% and BC ratio >1 under all scenarios and the project is viable. It is also viable at 20% cost over-run.

F.2. Technical Evaluation

Please provide an assessment from the technical perspective. If a particular technological solution has been chosen, describe why it is the most appropriate for this project/programme.

Technical evaluation

135. The adaptation measures has been planned based on the assessment of the climate issues to which the maximum section of the most economically challenged and vulnerable groups population of the state are exposed and susceptible. The interventions are planned with the focus on sectors critical for enhancing and protecting livelihoods and reducing the impacts of weather/climate related variability. Since the agriculture sector is the main stay of state's economy and is most impacted by the climate variability adaption intervention are selected to address the existing challenge. The technological approaches to specifically tailored for the areas are:

1. Construction of the ground water recharge structure in renovated and modernized community tank towards augmentation of ground water resource
2. Undertake pilot implementation of solar pump project to facilitate irrigation

Ground Water Recharge Structure:

136. The project is designed to tap additional water accumulated in the community pond/tank during the monsoon for the purpose of ground water recharging without impacting the live hood and dependency of the people on the water of these community tank. The selected district is subjected to erratic rainfall including variation in both the intensity and dispersion during the recent past. The intense rainfall has resulted in frequent flooding across the rural areas and also lowered the quantum of ground water recharge. The variation in the rainfall pattern, drought situation coupled with anthropogenic stress of unregulated ground water withdrawal is resulting into ground water depletion across the state. The lower ground water availability has in turn impacted the agricultural yield largely and enhanced the drudgery of rural woman required to fetch water during the dry season.

137. To enhance the resilience of the community against the weather induced vulnerability and ensure long term sustainability DoWR, Govt. of Odisha has designed innovative means of augmenting the ground water resources. This innovation is considered as a technological improvement and enhancement of the current scope of ground water recharge and practice in the state with much lower investment. The concrete adaptation measures are designed based on the successful experience of the pilot recharge structure constructed. The concrete adaptation measures include construction of a ground water recharge structure to tap additional water available in the tank during monsoon. The structures are planned to be constructed in an existing partially / completely derelict community/MI tank through retrofit and renovation for higher water accumulation /storage. The recharge structure is so designed that it will only be tapping water during the scenario of additional water accumulation in the tank over and above 1.5 meter above the tank bed level. The tapping point of the ground water recharges structure (of 1.5 m diameter) is designed to be maintained at a height of 1.5 m above the tank bed¹⁹. This will ensure that during the pre- monsoon/summer, when level inside the tank falls below 1.5 m there won't be any transfer of the tank water to the ground for recharge ensuring water security for the populace depending upon the tank. The project will result in optimal utilization of rain water and will also support the communities in the following aspects outlined below. The assessments of the benefit are based on the documentation from the pilot.

- Conservation and harvesting of surplus monsoon runoff in reservoir, which otherwise was going un-utilized by being drained to watershed/ basin/river or result in inundation/ flooding.
- The agricultural yield is benefitted due to the marked rise in the ground water level in the tank catchment area. It has also resulted in additional cash crop cultivation. The ground water augmentation resulting from the recharge structure constructed in the renovated tank is estimated on the basis of total water recharge and the ground water level rise. It is estimated that a single unit will result in replenishment/recharge of 13 hectare meter of ground water in a year (considering normal average annual rainfall of around 1500 mm). The aforesaid quantum of recharge will result in ground water table rise of 4.17 meter within a 500 meter radius of the tank and will positively impact an area of 25 hectare area. The proposed activity undertaken across 10000 community tank is expected to result in recharge of 131040 hectare meter of ground water in a year and benefit a total area of 250000 hectare.
- Improved soil moisture in the tank catchment area benefitting agricultural productivity in non-irrigated zone.

¹⁹ The detailed design of the project is presented in the feasibility report

- Subsurface storage space in the pond has increased and inundation of water during monsoon is avoided. Prior to the project scenario the community tanks are mostly left unmanaged without necessary renovation and maintenance resulting silting and lowering of the reservoir volume. Moreover silting results in lowering of permeability and lower penetration of water from the tank for the purpose of recharge. So in case of intense rain the tank gets quickly filled and also results in frequent inundation of the surrounding areas. The additional monsoon run-off is left unutilized.
- Results in energy saving due to reduction in suction and delivery head as a result of rise in water levels
- Besides the direct measurable impacts, the artificial recharge schemes has also generated indirect benefit in terms of improvement in fauna and flora, reduced drudgery of woman required to fetch water from the ground water sources, etc. Besides, the social and economic status of farmers of benefitted zone will also substantially improve due to increase in crop production.
- There is no major concern over water pollution due to these structures. Firstly, Odisha receives more than >1000 mm rainfall even though it is erratic. This is a reasonable quantity of rain for subsurface dilution of pollutants. The design also has sieves and concrete homey-comb structure that can reduce heavy pollution load if any. The social norms for keeping other pollutants off the tank will be maintained by the pani panchayat. Complete removal of the pollution is not possible through this structure.
- The status of the new tanks will be known when the baseline study for the new project is initiated. As of now those tanks are in either partially or completely derelict condition with poor water quality.

138. The renovation and re-modernization of the tank will be supported from the existing plan/non-plan budget of the department (DoWrR, Gol) and the central scheme convergence.

Solar Pump

139. The state is predominantly an agrarian economy with around 39.68% of geographical area (61.80 ha) under agricultural use. Out of the cultivated area of 61.80 lakh ha about 34% is under irrigated conditions. As per the study by FAO, it is revealed that the highest yields that can be obtained from irrigation are more than double the highest yields that can be obtained from rain fed agriculture. Even low-input irrigation is more productive than high-input rain-fed agriculture. Such are the advantages of being able to control, quite precisely, water uptake by plant roots. Even with the potential of 2.88 million²⁰ SPV pumps set the penetration as per MNRE as on January 2016 is nil²¹. With the objective to promote the solar pump in a state the project has proposed for a pilot of 1000 solar irrigation pumps of 3 hp capacity (each) across the 15 project districts. The project will render the following benefit
1. The project will allocate fund to promote and develop application of clean and renewable energy in agricultural activity
 2. Additional area of 1800 ha under to be covered under irrigation
140. The major barrier to the commercial penetration of the solar pump is the higher initial investment and lack of access to finance which is beyond the capability of the marginal and small farmer to invest or arrange. The pilot is therefore planned to demonstrate the benefit and innovate an incubator approach to develop a tailored support model for commercialization of the technology and expansion of the outreach through the learning of the pilot. This pilot will improve the probability of success of the future interventions. The net of financial viability gap for the solar irrigation pump project is planned from GCF.
141. The proof of concept and the benefit that project is likely to render, is identified through research and assessment of the benefit obtained through the pilot. The appropriateness of the interventions are evaluated and found to be justified based on the following ground:
- Its ability to address the climate related stress from variability in the intensity of the rainfall pattern and its impact towards destabilizing the normal course of life because of water inundation and resulting social and health related impact.

²⁰ [CDM potential of SPV pumps in India Pallav Purohit, Axel Michaelowa, HWWI Research Programme International Climate Policy](#)

²¹ <http://mnre.gov.in/file-manager/UserFiles/progress-report-of-solar-pumps-for-irrigation-implemented.pdf>

- Its ability to response to the climate related stress in the agriculture sector. The lowering of the ground water level also attributed to lower recharge largely owing to the variability and intensity of the rainfall. This is severely impacting the agricultural yield because of lower soil moisture availability, lower availability of water for irrigation and enhancement of pumping cost.
- Its ability to replenish ground water resources and restore ecological balance
- Its ability to create a market and promote non-fossilized means of irrigation

142. The effectiveness so the interventions is mapped based on the following aspect

- Ability towards convergence of various schemes and investment proposition for a common goal of enhancing climate resilience.
- The benefit the project is likely to render as against the cost. The opportunity cost of the project is quite high.
- The project is planned to be implemented through community level participation and use of indigenous resources
- The project apart from protecting livelihood will create livelihood opportunity such as operator of solar pump, labor force for operation and maintenance of the ground water recharge structure and tanks.
- Ownership of the community as the community will be directly and immediately benefited from the projects

F.3. Environmental, Social Assessment, including Gender Considerations

143. A Social and Environment Screening Procedure and a detailed ESMP plan have been developed for the project (See Annexure 4) to assess and address environmental and social risks arising from the project.

Environment

144. The project will involve earth works that will be undertaken during the pre monsoon / dry season to reduce erosion and air quality issues. Sediment that is removed from the tanks will be placed back on to agricultural land by the farmers, thereby provided a significant environmental and social benefit by returning previously lost sediment that is normally of high quality back into the agricultural sector. Resilient crop management practices and water management will ensure no further erosion from agriculture lands.
145. The construction of the recharge shafts would bases on the standard design parameters and without creating any environmental damages due to constructional material during construction activity. These activities would mainly be taken-up during dry season / pre monsoon season particularly during the low or nil water level situations.
146. The farmers would be sensitized on the integrated pest management (IPM) well as organic and low input agricultural practices would be promoted during the project. It may noted that the overall pesticide consumption in the project areas and the state of Odisha is much lower than that of the national average. The project would ensure regular ground water sampling in order to obviate the risk related to any ground water contamination. The water sampling and monitoring would continue even after project completion through State Government concerned departments.
147. In order to ensure sustainable water use through solar pumping system, water budgeting and water sharing master plan is proposed as one of the project activities. Further, the solar pumping systems would be integrated with promotion of micro-irrigation so as to improve water use efficiency.

Social :

148. The project would enhance the livelihood and ensure sustainable income to vulnerable communities. The ground water recharge structures would ensure water security in the changes climatic situations.
149. Reaching out to and including the most marginalized sections of the populations belonging to diverse socio-economic backgrounds such as the ST, SC, landless, women, small & marginal farmers, etc. residing under tank systems with equitable benefit to them would be a big challenge for the project and would be resolved through

extensive consultation. Jal sathis identified from amongst lead farmer, Pani Panchayats (PPs) would play a catalytic role.

150. The involvement of pani panchayat in operation and maintenance of the structures would ensure stakeholders engagement and ensure decentralized governance mechanisms in implementation of the project. Further, capacity Building: Capacity of stakeholders to manage and execute programs at different level has been provided for.
151. The project activities are taken in existing silted ponds and does not contemplate any displacement of livelihoods, involuntary resettlement and loss of cultural heritages.

Gender

152. The gender focus is a key element to ensure inclusion and closely linked to the core indicator: The project was designed in consultation with women's organizations and CBOs in the field and through a structured consultation Project recognizes that participation of women will have a large bearing on the successful outcomes. Against this, mechanisms to ensure their participation have been developed in most components (livelihood planning), solar energy management and also some of the off-farm enterprises apart from bringing in linkage to anganwadi set up of the Women and Child Development Department for health and nutritional security. Separate gender action plan is prepared and given in the Annexure 6

F.4. Financial Management and Procurement

153. The executing entity Department of Water Resources (DoWR), Govt. of Odisha, has been using the procurement policy of the World Bank for OCTMP-I. Procurement of all goods, works and services are proposed to be carried out in accordance with the World Bank's Procurement in Investment Project Financing, Goods, works, non-consulting and Consulting services, July 2016 for the funding activities supported by World Bank. The details of procurement including the first 18 month of procurement plan will be finalized during the appraisal mission of the World Bank. The procurement procedures pertaining to procedures and methods to be followed for procurement is part of the OCTMP Procurement Manual and are to be used.
154. The state will follow its own works code for activities supported by Govt. of Odisha under the project (structural dimensions of the tank improvement are part of the OPW code). All agencies, specifically the PPs will follow community based purchase procedures. Both these procedures are permitted as per the new guideline of World Bank. Therefore there is no contradiction in any procurement under any activities as most of the conditions are compatible and in conformity with the World Bank procurement guideline. The OCTMP phase I project supported by World Bank, in the recent appraisal found no anomaly. Once this project is approved it will be in sync with the phase II of the OCTMP (new project) and the procurement plan and manual will be prepared during the appraisal stage and get validated by all stakeholders. Therefore, no delay is foreseen. The detailed procurement plan is presented in the Annexure 7.
155. The methods for National Competitive Bidding for the procurement shall be based on the following principles:
 - Only the model bidding documents for NCB agreed with the GOI Task Force [and as amended from time to time], shall be used for bidding;
 - Invitations to bid shall be advertised in at least one widely circulated national daily newspaper, at least 30days prior to the deadline for the submission of bids;
 - Outside a pre-determined margin or "bracket" of prices shall not be used in the project;
 - Rate contracts entered into by Directorate General of Supplies & Disposals, will not be acceptable as a substitute for NCB procedures. Such contracts will be acceptable however for any procurement under
 - Shopping procedures;
 - Two or three envelop system will not be used.
156. For the consulting services (a) quality and cost based selection procedure, (b) Single-Source Selection (SSS) and (c) selection of individual consultant's method will be used.

157. The project will follow the process used in the OCTMP-phase 1 and good practices established by the state in several multilateral projects. This is already part of a financial manual. The key objectives are as follows: The primary objective of sound financial management is (a) to ensure smooth flow of funds to the different levels of executing agencies so that there are no delays in the implementation of activities, (b) all financial transactions are as per rules and procedures and in line with the norms of the project, (c) all such transactions are duly accounted for in the prescribed formats and (d) all payments due to be made to any service providers are done in efficient, speedy and transparent manner. Since the implementation arrangement for the project is at different levels, it is important that there is a coherence and formality in book keeping, accounting policies, procedures, transactions, audit, procurement, , financial report and project monitoring etc. aligned with the norms of the World Bank as well the financial rules of the Government. An important objective of this document and the Financial Manual is to guide all the project implementing authorities and participants in general and the finance persons in particular, in the financial operational issues in the project. The project will aim at producing real time, relevant and reliable financial information that would allow the project executives to plan and implement the project, monitor compliance with agreed procedures, and guide the project progress towards the set objectives.
158. AE-NABARD will also guide in fiduciary risk management and establish a seamless fund flow both advance and utilization basis. NABARD has been working with Department of Water Resources on other projects and is fully aware about the treasury system and financial control systems.

G.1. Risk Assessment Summary

159. The technical risks with regard to project implementation is proposed to be mitigated through capacity building e.g. use of low input practices, integrated pest management, use of solar pumping systems, installation of recharge structure etc. Components with regard to training, awareness and capacity building has been incorporated in the project designed and interventions planned.
160. Financial management risks and operational risks are low as the standard operating procedures are in place that include audit system, quality manual, and operational manual of Pani Panchayats (PPs). In addition the project would get support of the external agency in related manuals synthesized from pump vendors, warranty provisions, etc. AE-NABARD has handled several projects in water and agriculture sector, they will provide fund management and compliance related support. AE is already working with Department of Water Resources (DoWR), Govt. of Odisha under its infrastructure funding i.e. Rural Infrastructure Development Fund (RIDF). NABARD would guide in development of necessary transparent and effective financial management systems for the project. The risk management details are presented under section G2.
161. The risks associated with groundwater recharge as well environmental and social risks have been identified necessary framework for mitigation of the same has been presented in the Environmental & Social Management Plan (ESMP). The major issues in terms of sustainable crop and water management practices are proposed to be tackled through specific interventions proposed under the project.
162. Project during design has effectively engaged stakeholder's consultation and their feedback has been incorporated in the proposal. During the implementation decision on beneficiary selection, ensuring of the equity of benefits is proposed to be through community consultation involving community based organizations such as pani panchayats and village panchayats. The project would have a grievance redressal mechanism and the mechanism will also include direct feedback to the AE.

G.2. Risk Factors and Mitigation Measures

Selected Risk Factor 1

Description	Risk category	Level of impact	Probability of risk occurring
Fiduciary: Projects sites are generally remote. The risks relate to two aspects: (a) Management Performance of Pani Panchayats (PPs) and GWRS (b) Performance of pumping system and livelihood enhancement	Technical and operational	Medium (5.1-20% of project value)	Low
Mitigation Measure(s)			
The state has early experience of working and with decentralized implementation framework and the overall risk is to be moderate. For (a) PPs would receive training and capacity building on book-keeping, project and financial management and regular visits from the PPs institutional support team. For (b) the project will provide technical assistance and supervise the work of the contractors under the supervision of the Directorate of Ground Water Survey & Investigation (GWSI). In addition the project will hire accredited consultants with accreditation in energy audit as well as support in agriculture and water who will assist PMU in project			

management. AE –NABARD will provide fund management and audit support. Core tank improvement project is covered under the World Bank supervision. This procurement will be independent of that by the DoWR.

Selected Risk Factor 2

Description	Risk category	Level of impact	Probability of risk occurring
Environment and Social: a) Soil erosion in catchment areas due to increased runoff b) Support from Local Community c) Pollutants in Catchment area mix with ground water d) Overdraft of ground water e) Equity in selection of beneficiary and water use	Social and environmental	Low (<5% of project value)	Low

Mitigation Measure(s)

- a) The activities related to desilting would be taken-up in such a way to reduce likely erosion and runoff. Promotion of soil and water conservation works in catchment areas would be undertaken
- b) Selection of tanks would be done through community consultation and their priorities for taking up these activities
- c) The project would promote integrated pest management and nutrient management strategy in the catchment areas of the tanks.
- d) One of the major intervention under the proposed project is development of crop water budgeting as well as water sharing master plan preparation (component 2 sub-component – 2.3 & 2.3). These planning processes would include the sustainable development & management of ground water resources.
- e) Beneficiaries for Project intervention i.e. solar pumps would be selected based on the vulnerability, resource efficiency and technical norms

Selected Risk Factor 3

Description	Risk Category	Level of Impact	Probability of risk occurring
Technical: (a) Practice of GWRS installation is not a common practice and villagers/farmers may be apprehensive initially	Technical and operational	Low (<5% of project value)	Low
(b) Solar panel maintenance and pumping	Technical and operational	Low (<5% of project value)	Low

Mitigation Measures

- (a) There will be orientation of para workers through live demonstration and they will act as facilitators for others.
- (b) Farmers are familiar with pumping system, the vendor certification programme will include the input to barefoot workers, women in particular to be trained in panel maintenance, recycling of batteries etc. by the supplier.

Selected Risk Factor 4

Description	Risk category	Level of impact	Probability of risk occurring
Siltation, sedimentation and waterlogging may be a challenge based on excess rainfall, terrain and gradient	Technical and operational	Medium (5.1-20% of project value)	Low

in some of the tanks and may delay the installation of recharge shaft			
Mitigation Measure(s)			
The tank identification and feasibility study that has inbuilt hydrological investigation would take care of that. The department has a plan to train 500 engineers for the purpose for ensuring timely work completion and quality of the installation.			
Selected Risk Factor 5			
Description	Risk category	Level of impact	Probability of risk occurring
Timely recording of transactions and book keeping especially for the women entrepreneurs and farmers	Financial	Medium (5.1-20% of project value)	Medium
Mitigation Measure(s)			
<i>A massive financial literary input will be part of the capacity building strategy. The business planning exercise of the Farmers Producers Organization (FPOs) and a simple book keeping training will address this issue.</i>			
Selected Risk Factor 6			
Description	Risk category	Level of impact	Probability of risk occurring
Functioning of the solar pumps, its performance and maintenance	Technical and operational	High (>20% of project value)	Medium
Mitigation Measure(s)			
<i>As part of the implementation strategy a vendor certification programme has been planned to train the village level women and jal sathis who will ensure proper maintenance as per the standard operating procedure developed in the project. Still there is a possibility of disruption due to climatic conditions of the eastern region having cloudy weather to reduce performance of the pumps and theft of panels and breakage due to children and cattle. This will be addressed gradually and building a strong social norm. However, the cloudy weather of the reason affecting performance and its impact cannot be discounted.</i>			
Other Potential Risks in the Horizon			
<i>Please describe other potential issues which will be monitored as “emerging risks” during the life of the projects (i.e., issues that have not yet raised to the level of “risk factor” but which will need monitoring). This could include issues related to external stakeholders such as project beneficiaries or the pool of potential contractors.</i>			
Not applicable			

* Please expand this sub-section when needed to address all potential material and relevant risks.

H.1. Logic Framework.

Please specify the logic framework in accordance with the GCF's [Performance Measurement Framework](#) under the [Results Management Framework](#).

H.1.1. Paradigm Shift Objectives and Impacts at the Fund level²²

Paradigm shift objectives

Increased climate-resilient sustainable developmentIncreased climate-resilient sustainable development	Overall, the project will contribute to the Fund level impacts of Increased resilience and enhanced livelihoods of the most vulnerable people, communities, and regions and Increased resilience of health and wellbeing, and food and water security. Combined with government co-financing, GCF resources will support an integrated approach to strengthening the resilience of smallholder farmers in water stressed districts contributing to climate smart water management integrated with sustainable crop planning. The interventions will directly benefit 5.19 million people in the State of Odisha covering 12% of the population of the state. The project would also promote sustainable strategy towards energy security involving low emission crop water management.					
	The specific paradigm shift objectives of the project are:					
	• Augmentation of ground water recharge to improve water table and water quality conditions in rural areas (Gram Panchayat) of the state through adoption of recharge systems in existing village ponds / tanks. • Sustainability of ground water based (domestic / irrigation) Schemes at GP level. Revival of defunct community tank used as drinking water sources for reducing vulnerability. • Use of solar pumps for irrigation as part of low emission climate resilient crop planning strategy. • Integration of climate resilience planning in the grass-root level institutions involving community based organizations. • Create a knowledge base for enabling policy and regulatory framework for market transformation					
	This is a unique project that links NAPCC's Mission on Sustainable Agriculture, Water Mission (integrated water resource management component) along with National Solar Mission (solar energy deemed generation: appliance component). It also links with State Action Plan on Climate Change (SAPCC) identified Missions: Water Mission, Agriculture Mission and Energy Mission. The project is also aligned with Pradhan Mantri Krishi Sichai Yojana. The Integration of solar energy is first of its kind in the state and would help in wider replication, opening of the private market for solar pumps and large scale adoption of clean and non-pollution sources of energy.					
Expected Result	Indicator	Means of Verification (Move)	Baseline	Target		Assumptions
				Mid-term (if applicable)	Final	
Fund-level impacts						
	*A2 Total number of direct and indirect beneficiaries; Number of beneficiaries relative to total population	Assessment reports would include	At least one third of this population are food		5.19 million (12% of total populati	Assumed normal rainfall for at least 2 consecutive years.

²² Information on the Fund's expected results and indicators can be found in its Performance Measurement Frameworks available at the following link (Please note that some indicators are under refinement): http://www.gcfund.org/fileadmin/00_customer/documents/Operations/5.3_Initial_PMF.pdf

		Project reports: annual reports; mid-term and final evaluation; project MIS Database	insecure and are at risk due hydrologic al and agricultura l drought		on of Odisha vulnera ble people would be benefitt ed directly {2.59 million male (49.90 %) and 2.60 million female (50.10 %)}. The indirect benefici aries would be about 10.78 million.	smooth flow of convergent funds
<i>A2.0 Increased resilience of health and well-being, and food and water security</i>	<i>A2.2 Number of food- secure households (in areas/periods at risk of climate change impacts)</i>	Gender sensitive Household Survey	At least one third of this population are food insecure and are at risk due hydrologic al and agricultura l drought	50% of the targeted households to be food secure and water secure	All the targeted househ old to be food secure and water secure from agricult ure and drinking water point of view (1.03 million househ olds as direct benefici ary househ olds), 50% women benefici ary	Assumed normal rainfall for at least 2 consecutive years. smooth flow of convergent funds
<i>M1.0 Reduced emissions through increased low-emission</i>	<i>M1.1 Tonnes of carbondi- oxide equivalent (tCO₂ eq) reduced or avoided as a result of Fund Funded project</i>	Baseline audit and concurrent audit report	0 No solar pump installed	-	2614 tonnes/ year. 1000 solar	Channel partner linkage and timely procurement and smooth flow of convergent funds

energy access and power generation			for irrigation.		pumps installed	
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H.1.2. Outcomes, Outputs, Activities and Inputs at Project/Programme level						
Expected Result	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-term (if applicable)	Final	
Project/programme outcomes	Outcomes that contribute to Fund-level impacts					
Cross-Cutting	ACrC1 Number of technologies and innovative technologies transferred or licensed to promote climate resilience	Gender-sensitive Household surveys. Recharge well and aquifer yield monitoring Adoption of climate resilient crops from concurrent report Water quality readings.	No ground water recharge shaft is used in tanks. More than 75% of the tanks are derelict and insufficient to handle water stress.	Ground water recharge structure in 5000 tanks.	Ground water Recharge structures in 10000 tanks covered along with the remaining households.	Timely procurement, execution of tanks and closure of the IBRD loan for the OCTMP Phase II. Smooth flow of convergent funds
	MCrC2 Number of technologies and innovative solutions (including gender-friendly and solutions) transferred or licensed to support low-emission development	Baseline audit and concurrent audit report	No solar pumps for irrigation installed	At least 300 pumps are installed	1000 solar pumps are installed	Channel partner linkage and timely procurement Smooth flow of convergent funds
A5.0 Strengthened institutional and regulatory systems for climate-responsive planning and development	A5.1 Number of gender friendly policies, institutions, coordination mechanisms and regulatory frameworks that improve incentives for climate resilience and their effective implementation.	1. Pani Panchayat Process Monitoring Report 2. Annual Reports of State level Steering Committee 3. Water policy briefs.	Climate Responsive planning process currently not integrated in the community level institutions	-	Community level institutions (including 50 % women)-pani panchayats integrate the climate resilient/ responsive planning for 10,000 tanks. Benefits to the community regarding resilient planning and management captured and policy framework suggested for integration of	Political will and community support

					project learning in water policy framework	
Project/programme Components (linked to outputs)	Components that contribute to outcomes					
1. Ground Water Recharge System installed in 10000 tanks as a concrete adaptation measure to ensure ground water conservation to reduce vulnerability in 15 water stressed districts of the state	No. of ground water recharge structures installed	Final assessment report Procurement Document Progress Monitoring report	No tank has recharge shaft now	5000 tanks will be fitted with recharge shaft.	10000 tanks will be fitted with recharge shaft	Timely installation of GWRS.
2. Increase in resilience of health and wellbeing vulnerable people through food security and water security.	No. of vulnerable people With increased climate resilience, Preparation of crop water budgeting plan, water sharing plan, livelihood improvement plan	HH survey Document of department of Agriculture & Cooperation NFSA implementation progress report Surveillance data	More than 75% of the identified vulnerable people are food insecure 70% of the surveyed area report water borne disease	At least 50% (2.6 million) of the vulnerable people with increased climate resilience with additional days of food Out of which 1.3 mn female and 1.3 million male	5.19 vulnerable people get with increased climate resilience ensuring food security, Crop water budgeting plan, water sharing plan and livelihood plan prepared	Proper tank improvement plan prepared and PPs and community self manage
3. Solar pumps installed in pilot locations for demonstration and training to village level para professionals for operation and maintenance	No. of pumps installed as per the standards Training to village level para professionals	Vendor survey Progress report	No installation as of now No specific training related to operation and maintenan ce as of now	At least 500 pumps are installed	1000 pumps are installed as per standards 2000 village level para professionals are trained and certified.	Successful procurement, agreement and installation Training and certification
4. Capacity building plans for livelihood support systems to community to build resilience	No. of jalsathis and village para professionals of PPs trained No. of farmers trained No. of landless households use alternate livelihood	Training modules Training report HH survey Progress Report	Only about 5 % of the members of PPs/PRIs have got any training on water managem		300000 farmers and 150000 landless population to be covered under training on poultry and fishery. of which 20000 village para-	Successful timely delivery of the capacity building input Proper identification and management of training of trainers

			ent/livelihood		professionals and 500 engineers trained. (50% are females)	
5. Quality Monitoring system for ground water governance established	Preparation of quality management database and MIS, modelling tool, baseline and independent assessment , process monitoring	Database Tank Quality Management Module Progress Monitoring Report	Primary mapping has taken place, a proper database is missing	Coverage of 1 st phase tanks under OCTMP II	The quality Management system covers all 10000 tanks including quality management database and MIS, modelling tool , baseline and independent assessment audit report	Timely data capture connectivity, validation of data captured by jal sathis
6. Knowledge management (institutional and regulatory) input provided for water and clean energy market development	Preparation of policy brief for ground water management, SOP Science to policy documents developed to create an enabling environment for market transformation	Policy briefs Notifications Models and Toolkits Process Monitoring Report	No knowledge capture system as of now	Integration with PP and PRI system	Policy briefs Notifications Models and Toolkits Process Monitoring Report prepared	Timely and systematic capture of lessons; proactive facilitation for institutional development and policy development
Activities	Description		Inputs		Description	
Component 1:						
Activity 1.1.	Baseline study for 10,000 tanks are conducted and database developed.		Based on the indicator sets (social, environmental, hydrological, gender sensitive), schedules and database format to be developed			
Activity 1.2.	Tank improvement plan and estimate for the recharge shaft installation developed		TIMP is a pre-Feasibility participatory planning document. The tender document to be prepared based on TIMP but as per the cost norms for award (specified in 2.1) feasibility report. Jalsathi identification			
Activity 1.3	Standard Operating procedure for installation and maintenance developed		Based on the best practices developed under OCTMPO Phase I SOP approval.			
Activity 1.4	Ground water recharge system installed in 10000 tanks		Construction contractors are mobilized through standard procurement process			

Component 2:			
Activity 2.1	Tank water level and other assessments completed for all 10000 tanks	Tank ayacut survey and baseline water level assessment done, modelled for normal, deficient and excess precipitation. Assessment report, work contract and execution.	
Activity 2.2	Crop water budgeting based on agro-climatic zone prepared	Based on the agro-climatic condition the most efficient crop water budget prepared, district irrigation plan, contingency plan modified in modelled scenario.	
Activity 2.3	Water sharing master plan developed	PPs work out the water sharing plan in a consultative process based on the additional moisture expectation, cost recovery discussed	
Activity 2.4	Livelihood improvement plan prepared	Livelihood improvement plan prepared based on livelihood analysis, food security of all stakeholders including the landless	
Activity 2.5	Water quality sample drawn from random wells	The water quality test is to be conducted as per the standards specified by OSPCB	Ground water division will draw water sample through jalsathis Testing is done at the standard labs
Component 3:			
Activity 3.1	Identification criteria for 1000 solar pump installation developed	Identification criteria developed based on tank location, solar insolation and easy panel access for maintenance as well as security	
Activity 3.2	Procurement plan and standard supplier contract for 1000 solar pumps developed	The standard documents are revisited to include skill development, certification	Identification of women to be skilled
Activity 3.3 1	1000 solar pump installed and baseline audit completed	Solar pump installation involving the PPs and also the identified para professionals	The pumps are installed as per the phasing
Activity 3.4	2000 village level para-professionals are certified in operation and maintenance of pumps	Identified para professionals (mostly women) to be trained and certified on maintenance of panels, batteries and jal sathis on pump operation	
Activity 3.5	Energy saving report generated	Post installation audit conducted	
Component 4:			
Activity 4.1	Training need assessment for sample households in tank command and PPs completed	Training need assessment of target households in tank	Training need assessment to have clear focus on target groups (women, BPL, landless)

		command and also the PPs	
Activity 4.2	Training modules prepared and partners identified for both training and demonstration	Training modules on climate resilient practices, water sharing, PP strengthening developed	Consultation with community and development of raining module as per the need. Interface with WALMI and its partners for training delivery and line department for demo
Activity 4.3	Training of 500 engineer 20,000 jal sathis completed and certified	Departmental training for tank improvement, recharge shaft integration and monitoring and identification and training of 20,000 jal sathis.	This is a critical input and a structured training programme will be developed for engineers and paraprofessionals
Activity 4.4	No of training and demonstration organized in convergence with relevant departmental programmes of the government	Training and demonstrations to be conducted in convergence with line department based on the project need	
Activity 4.5	No of landless and women members covered under capacity building for off-farm initiatives	Training linkage on non-farm/off farm activities and fishery related activities to be imparted in convergence with fishery & ARD, ORMAS, SIRD and private sector	As far possible linkages to be developed for landless women on skill development, SHG and bank linkage
Activity 4.6	No of FPOs are linked	Collectivization of produce strengthening of FPOs to access and equity and grant from SFAC and other intermediary institutions	Linkages to market and strengthening of the FPOs
Component 5:			
Activity 5.1	A geospatial tank quality management database and MIS prepared	A satellite based monitoring system to be integrated with the tank database developed by the project	A web based MIS and tank database to see the change in water and crop scenario (both satellite based and ground trothed)
Activity 5.2	Water Quality and dynamic ground water modelling tool developed	Department will do a scientific modeling of ground water recharge and usage, water quality etc. This will enrich the climate information	A fully developed model and toolkit to be prepared
Activity 5.3	Baseline and independent assessment report based on project objective and indicators prepared	Project monitoring report to be prepared by service provider for PMU on a concurrent basis. It will also interface with third party assessor engaged by NIE.	
Activity 5.4	Process monitoring report that estimates adaptation and mitigation benefit prepared	Embedded experts and jal sathis to undertake process monitoring of critical processes enshrined in the project that leads to adaptation and mitigation benefit	
Component 6:			
Activity 6.1	Preparation of policy briefs for Odisha ground water management and development	Inputs to be provided to task force on state water policy and other relevant polices related to this	Consultation and research input to feed to task force and steering committee

	regulation, state water policy and relevant facilitation	project for market transformation	
Activity 6.2	Process documentation and preparation standard operating procedure for development of solar pumping value chain	Standard operating procedure to be developed to build a vibrant solar power ecosystem in the state and trained women in villages providing last mile link.	The energy department and regulator to develop an ambitious plan for solar energy integration with agriculture for climate resilience with mitigation co-benefit.
Activity 6.3	Science to policy knowledge product framework developed	Science to policy frame work and knowledge products and publications developed	Research based peer learning materials developed and published that aids in creating an enabling framework
Activity 6.4	Process document for convergence with other departments are developed	Convergence modalities agreed with other departments and vetted at the steering committee	The steering committee vets the convergence mechanism and fund flow
Activity 6.5	Quarterly project newsletter published	Newsletter publication with stories from field and important milestone	Publication of digital and physical newsletter, social media integration
Activity 6.6	Ten peer learning workshops are conducted during the lifecycle of the project: Workshops are organized categorized into inception, peer learning.		Workshop managed and learnings shared

H.2. Arrangements for Monitoring, Reporting and Evaluation

Besides the arrangements (e.g. semi-annual performance reports) laid out in AMA, please provide project/programme specific institutional setting and implementation arrangements for monitoring and reporting and evaluation. Please indicate how the interim/mid-term and final evaluations will be organized, including the timing.

163. Primary responsibility of monitoring rests with EE (Department of Water Resources) and the PMU established under the project. The PMU will be supported by technical support agency / knowledge partner experienced in climate change adaptation, resilience building, having substantial experience in agriculture and water issues in the area. PMU and knowledge partner generate quarterly progress report compiled from monthly MIS and assist in annual work plan budget formulation and approval, support the independent audit and assessment. The standard formats will be as in practice in OCTMP I (PDO level monitoring established by World bank) and this project will be guided by indicators and outcomes as per performance management framework for tracking based on the input from AE. The district level project implementation would be monitored by district steering committee. The last mile monitoring will be done by the jal sathis (ensuring participatory monitoring) who will upload the data through smartphones based on the parameters.
164. The second level of assessment will be done by Odisha Remote Sensing Application Centre (ORSAC) and Ground Water Survey & Investigation (GWS&I) which will be both satellite based aggregation and mobile app based data collection.
- Directorate of Ground Water Survey and Investigation (GWS&I) will conduct geo-physical tests through out-sourcing, in the vicinity of tank / pond, to ascertain the lithological parameters which will help in assessing the performance of the recharge system.

- GWS&I will monitor ground water table and water quality twice a year (May & October) near all tank locations where the Ground Water Recharge Structures (GWRS) have been constructed through out-sourcing. This will help in assessing impact of GWRS in the locality.
- The captured monitoring data is to be entered into a dedicated software / website by GWS&I for scientific use and public information.
- The impact assessment of the Scheme will be done for three years after its closure, by an agency of repute, selected by DoWR.
- Spatial tools based Third Party Monitoring of Water bodies, Recharge Pits and water management

165. Further, recharge to ground water depends on precipitation, surface water bodies like reservoirs, tank etc., favorable lithological landform and structural set up etc. Satellite imagery facilitates better appreciations of recharge condition by studying all the said parameters in an integrated manner. In this background, it is proposed to set up an outcome based space based monitoring protocol to cater to the following under the aegis of ORSAC, the nodal agency of State for implementation of RS & GIS based activities:

- i. Monitoring of status of water bodies- Using multi temporal satellite images the status of water spread, turbidity and spread of aquatic vegetation would be monitored temporarily.
- ii. Irrigated field – Coverage of irrigated field, water inundation, water logging etc would be monitored using High resolution satellite data.
- iii. Crop Area/Vegetation Monitoring: Remote sensing data would be used for assessment of crop acreage, condition and vigor using Normalized Difference Vegetation Index (NDVI).

On pilot basis on selected areas moisture studies using Microwave Radar data/SAR data and integrated land crop inventory is proposed to be taken up for outcome based monitoring after commission of construction of recharge structures.

166. AE-NABARD will provide concurrent fund monitoring and operational support in the entire project implementation. The same would in the form of financial management, monitoring and evaluation, reporting to GCF as well as to NDA as per the requirements and providing of technical support in terms adherence to technical, environment and social standards, procurement processes, during implementation.

167. The primary responsibility for day-to-day project monitoring and implementation rests with the Project Executing Entity i.e. Department of Water Resources and PMU to be set-up under the project. The PMU (Project Director) will develop annual work plans to ensure the efficient implementation of the project and inform any delays or difficulties during implementation, including the implementation of the Monitoring & Evaluation (M&E) plan, so that the appropriate support and corrective measures can be adopted. The Project Director will also ensure that all project staff maintain a high level of transparency, responsibility and accountability in monitoring and reporting project results.

168. A project inception workshop will be held after necessary project documents and agreements are signed. These inception workshops would be held at State level as well as District level. The inception workshops would aim to: a) re-orient project stakeholders to the project strategy and discuss any changes in the overall context that influence project implementation; b) discuss the roles and responsibilities of the project team, including reporting and communication lines and conflict resolution mechanisms; c) review the results framework, re-assess baselines as needed, and discuss reporting, monitoring and evaluation roles and responsibilities and finalize the M&E plan; d) review financial reporting procedures and mandatory requirements, and agree on the arrangements for the annual audit; e) plan and schedule Project Review meetings and finalize the first year annual work plan. The Project Director would compile and finalize State and District level inception workshop reports in two months after the inception workshop and submit the same to AE-NABARD for approval.

169. A project implementation report (PIR) will be prepared for each year (annual report). The EE, PMU (Project Manager), the NABARD Regional Office and NABARD Head Office will provide objective inputs to the annual implementation report. The EE / PMU (Project Director) will ensure that the indicators included in the project results framework are monitored annually well in advance of the PIR submission deadline and will objectively report progress in the PIR. The annual PIR will be shared with the Project Steering Committee and other stakeholders. The NABARD

Head Office will coordinate the input of the NDA Focal Point and other stakeholders to the PIR. The final project PIR, along with the terminal evaluation report and corresponding response, will serve as the final project report. Semi-annual reporting on quarterly basis as per NABARD's requirements will be undertaken by PMU – Project Director.

170. Monitoring and Evaluation by AE would be based on the offside and onsite monitoring of the project. The offsite monitoring would be based on the quarterly progress reporting by EE and other impact reports submitted by the EE based on GIS technologies and ground water monitoring reports complemented by online ITE platform. The onsite monitoring will include quarterly (and more frequently if required) field monitoring by NABARD Regional Office and Head Office. District Development Managers (DDMs) of NABARD posted in the project districts would also be engaged in the field level monitoring on more frequent basis. Additional Monitoring & Evaluation, implementation quality assurance, and troubleshooting support will be provided by the NABARD Head Office as needed. The project target groups and stakeholders including the NDA Focal Point will be involved as much as possible in project-level M&E. AE would also participate in the Project Steering Committees at State Level as well as District level through AE's (NABARD's) Regional and District Office. NABARD Regional Office will regularly interact with the PMU and Project Director as needed, including through participation in quarterly review meetings planned under the project, quarterly and half yearly field visits as well as through annual review missions.
171. AE NABARD will take-up annual external audit of the project with terms and reference approved by AE. The external audit will review the GCF special/trust account and related statements of expenditure under the project. The same would additional to regular concurrent auditing followed for fund disbursements as well as auditing being followed by Executing Entity as per the Government norms.
172. **Interim Evaluation / Mid-term review:** An independent midterm review will be conducted within two and half years of project being effective and shall include a review on institutional, technical, environmental, social, gender, economic and financial issues, assessment on the performance of the funded activity against the GCF investment criteria and assess, as the case may be, the need for mid-course corrections. The final report will be cleared by the NABARD Regional Office and Head Office and will be placed before Project Steering Committee. The outcome of the midterm review will be incorporated as recommendations for improving the implementation during the second half of the project's duration.
173. **Final review:** Within three months of the closing of the project, the EE/ PMU (project Director) will submit a project completion report to NABARD that includes evaluation of outcome an impact indicators and assessment based on the GCF investment criteria and project result framework. Independent Terminal/Final Evaluation (TE) would be initiated by AE within three months of project completion and report would be completed in six months. The final TE report will be cleared by the NABARD Regional Office and Head Office, and will be approved by the Project Steering Committee.

I. Supporting Documents for Funding Proposal

- ☒ NDA No-objection Letter
- ☒ Feasibility Study
- ☒ Integrated Financial Model that provides sensitivity analysis of critical elements (xls format, if applicable)
- ☒ Confirmation letter or letter of commitment for co-financing commitment (If applicable)
- ☒ Project/Programme Confirmation/Term Sheet (including cost/budget breakdown, disbursement schedule, etc.) – see the *Accreditation Master Agreement, Annex I*
- ☒ Environmental and Social Impact Assessment (ESIA) or Environmental and Social Management Plan (If applicable)
- ☒ Appraisal Report or Due Diligence Report with recommendations (If applicable)
- ☒ Evaluation Report of the baseline project (If applicable)
- ☒ Map indicating the location of the project/programme
- ☒ Timetable of project/programme implementation

** Please note that a funding proposal will be considered complete only upon receipt of all the applicable supporting documents.*

List of Annexes

- Annexure 1: Revised Feasibility Report
- Annexure 2: Integrated Financial Model
- Annexure 3: Term Sheet
- Annexure 4: Environmental & Social Management Plan
- Annexure 5: OCTMP I Evaluation Report
- Annexure 6: Gender Analysis Report
- Annexure 6A: Gender & Social Inclusion Action Plan
- Annexure 7: Procurement Policy and Plan
- Annexure 8: Accredited Entity Fee Details
- Annexure 9: Stakeholder Consultation Report of Odisha, India
- Annexure 9 (A): Justification to the Comments on Stakeholder Consultation Report
- Annexure 10: Letter of confirmation from Government of Odisha on co-financing
- Annexure 11: Map indication location of project.
- Annexure 12: NDA No Objection Letter



No-objection letter issued by the national designated authority

रवि एस. प्रसाद

आई.ए.एस.

संयुक्त सचिव

Ravi S. Prasad

I.A.S.

Joint Secretary

To,

The Green Climate Fund ("GCF")

Songdo Business Centre

175 Art Centre-Daero

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Incheon- 22004 (Republic of Korea)



सत्यमेव जयते

भारत सरकार

पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय

Government of India

Ministry of Environment, Forest & Climate Change

New Delhi, 31 August 2016

Subject : Funding proposal for the GCF by National Bank for Agriculture and Rural Development (NABARD) regarding **"Ground water recharge and solar micro-irrigation to ensure food security and enhance resilience in vulnerable tribal areas of Odisha"**

Dear Madam/Sir,

We refer to the project, **"Ground water recharge and solar micro-irrigation to ensure food security and enhance resilience in vulnerable tribal areas of Odisha"** in India as included in the funding proposal submitted by National Bank for Agriculture and Rural Development (NABARD) to us on 12th July 2016.

The undersigned is the duly authorized representative of Ministry of Environment, Forest & Climate Change, the National Designated Authority of India.

Pursuant to GCF decision B.08/10, the content of which we acknowledge to have reviewed, we hereby communicate our no-objection to the project [or programme] as included in the funding proposal.

By communicating our no-objection, it is implied that:

- (a) The Government of India has no-objection to the project as included in the funding proposal;
- (b) The project as included in the funding proposal is in conformity with India's national priorities, strategies and plans;
- (c) In accordance with the GCF's environmental and social safeguards, the project as included in the funding proposal is in conformity with relevant national laws and regulations.

We also confirm that our national process for ascertaining no-objection to the project as included in the funding proposal has been duly followed.

We acknowledge that this letter will be made publicly available on the GCF website.

Kind regards,

(Ravi S. Prasad)

Joint Secretary to Government of India

GCF Focal Point for India



Environmental and social report(s) disclosure

Basic project/programme information	
Project/programme title	Ground water recharge and Solar Micro Irrigation to ensure food security and enhance resilience in vulnerable tribal areas of Odisha
Accredited entity	National Bank for Agriculture and Rural Development (NABARD)
Environmental and social safeguards (ESS) category	Category B

Environmental and Social Impact Assessment (ESIA) (if applicable)	
Date of disclosure on accredited entity's website	2017-03-01
Language(s) of disclosure	English, Odia
Link to disclosure	http://www.nabard.org/content.aspx?id=643 The ESMP contains an impact assessment (ESIA) consistent with the requirements of PS1 for a category B project.
Other link(s)	
Environmental and Social Impact Assessment (ESMP) (if applicable)	
Date of disclosure on accredited entity's website	2017-03-01
Language(s) of disclosure	English, Odia
Link to disclosure	http://www.nabard.org/content.aspx?id=643
Other link(s)	
Resettlement Action Plan (RAP) (if applicable)	
Date of disclosure on accredited entity's website	N/A
Any other relevant ESS reports and/or disclosures (if applicable)	
Description of report/disclosure	N/A