

DETAILED PROJECT REPORT

NATIONAL ADAPTATION FUND FOR CLIMATE CHANGE
(NAFCC)

ODISHA

DPR-NAFCC: Conserve water through the management of run-off in the river basin to reduce vulnerability and enhance resilience for traditional livelihood in Nuapada

ASSISTED BY CTRAN CONSULTING

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Project Concept Note:

Title of the Project / Programme	Conserve water through the management of run-off in the river basin to reduce vulnerability and enhance resilience for traditional livelihood in Nuapada
Project / Programme Objective/s	To construct water harvesting structures i.e. check-dams to conserve water through the management of run-off in the river basin to reduce vulnerability and enhance resilience for traditional livelihood.
Project / Programme Sector	Water Resource
Name of Executing Entity/ies/Department:	Department of Water Resources Government of Odisha
Beneficiaries	Inhabitants of along the river basin of Jonk River (a tributary of Mahanadi) in Nuapada affected by both drought and flood
Project Duration (In Years)	4 Years
Start Date	January 2016
End Date	December 2020
Amount of Financing Required (Rs.)	Pilot scale Rs 20 crore
Project Location State: District	Odisha Nuapada
Contact Details of the Nodal Officer of Executing Entity/ies	Sri P K Jena, IAS Comm. cum Sec, Department of Water Resources Govt. of Odisha, Rajeev Bhawan, Bhubaneswar-1 Nodal Officer (for MoEFCC coordination), Climate Change Cell: Dr P K Prusty
E-Mail	pkj364@yahoo.com
Cell Number: (Phone and Fax)	+91-9437445000

1. PROJECT BACKGROUND:

1.1 Project / Programme Background and Context:

Odisha depends largely upon monsoon for its Water Resources. South West Monsoon triggers rainfall in the State. About 78% of total annual rainfall occurs during the period from June to September. In addition to seasonal availability the rainfall in the state also shows a spatial



variation. Under normal conditions the State receives annual precipitation of about 230.76 billion cubic meter (BCM). Of the total precipitation, a part is lost by evaporation, transpiration and deep percolation and a part stored in the form of ground water reserve, the remaining appears as surface runoff. Considering the topographical and geological limitations, 75% of the average annual flow can be utilized.

Impact of climate change on water resources in Odisha is likely to be due to the vagaries of monsoons creating variability in river flows and increased frequency/intensity in extreme events such as floods, droughts and cyclones. Heavy flood or drought occurs almost every alternate year due to disproportionate distribution of rainfall. In recent years, wide fluctuation in climate has been observed and irregular rainfall causing both floods and droughts is a major concern. The impact of droughts on farmers has been crippling in some areas.

Among the four topographical region Nuapada district of Odisha falls under the western rolling uplands. Odisha state has been divided into 10 agro climatic zone and Nuapada district falls under zone-8 that is western undulating zone. Under normal condition mean annual rainfall of Nuapada district is 1352 mm. The mean maximum summer temperature of this district goes up to 37.8 degree Celsius and mean minimum temperature in winter goes up to 11.9 degree Celsius. The villagers of Nuapada district are corroborating the history of 50 years and recount the high

temperature and erratic rainfall and both pattern of drought and flood in the district. Nuapada has been classified part of a multi-hazard zone. As per Long-Term Prediction (by 2100) of Projected

(a.) Problem Context:

The state of Odisha is highly vulnerable due to climate change. Many districts in the state face multi-hazard scenario. The climate change has introduced high monsoon variability and risks in agriculture and fishery in Nuapada district. Poor run-of management has washed out top soil and reduced soil fertility resulting in poor yield. Poor run off management has implication on water conservation and overall enhancement of risk and vulnerability for the people living in the fringe. Poor employability in the villages have caused people to migrate and traffickers have caused larger societal damage to young mass.

This project aims to reduce vulnerability and enhance resilience for traditional livelihood in Nuapada district by restoring a hill stream in Jonk river basin through constructing water harvesting structures i.e. check-dams to conserve water through the management of run-off. The project aim to achieve multisector improvement specifically in water conservation, promotion of horticulture, linking the fishery activity as well as efficient use of water for agricultural activity.

Project location:

Jonk river basin where several hill springs feed in have become defunct over the years and it is a matter of concern. These are non-perennial streams and over the years have been suffering due to vagaries of monsoon. Due to sudden spurt of rain some have altered course and eventually wandered away to be defunct. Water can be seen in the stream till the months of January-February. During the dry season which generally begins February onwards (and remains until the beginning of the rainy season), these remain dry. Clearly, watersheds with a higher proportion of area drained by non-perennial streams will tend to have lower soil moisture retention and water harvesting capability than those areas where perennial streams pre-dominate. This has impacted the vegetation and economy of the region over the last few years.

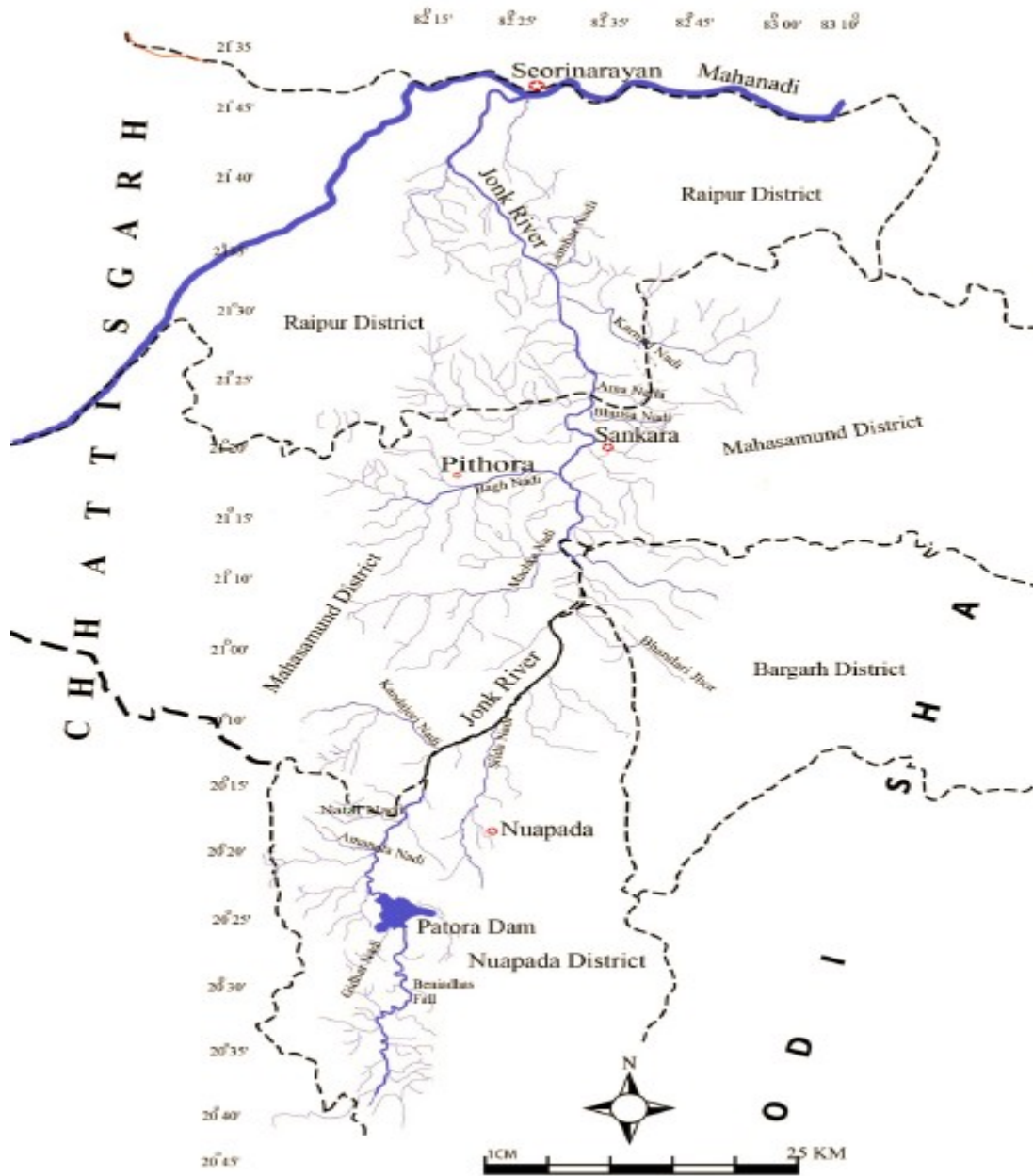


Figure 1 Jonk river basin in Nuapada

The programme takes into account a select command area in the Jonk River basin of Nuapada district to create Water harvesting structures i.e. check-dams to conserve water through the management of run-off in the river basin to reduce vulnerability and enhance resilience for traditional livelihood.

Details of the project Location is mentioned as follows.

Sr No	Check Dam	Stream	Village	Block	Catchment Area in Sq. Km.	Length in Meter	Co-Ordinates	Topo	Ayacut (In Ha.)
1	Budhipali Check Dam	Kharkhara Nalla	Budhipali	Nuapada	115	60	Long 20:52:50 E Lat 82:32:32 N	64L/9	50
2	Parsadadar Dam	Kharkhara Nalla	Parsadadar	Nuapada	123.5	65	Long 20:55:25 E Lat 82:33:22 N	64L/9	45
3	Parkod Check dam	Kharkhara Nalla	Parkod	Nuapada	127.5	68	Long 20:55:40 E Lat 82:33:30 N	64L/9	50

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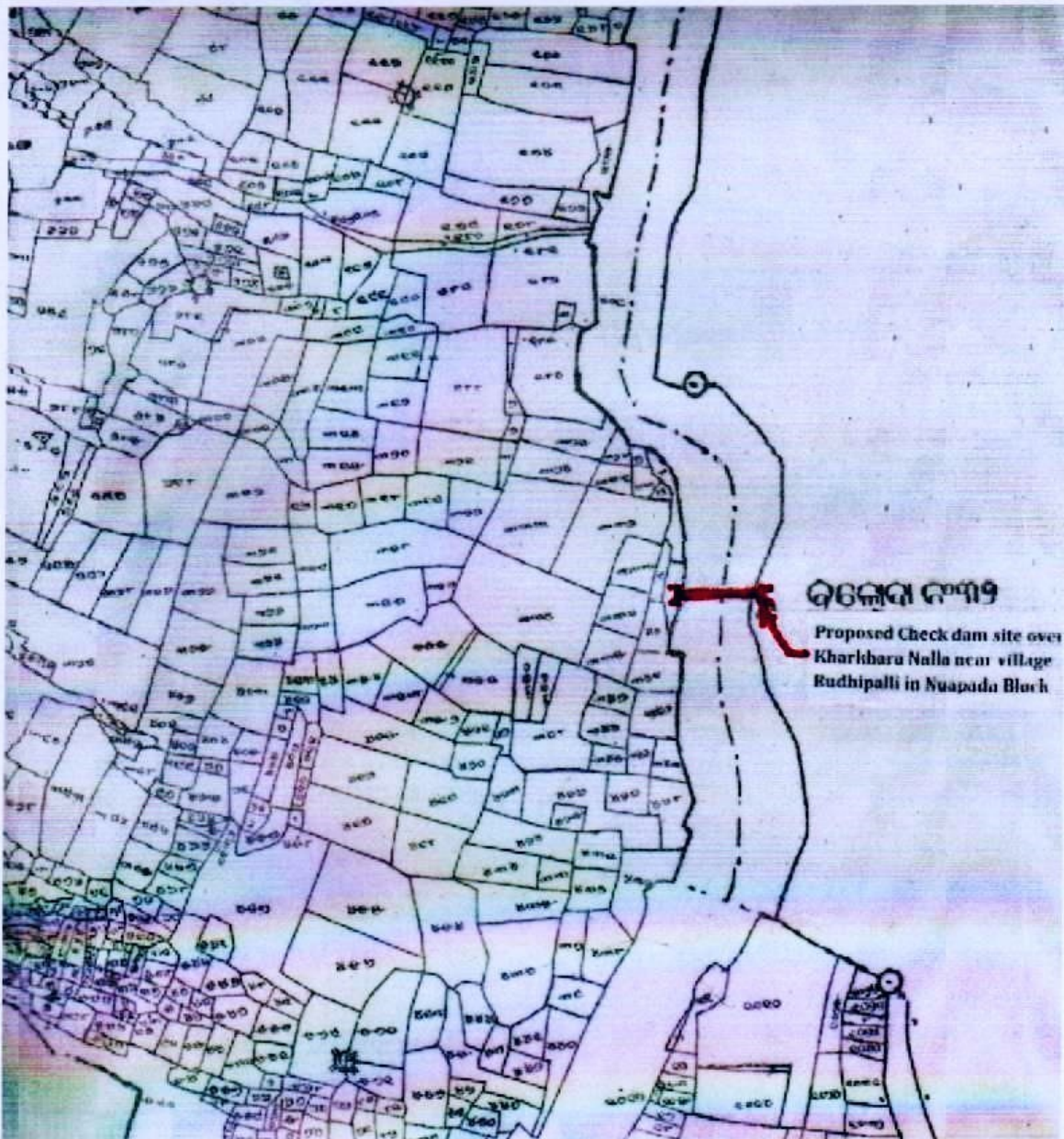
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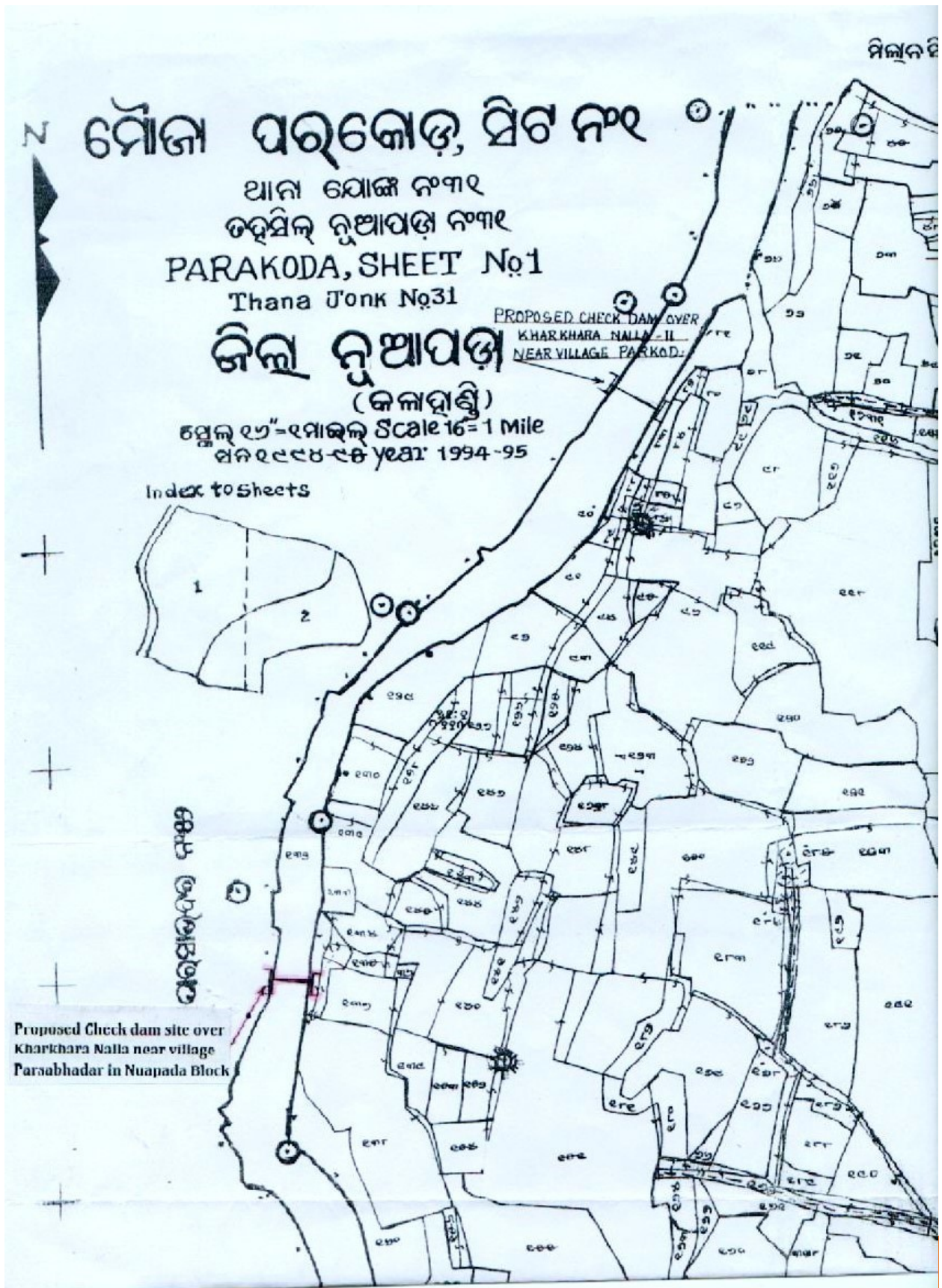
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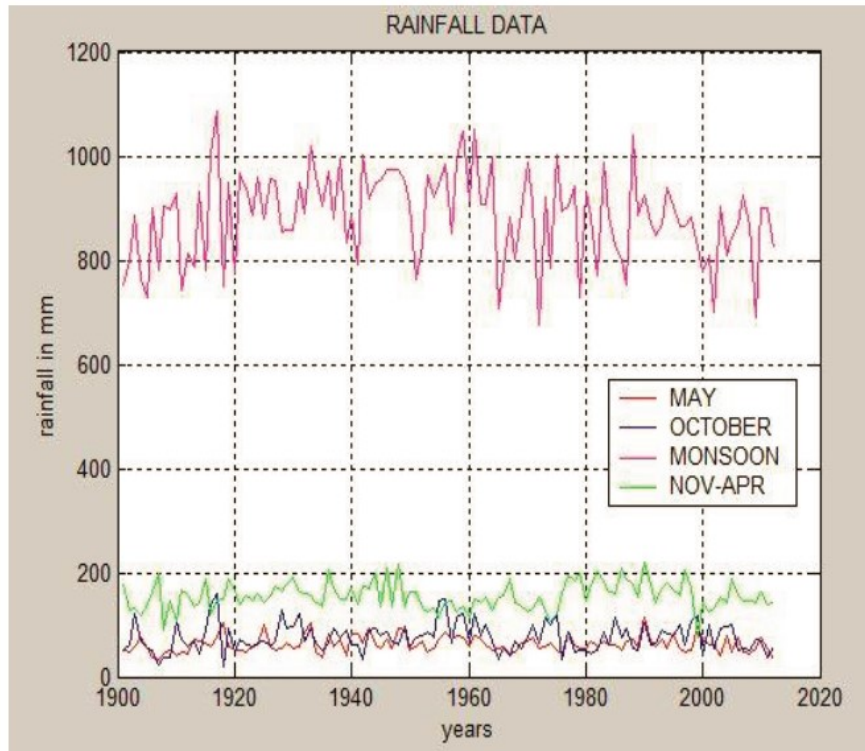
(b.) Vulnerability Analysis

The Nuapada falls in the drought prone western and south western part of Odisha, where the indicators of development are comparable to the sub Saharan region. Here the people face perpetual water stress and drought like situation. Hilly area are also prone to flash floods because of its high gradient and poor distributary system and this kind of flood leads to sand casting and permanent damage to top soil. Characterised by high indebtedness, high migration and poor nutrition, this area is highly vulnerable to climate change and large public investment in this region have not been very effective to reduce poverty.

Combined vulnerability score of Nuapada has been estimated at 0.505 and is ranked amongst the highly vulnerable districts.

Rain fall

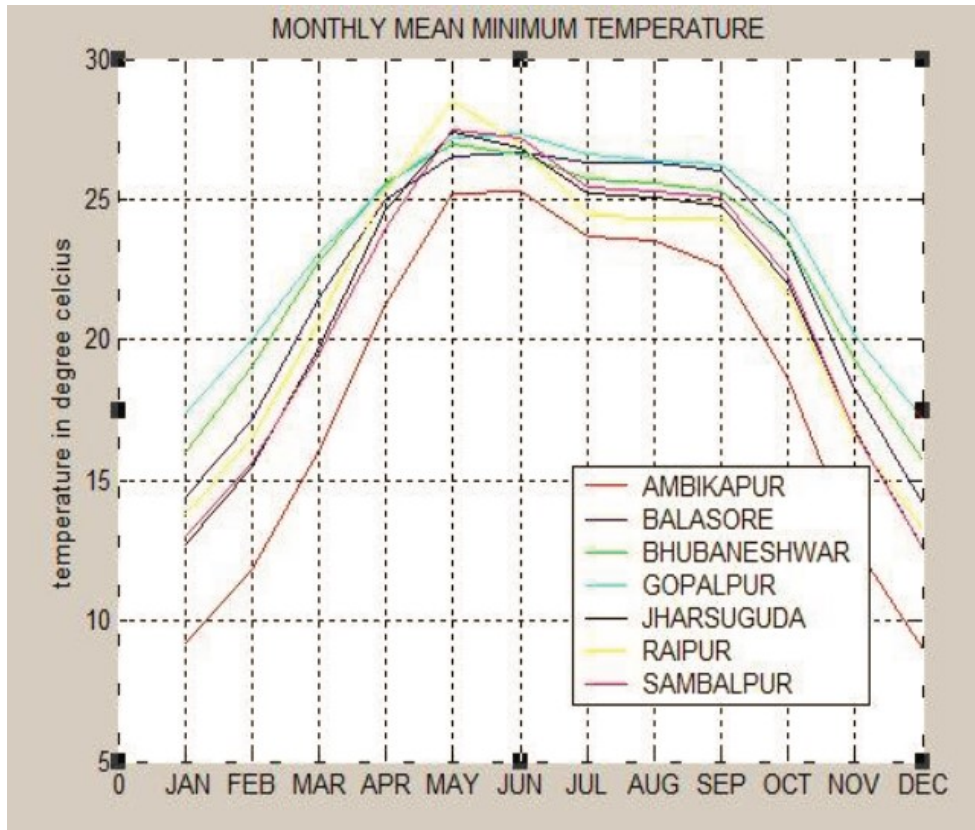
IMD analysis of the rainfall on Mahanadi basin (where Jonk basin is situated) is given below:



From the graph, it can be inferred that, there is a decrease in the rainfall during monsoon season. In last 30 years, the rainfall in monsoon is significantly lowered and an increased precipitation can be observed for the period of November –April. There is no much change observed for the month of May and October. This type of irregularities in monsoon may affect the agriculture adversely to a greater extent. Even the increasing rainfall in non-monsoon periods and decreasing rainfall in monsoon periods, may lead to severe droughts in various areas and some parts to floods, simultaneously.

Temperature

The temperature pattern has been shown below of the Mahanadi Basin.



The overall scenario shows about 4-4.5 degree C rise in these regions by 2050.

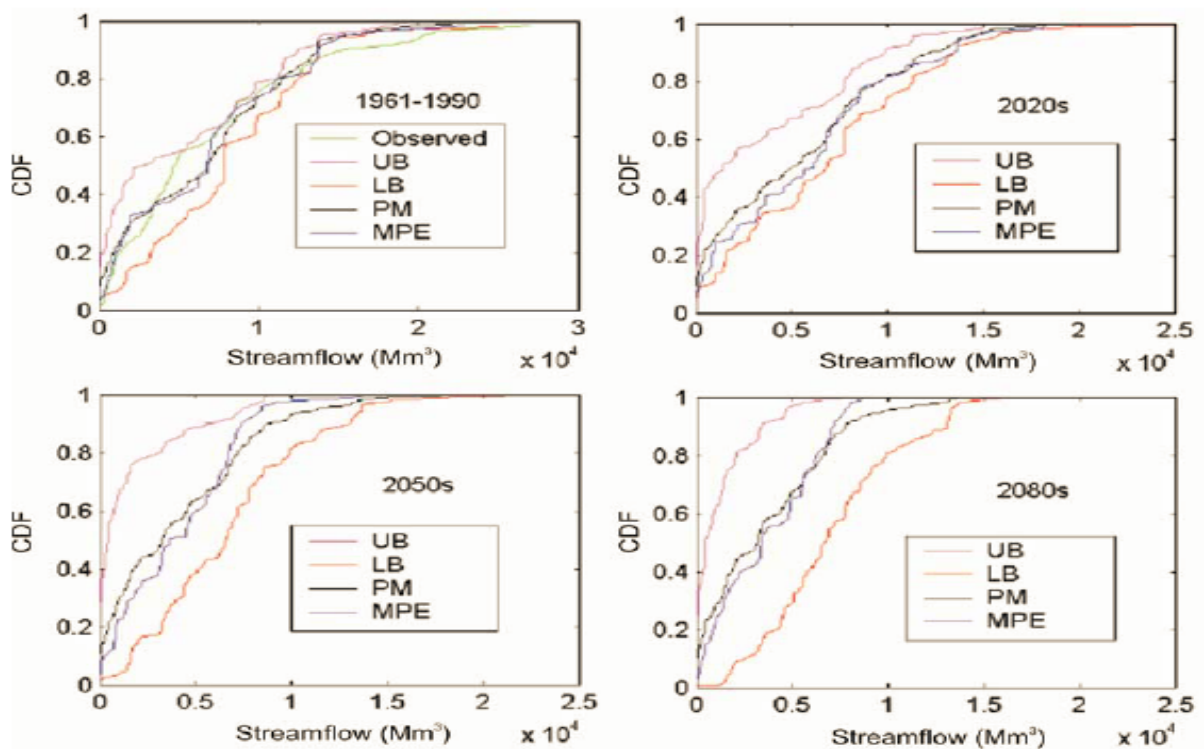
Future Climate Scenario

Change in Mean Annual Temperature under A2 Scenario in IPCC AR5, Odisha for the Nuapada district shows 4-4.5 deg C rise in temperature and may introduce significant loss to flora, fauna and ground water. Under the same scenario it is also like to receive high precipitation of 40-45 mm total annual precipitation.

The basin level vulnerability has been estimated under future climate scenario especially in the streamflow:

As per the model of Majumdar and Ghosh, the conditional random field (CRF)-downscaling model^{26,27} for 2045–65 and 2075–95 for the range of GCM-scenario¹ combinations with Fourth Assessment Report (AR4) projections. It is seen that for most future scenarios, there is a decrease in middle level flows (equalled or exceeded 20–70% of the time). This decrease becomes more prominent by 2075–95. High flows increase in most scenarios for 2045–65, but the number of scenarios showing an increase in high flows also decreases by 2075–95. Low flows show a slight increase for 2045–65 (above 80% flows) but a smaller range of low flows increase for 2075–95 (above 90% flows only).

¹ The GCMs used are CGCM2 (Meteorological Research Institute, Japan), MIROC3.2 medium resolution (Center for Climate System Research, Japan) and GISS model E20/Russell (NASA Goddard Institute for Space Studies, USA).



This has strong influence in limiting the overall adaptive capacity and is likely to enhance the future vulnerability.

Food security: The key vulnerability in the areas is reduced food security due to only one crop getting cultivated and due to decline in soil fertility the problem gets acute and people migrate. Landslides: due to encroachment and some unsustainable practices a portion of the natural hill streams and soil have degraded. This enhances low productivity and high run off and eventually leading to the vulnerability for the human life and livestock apart from threat to the river basins and sub-basins.

The modeled scenario shows (A2 and B2) that by 2071-2100 period: At Mahanadi basin of Orissa Rice crop is found to be most vulnerable crop in the region with 12% and 7 % decrease in productivity. The Groundnut productivity too would reduce by 10% and 5% in A2 and B2 scenario respectively. Maize crop showed 6 and 4% decrease in productivity in both the scenarios. The region comes under humid climatic region in the country with recurring Floods. Decrease in yields are mainly due to the further increase in rainfall well before monsoon and also during monsoon (crop growing season).

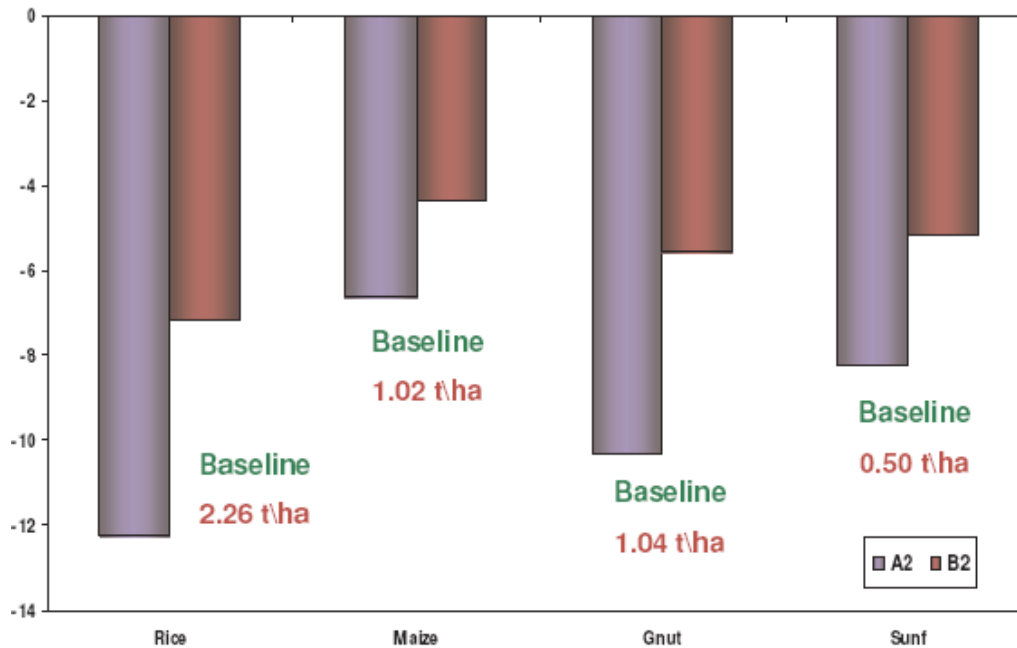


Figure 2 Yield variation under A2 and B2 scenario in Mahanadi Basin

Water scarcity: As such in many parts, the water from the canal does not reach many part of the village and they fail to take up any fruit or vegetable crop. The fishing activity is also getting reduced.

Urgency: The key urgency in this area is to preserve the hill stream, arrest the run-off and develop a resilient livelihood framework involving pani-panchayats. Without this, the ecosystem will be destroyed endangering with depleted and contaminated ground water and adverse climate variability when in deficit moisture condition and flash flood when the moisture is in excess.

Co-benefit: The project is structured to improve water use efficiency, enable emission reduction through solar energy intervention in water pumping, methane management through SRI. This project will have both high adaptation and mitigation co-benefit.

The project will document the climate adaptation benefits and cost through a competent agency to show-case the initiative for other areas.

(c.) Outline of Economic, Social Development and Climate Change:

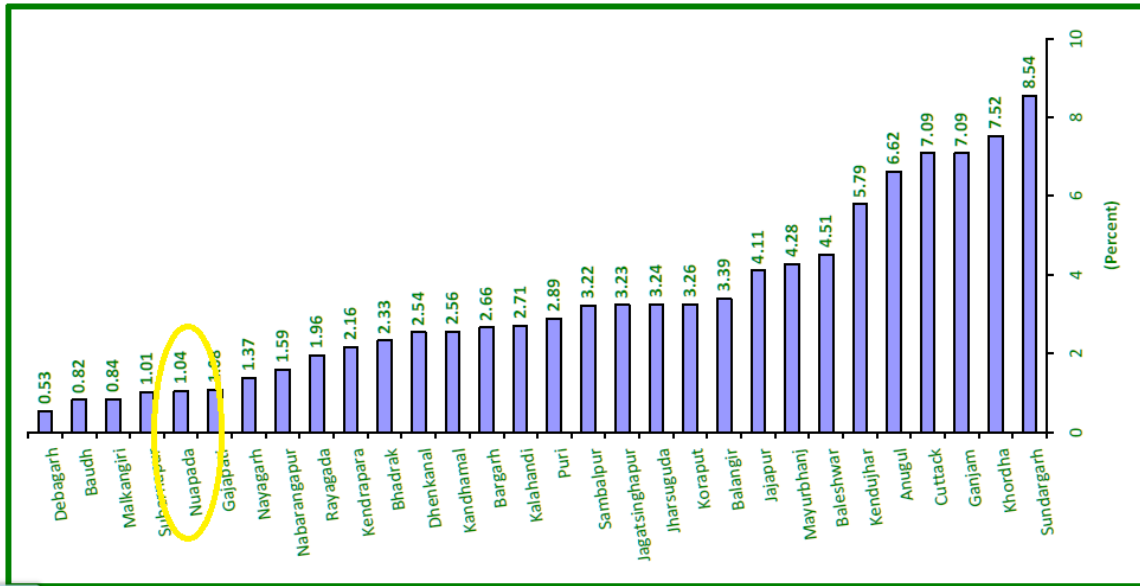
Nuapada district has basically an agrarian and forest economy. Much of the population depends on agriculture and forest. They live in subsistence economy in the absence of any alternative sources of meaningful employment. Absence of Irrigation, poor land quality make agriculture non remunerative. In both forest and agricultural produces the people suffer distress sale. Most of the lands in Nuapada district are upland with low productivity. Irrigation facility is almost non-existent (less than 15% against the state average of 30%), land right is not clear and there are many villages which are on encroached land even if people have been staying there since generations.

Three major irrigation projects lower Jonk, Sunder dam and upcoming Lower Indira Irrigation Project provide support to 45,000 acres of land. Paddy is the main crop in the entire district. Other crops like Maize, cotton and onion make a major share of crop cultivated. The frequent occurrence of drought is one of the major bottlenecks on the growth process. The agriculture sector of the district is facing a large number of challenges as mentioned below resulting in poor economic growth of the district where large percentage of population is dependent on agriculture.

- Majorly mono cropped
- Poor skill base of farmers
- Rain-fed agriculture
- Lack of irrigation infrastructure
- Seasonality in groundwater level
- Poor availability of inputs
- Poor market infrastructure, information and regulation
- Regularly decreasing farm size

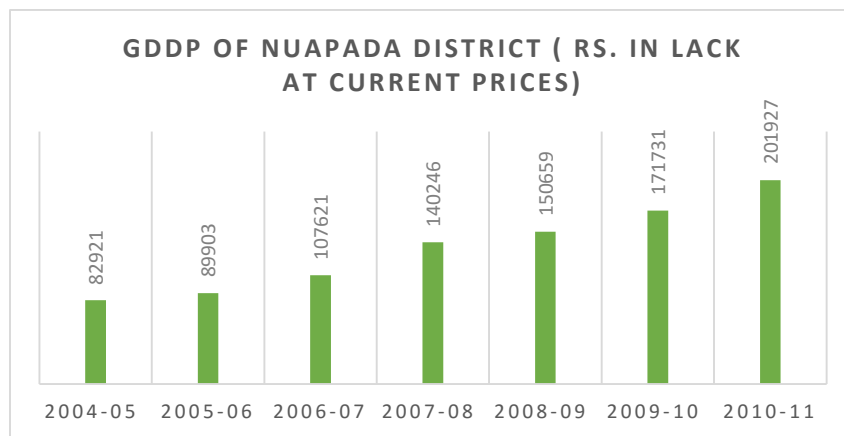
More than 10,000 households migrate to other state in search of better employment opportunities every year after the harvesting season is over. The pre-eighties settlement failed to reach these unfortunate people. In case of forest also the same trend is found. The tribal people have been living in close proximity with nature. Nature forms an integral part of their lives. But there are a number of restrictions imposed upon them so far as their usufruct right is concerned.

Share of GDDP to GSDP in 2010-11 at 2004-05 Prices



Source: Economic Survey Report 2014-15

In term of percentage share of GDDP to State GSDP, Nuapada contributes only 1.04 % which is one of the lowest across the district of Odisha. The real per capita of Nuapada district in 2010-11 at 2004-05 prices is found to be Rupees 19399.



Source: Economic Survey Report 2014-15

Social sector development has been an essential prerequisite for sustained human development and economic development of the State. It builds up strong edifice of a vibrant economy. It sets foundation for rising income & employment opportunities, productivity, technology advancement

and finally enhancing the quality of life in the State. Education, health, sanitation, welfare programmes for women, child, SC & STs are the prime sub sectors of Social sector.

In 2011, Nuapada had population of 610,382 of which male and female were 301,962 and 308,420 respectively. In 2001 census, Nuapada had a population of 530,690 of which males were 264,396 and remaining 266,294 were females. In 2001 census, this figure for Nuapada District was at 1.44 percent of Maharashtra population. There was change of 15.02 percent in the population compared to population as per 2001. In the previous census of India 2001, Nuapada District recorded increase of 13.04 percent to its population compared to 1991. Nuapada District demography details is given below:

Description	2011	2001
Actual Population	6,10,382	5,30,690
Male	3,01,962	2,64,396
Female	3,08,420	2,66,294
Population Growth	15.02%	13.04%
Area Sq. Km	3,852	3,852
Density/km ²	158	138
Proportion to Odisha Population	1.45%	1.44%
Sex Ratio (Per 1000)	1021	1007
Child Sex Ratio (0-6 Age)	981	969
Average Literacy	57.35	42
Male Literacy	70.29	58.46
Female Literacy	44.76	25.79
Total Child Population (0-6 Age)	88,344	84,521
Male Population (0-6 Age)	44,600	42,927
Female Population (0-6 Age)	43,744	41,594
Literates	2,99,383	1,87,412
Male Literates	1,80,903	1,29,461
Female Literates	1,18,480	57,951
Child Proportion (0-6 Age)	14.47%	15.93%
Boys Proportion (0-6 Age)	14.77%	16.24%
Girls Proportion (0-6 Age)	14.18%	15.62%

Source: Census 2011

Odisha is one among very few leading States with faster reduction of poverty ratio from 57.20 percent in 2004-05 to 32.59 percent in 2011-12. But still it remains a matter of concern for some parts of the State, like Nuapada district. Majority of the population (78%) belong to BPL category and the literacy rate of the district is very low (57%) as whole and female literacy in particular (45%). The poor infrastructure base related to market, market, education etc. are the major bottlenecks in the development of the district. The indigenous mode of cultivation and use of low productive inputs, low rate of farm mechanization and fragmented land holding retards the productivity of the sector. Again, the lack of agro based industries adds woes to the sector as well. Apart from this the large base of unskilled labour force and seasonal migration are among the major weaknesses.

1.2 Project / Programme Objectives:

Overall Goal:

The overall goal of the project is to “Conserve water through the management of run-off in the river basin to reduce vulnerability and enhance resilience for traditional livelihood in Nuapada.”

Project Objectives:

To construct water harvesting structures i.e. check-dams to conserve water through the management of run-off in the river basin to reduce vulnerability and enhance resilience for traditional livelihood.

The project objectives corresponds to the objectives of National Adaptation Fund for Climate Change, i.e., promoting concrete adaptation in water resource sector, capacity building of different stakeholders and promoting / supporting documentation of learning and its dissemination.

Specific objectives of the project are;

- To protect the natural streams near the basin to reduce the climate variability.
- To undertake structural measures such as check dams based on future climate variability analysis along the basin for checking run-off and use measures for both drought and flood control endemic to the area.
- To diversify livelihood from paddy monoculture and introduce horticultural activity to improve livelihood security
- To link fishery and poultry as part of livelihood diversification initiative.
- To introduce solar pumping system for efficient use of water in select crops based on vulnerability.
- To develop linkages with Pani Panchayats for water management and improve their capacity on scientific soil water management and crop choice based on climatic stress.
- To develop resource material and tool for monitoring of the climate change adaptation and mitigation co-benefits

1.3 Details of Project / Programme Executing Agency:

(a) Name and Other Details:

Name: Department of Water Resources, Government of Odisha.

Address: Principal Secretary, Department of Water Resources
Rajeev Bhawan, Bhubaneswar

Coordination with MoEFCC and NIE:

Dr P K Prusty, Nodal Officer, Climate change cell, Department of Forest and Environment,
Odisha Secretariat, Govt. of Odisha

Partner departments: Directorate of Agriculture, Horticulture, Fishery, Energy

(b) Technical Person Power:

The following manpower is currently identified as key resource persons for this project with the Nodal Office i.e. Water resource department, Government of Odisha.

Sr No	Name	Designation
1	Er. D. K Samal	Superintending Engineer, Monitoring
2	Er. S.K Sahoo	Executive Engineer, Khariar Division , Nuapada
3	Er. N.K Mohanty	Asst. Executive Engineer, Nuapada MI
4	Er. A Nayak	Junior Engineer Nuapada MI Sec-I
5	Er. B.P Sahoo	Junior Engineer Nuapada MI Sec-III

However, the project executing entity shall be the coordinating body to interface with Project Implementing Agencies at the district level (from stake holding departments). The relevant entities will have requisite technical manpower. The profile of such manpower will be outlined during the signing of the MoUs. In addition the project executing entity will take help from experts and agencies for some of the activities.

(c) Three Largest Climate Change Adaptation Projects Handled:

Government of Odisha and especially Department of Water Resources has handled several climate change adaptation projects in the past.

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	Total project Rs 1084.2 crores	ADB	North-west Odisha	2008-17 Resilience in major and minor irrigation projects

Project	Objectives & geo. coverage	Amount Sanctioned	Funding Agency	Geographical Coverage	Implementation Period & Outcome
	development of potential irrigation infrastructures				
ICZMP	Coordination of activities of various stakeholders in an integrated approach for the sustainable usages of the coastal natural resources maintaining the natural environment.	Rs 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

(d) Three Largest Community Based NRM Projects Handled:

Department of water resource, Govt. of Odisha has undertaken many community based project. Below are some of the project under OCTMP (Odisha Community Tank Management Programme).

Project	Objectives	Amount Sanctioned in Lacks	Funding Agency	Geographical Coverage/ Ayacut in Ha.	Implementation Period & Outcome
Chamundia MIP, Ganjam	Increase productivity with in tank command area, sustainability of the restored MIP through capacity building of pani panchayat. Approach: Community managed MIP,	561.1466667	World Bank	1032 hecters, Jagannatha Prasad Block, GP-Chamunda	July 2013 - August 2015
Laxmi Nalla MIP Boud	Livelihood based sustainable tank management, Institutional Strengthening,	932	World Bank	1898 hecters in Harbhanga block , GP- Puruna Cuttack	March 2012- May 2015
Mankada MIP, Anugul	Convergence with Line Department	1266.666667	World Bank	2000 in Pallahada block of Anugul District	July 2013 - March 2015

(e) Three Largest Climate Change Adaptation/NRM Projects of State/Central Govt.:

Western Odisha Rural Livelihood project with watershed mission under Department of Agriculture

OIIAWMIP -ADB for Major and Minor Irrigation project

Integrated Coastal Zone Management Project (World Bank)

(f) Availability of Suitable Infrastructure for Implementation

The entity has all the resources for implementation of the project. However additional infrastructure at the district level will be determined in consultation with PIAs. The basin manager has full project office with requisite technical infrastructure.

(g) Blacklisting of Executing Entity:

The executing entity is not blacklisted.

1.4 Project / Programme Components and Financing:

Project / Programme Components	Expected Concrete Outputs	Expected Outcomes	Amount (Rs. Crore)
Component 1: Protection of the natural streams near the basin undertaking structural measures such as check dams based on future climate variability analysis along the basin for checking run-off and use measures for both drought and flood control endemic to the area	3 check-dams in the Jonk basin to protect the natural spring Enhance the command to 145 ha (at least 95% of the potential) Provide farm level water management through drip and sprinkler in stressed areas	Reduced risks of adverse impacts of climate change (drought and flood) in water and agriculture sectors and rejuvenation of hill stream for long term sustainability	7.85
Component 2: Diversify livelihood from paddy monoculture and introduce horticultural crops (fruits and vegetables)	At least 500 farmers take additional horticultural crops in the command area after paddy based on the water use efficiency	Poverty alleviation, livelihood security an enhanced awareness of community on efficient water use in the economic activity	2.0
Component 3: Link fishery and poultry as part of	Fishery activities are taken up in the command and farm ponds	Enhanced adaptive capacity through livelihood	1.00

Project / Programme Components	Expected Concrete Outputs	Expected Outcomes	Amount (Rs. Crore)
livelihood diversification initiative	User associations to work with about 100 no of landless people to involve them in fishery activities Backyard poultry unit established	diversification from non-land based activity as well as fishery, especially for the landless	
Component 4: Solar pumping system for efficient use of water in select crops based on vulnerability	Pilot programme on solar pumping to be introduced and 15 units made operational for efficient use of water	Reduced dependence on fossil fuel and efficient management of water in the stressed region	1.5
Component 5: Achieving sustainability by linkages with Pani Panchayats for water management	3 no of pani panchayats to be formed and capacity of the members enhanced on issues relating to climate risk and vulnerability related to water and efficient use of water.	Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	2.5
Component 6: Develop resource material and tool for monitoring of the climate change adaptation and mitigation co-benefits	Modules on climate adaptation at the local level to be developed for the PP The adaptation benefit and mitigation co-benefits to be determined through concurrent monitoring Knowledge products/best practice documents developed	Maximized multi-sectoral, cross-sectoral benefits/co-benefits to meet the challenges of water and food security	2.5
Project / Programme Execution Cost (10 % of Amount of Finance Required)			2.0
Total Project / Programme Cost			19.35
Project / Programme Cycle Management Fee Charged by Implementing Entity			0.58
Amount of Financing Required			19.93 (rounded 20.0)

Note: Programme execution includes Baseline and Tracking of Climate Parameters along with Mapping

1.5 Project Calendar:

Milestones	Expected Dates
Start of Project/Programme Implementation	April 2016
Mid-term Review (if planned)	January 2018
Project/Programme Closing	March 2020
Terminal Evaluation	July 2020

2.0 PROJECT / PROGRAMME JUSTIFICATION:

(a) Component wise Details and Justification of Project Components:

What is the business-as-usual development for the targeted sector:

Many structural measures such as check dams and also minor irrigation projects have been constructed in Nuapada district. The figure below shows block wise check dam available in the district. There are nearly 474 check dams which serve to an area of 7560 hector for effective irrigation and agriculture. The Jonk river basin and its stream flows have remained vulnerable requiring additional structural measures. Apart from that none of the water harvesting projects have an integrated approach for water use efficiency and promotion of horticulture, fishery, crop diversification etc.

Check Dam Status of Nuapada District As on Aug-2015			
Block	No of Check Dams	Sum of Catchment Area (In Sq. Km)	Sum of Ayacut in Ha.
Boden	93	1745.69	1640
Completed	92	1739.69	1625
Ongoing	1	6	15
Khariar	63	615.9	810
Completed	60	562.75	773
Ongoing	3	53.15	37
Komna	135	2572.41	2140
Completed	112	1911.51	1829
Ongoing	21	627	291
Tender stage	2	33.9	20
Nuapada	107	1412.44	1720
Completed	96	1239.77	1571
Ongoing	10	167.47	146
Tender stage	1	5.2	3
Sinapali	76	1261.4	1250
Completed	76	1261.4	1250
Grand Total	474	7607.84	7560

Source: MI Dept. Bhubaneswar, Odisha

Block Wise MIP Status of Nuapada District			
Block name	No of MIP	Certified Ayacut in Ha. (Kharif)	Certified Ayacut in Ha. (Rabi)
BODEN BLOCK	8	1902	20
KHARIAR BLOCK	13	1670	428
KOMNA BLOCK	10	2270	205
NUAPADA BLOCK	6	738	40
SINAPALI BLOCK	6	1494	476

Source: MI Dept. Bhubaneswar, Odisha

Irrigated area of Nuapada district (potential created) up to 2012-13:

								Area in '000 hect.	
Major & Medium		Minor (Flow)		Minor (Lift)		Other Sources		Total	
K	R	K	R	K	R	K	R	K	R
29.39	8.17	13.846	1.759	8.891	5.045	16.352	7.782	68.479	22.756

Source: Nuapada, NIC

Soil difference and fertility status:

Soil fertility of Nuapada district is one of the biggest concern for agriculture productivity:

Sl No.	Blocks	Soil reaction (%)			Fertility index		
		Acidic	Normal	Alkaline	N (Nitrogen)	P (Phosphorus)	K (Potassium)
1	Khariar	16	34	50	L	L	H
2	Sinapali	33	44	13	L	L	M
3	Boden	29	44	27	M	L	H
4	Komna	16	53	31	M	L	H
5	Nuapada	49	33	18	M	L	H
Average		29	42	30			

H – High, M – Medium, L – Low,

Source – Soil Chemist, Bhawanipatna

Source: Nuapada NIC

Facts in the table above clearly shows that more than 50% of the soil in different blocks is either acidic or alkaline leaving a portion of about 42% as normal. Almost 30% soil is acidic in nature,

highest in Nuapada i.e., 49%. Equal proportion shows alkalinity (30%), highest in Khariar i.e., 50%. Specific measures can be suggested for reclamation of these soils and appropriate crops are to be taken up in the cropping programme for better performance. Fertility index reflects high residue of Potash in soils of Khariar, Boden, Komna and Nuapada blocks and invariably all the soils show low degree of Phosphate availability.

Surface water scenario:

The following table shows the assessed inflow of surface water pertaining to the years 2001 & 2051 for the state of Odisha. The indicator shows that the basin wise availability of Surface water will be hampered due to climate change impact.

Basinewise availability of Surface Water (Scenario: 2001)

Basin Name	Average Annual flow (in BCM)			75% dependable flow (in BCM)		
	Own	Outside State	Total	Own	Outside State	Total
Mahanadi	29.90	29.255	59.155	25.508	23.225	48.732
Brahmani	11.391	7.186	18.577	8.849	5.521	14.011
Baitarani	7.568	-	7.568	5.434	-	5.434
Rushikulya	3.949	-	3.949	2.782	-	2.782
Vamsadhara	5.083	-	5.083	3.881	-	3.881
Budhabalanga	3.111	-	3.111	2.521	-	2.521
Kolab	11.089	-	11.089	8.885	-	8.885
Indravati	6.265	-	6.265	4.451	-	4.451
Bahuda	0.438	-	0.438	0.213	-	0.213
Nagavali	2.853	-	2.853	2.322	-	2.322
Subernarekha	1.193	1.115	2.308	1.193	1.115	2.308
Total	82.841	37.556	120.397	65.679	29.861	95.540

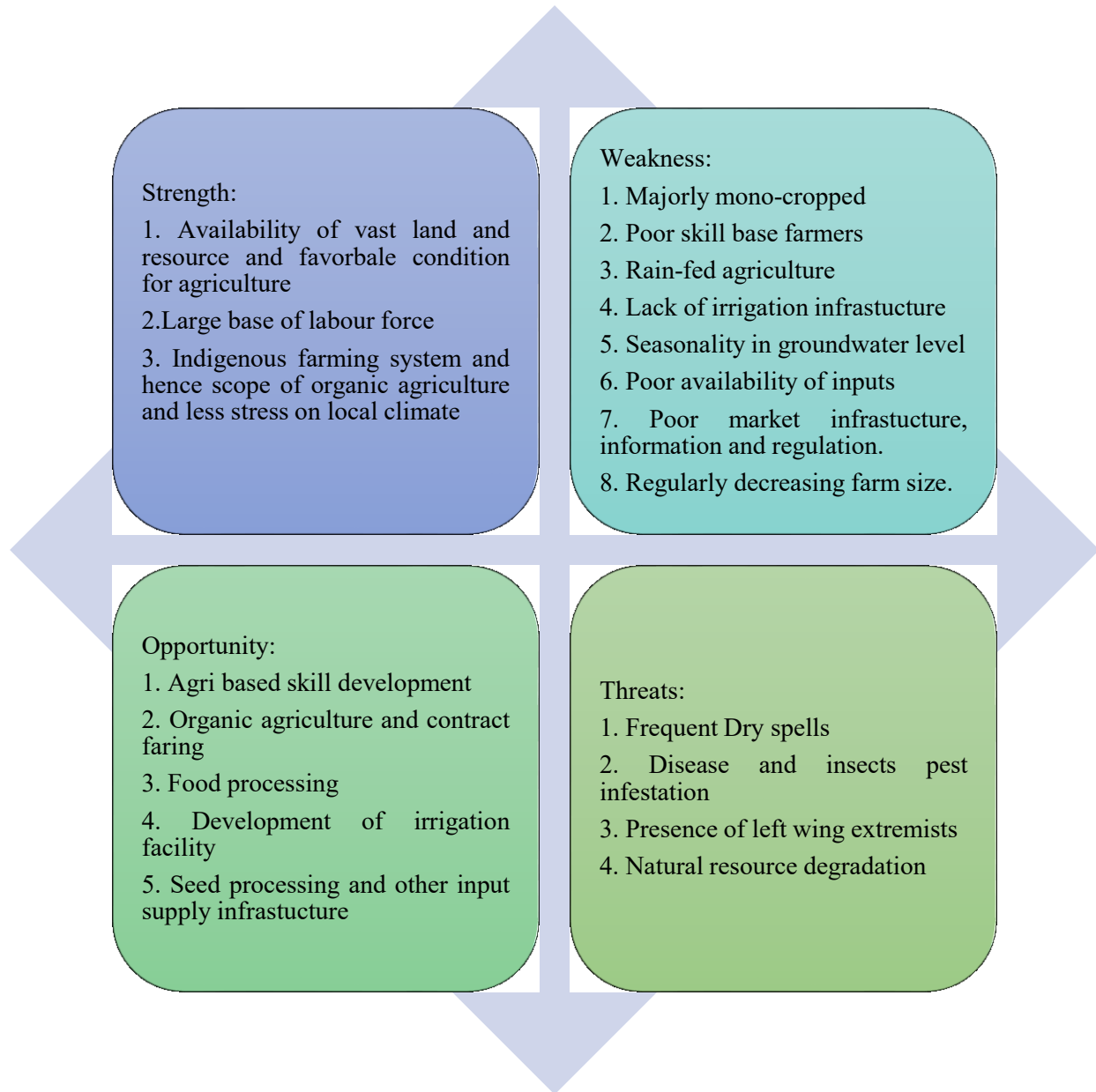
Basinwise availability of Surface Water (Future Scenario: 2051)

Basin Name	Average Annual flow (in BCM)			75% dependable flow (in BCM)		
	Own	Outside State	Total	Own	Outside State	Total
Mahanadi	29.90	21.039	50.939	25.508	16.702	42.210
Brahmani	11.391	3.118	14.509	8.849	2.395	10.884
Baitarani	7.568	-	7.568	5.434	-	5.434
Rushikulya	3.949	-	3.949	2.782	-	2.782
Vamsadhara	5.083	-	5.083	3.881	-	3.881
Budhabalanga	3.111	-	3.111	2.521	-	2.521
Kolab	11.089	-	11.089	8.885	-	8.885
Indravati	6.265	-	6.265	4.451	-	4.451
Bahuda	0.438	-	0.438	0.213	-	0.213
Nagavali	2.853	-	2.853	2.322	-	2.322
Subernarekha	1.193	1.115	2.308	1.193	1.115	2.308
Total	82.841	25.272	108.113	65.679	20.212	85.891

Source: Dept. of Water Resource

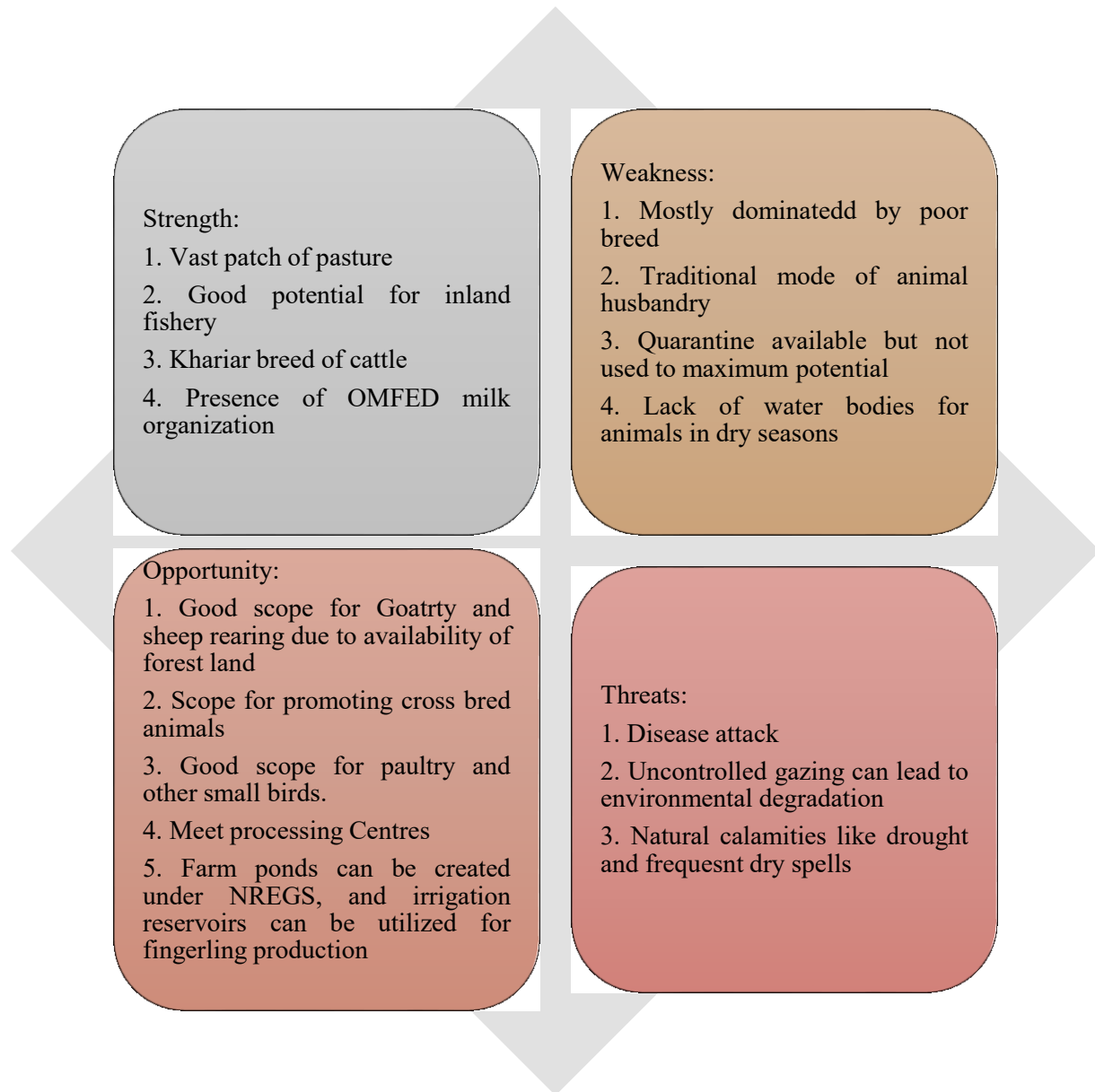
Jonk is part of the Mahandi basin and as indicated in earlier section has high level of vulnerability.

Project level SWOT Analysis
SWOT ANALYSIS AGRICULTURE SECTOR

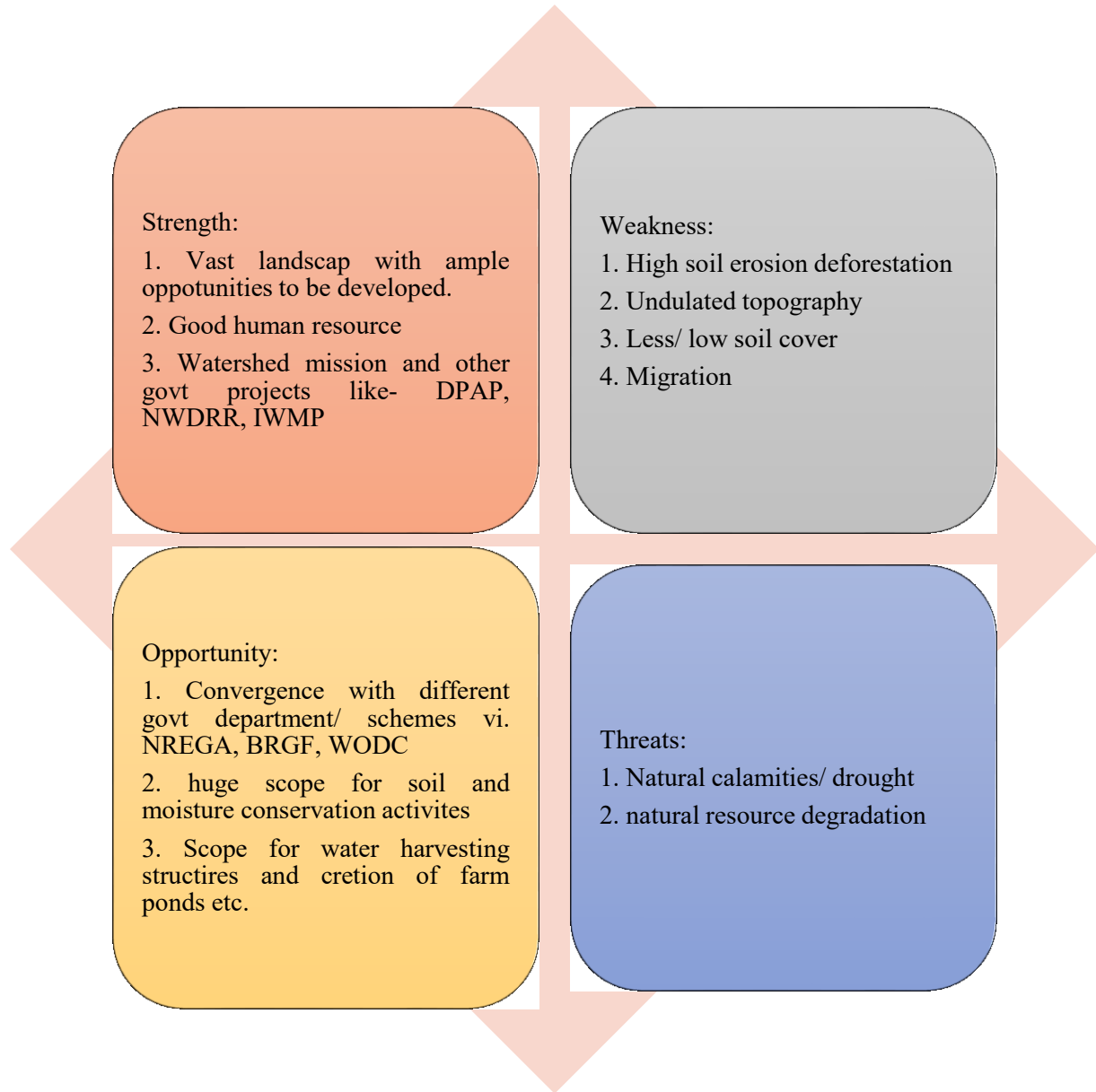


SWOT ANALYSIS HORTICULTURE SECTOR



SWOT ANALYSIS ANIMAL HUSBANDRY AND FISHERIES

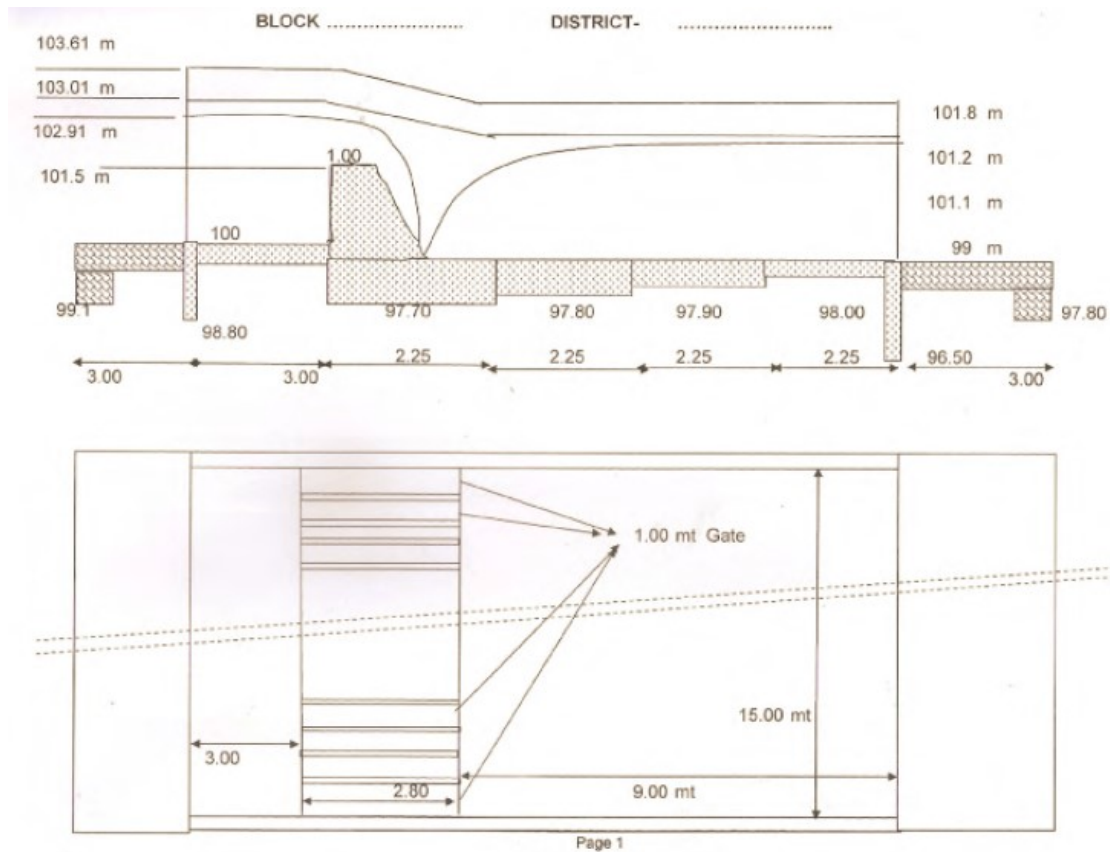
SWOT ANALYSIS ON WATER CONSERVATION / WATERSHED MISSION



(ii.) Specific Adaptation Activities to be implemented:

First of all this project is aiming at rejuvenating a hill stream in the Jonk basin. Secondly, it is attempting to keep water use efficiency as a goal with proper run off management. Current project aims to follow an integrated approach towards while climate proofing the water harvesting structure as well as enhancing the adaptive capacity of the poor farmers in the region linking them to different sectors like agriculture, horticulture, promotion of fishery. It is also planning a pilot implementation of renewable solar energy pumping mechanism that has strong mitigation co-benefit: Specific component that has elements of concrete adaptation have been give below:

- C1. Sustainable management of Soil and water through water harvesting structure [the climate modelled parameters on stream-flow, precipitation and temperature will be used to design appropriate structure].
- C2. Structural measures to climate proof the canal irrigation and enhanced command [it will use creatively the modelled precipitation data and take measures to enhance command, from flow, form lift and final stretch using drips in the stressed area]
- C3. Integration of suitable horticultural species [the goal is not only income diversification through vegetables but a cropping system needing lesser water]
- C4. Promote scientific inland fishery [integrating species in rice field that also ensures vector control and other fresh water fishery in the farm-ponds]
- C6. Sustainable energy use through solar pumping system [to demonstrate the reduction of fossil fuel and mitigation co-benefit]
- C7. Capacity building and Institutional Development of Pani Panchayats (micro-finance, micro-insurance, skill development, market linkage through Farmer Producer Organizations)
- C8. Development of tools and knowledge products for climate adaptation (and mitigation co-benefit)
- C9. Project management and monitoring system to



Structural intervention in the Jonk spring rejuvenation programme

(iii) Justification on the concrete adaptation activities of the project:

The concrete adoption activity is expected to show the following mentioned result to develop climate resilience in the targeted area.

- ✓ Reduced key risks and adverse impacts of climate change in water and agriculture sectors through introduction of structural measures like water harvesting structures like check-dams and farm ponds along the basin. *The activities envisaged in this includes a proper assessment of the modelled stream flow from both current variability and future climate projections as detailed out above. The structural interventions will take these parameters into account. Further, a lithological assessment will also be undertaken in the basin. The activities also would focus on two major agenda outlined the water mission under NAPCC and see how it helps in integrated water resource management at sub-basin level. This is a paradigm shift in how the basin level planning is attempted usually.*

- ✓ Maximize multi-sectoral, cross-sectoral benefits/co-benefits to meet the challenges of water and food security through the introduction of climate resilient cropping system, mixed farming model, solar energy in pumping system: *In this component attempt will be made to have series of interventions starting from choice of cultivars, developing a crop calendar (based on water use efficiency, sowing time), suitable crop rotation with legumes and hardy crops (focused on water use). It will also integrate some high value vegetables, value chain integration of Pani Panchayats with the market. The concrete adaptation focus here is justified based on the focus. The conventional focus is usually in enhancement of crop production. However, here this objective will be secondary, the approach will be more crop per drop. The water delivery and enhancement of adaptive capacity through livelihood options would ensure food and nutrition security. Conscious integration of solar pumping and drip irrigation in high value crops would ensure high mitigation co-benefits. Micro irrigation system will be used in the proposed project which emphasizes on optimal use of stored water, where the drip and sprinkler technique will be used. Through drip irrigation system the water will be supplied to the roots of the crops whereas through sprinkler irrigation the water will be sprinkled to the crop, hence enhancing the optimal use of water without any water loss during irrigation. Optimal use of water storage will lead to higher availability of water in the water storage area than the current situation and enhancing the probability of more water to percolate to the ground. This ground water recharge will affect the ground water level in the proposed area. The cropping pattern of the proposed location is mostly local vegetables, Maize and pulses. This kind of cropping pattern can be most suitable for drip and sprinkler irrigation system.*
- ✓ Human development, poverty alleviation, livelihood security and enhanced awareness of community by linking to Pani Panchayats and market linkage through Farmer Producer Organizations Government of Odisha is promoting Farmer Producer Organization in a big way. *Activities such as ensuring timely input and buy back of outputs, credit linkage, and crop insurance would ensure poverty reduction and enhance adaptive capacity of the water users.*
- ✓ Community based institution (Pani Panchayat/village committee) empowered to handle livelihood shock better through the capacity building input. *Two concrete activities will be taken up by CBOs here to ensure water use efficiency (a) water budgeting (b) crop planning focused on water use efficiency. The inputs will be provided on climate smart packages/training materials developed for the purpose.*
- ✓ There is systematic monitoring of the climate change and livelihood impact (adaptive capacity) in the village, multi-agency coordination platform established and best

practices are documented and widely shared. *The department will nominated specialized agency CTRAN as partner immediately to develop the baseline and also assist in the concurrent assessment of various adaptation benefits and co-benefits. It will also ensure that all the indicators identified are validated through the activity streams through stakeholder consultation. CTRAN has been assisting the climate change cell in the M&E of the climate change related activities in the state and helped in developing the first progress report (of Odisha SAPCC) in the country. The agency come out with learning document, knowledge products and policy briefs so that such replication will be possible elsewhere.*

(b) Economic, Social and Environmental Benefits of Project/Programme:

Components/Activities	Key Benefits (Direct)		
	Social	Economic	Environmental
<p>Component 1: Protection of the natural streams near the basin undertaking structural measures such as check dams based on future climate variability analysis along the basin for checking run-off and use measures for both drought and flood control endemic to the area.</p>	<p>The area is one of the most backward regions of the state. Scheduled caste and tribes have limited access to the benefit of water as most of these communities are victims of inequitable and adverse land distribution system. They usually are in the stressed regions of the command. The intervention will improve access and equity.</p>	<p>The high crop failure and low productivity in this region despite being in a basin are due to high variability of rainfall and monoculture of paddy. The intervention will help in reducing the effect of this variability and</p>	<p>The intervention is extremely important from the environment point of view. Several hill streams in this basin have been extinct due to lack of environmental flow and geomorphological reason. The intervention will help in attempting to restore at least one hill stream. It will also help in water quality improvement.</p>
<p>Component 2: Diversify livelihood from paddy monoculture and introduce horticultural crops (fruits and vegetables)</p>	<p>Cereal production certainly ensures food security and the integration of vegetables and fruits in the cropping system would ensure nutrition security for the malnourished people</p>	<p>Cereal crops are heavily dependent on public procurement system and fraught with delay in payment, vegetables are largely market linked and provides ready cash. The income diversification too is ensured.</p>	<p>Some of the crops (legumes) some tree crops would help in nitrogen fixation and soil organic carbon and improve soil health</p>
<p>Component 3: Link fishery and poultry as part of livelihood diversification initiative</p>	<p>While water related intervention would help the landed people the most, these activities will ensure livelihood security to landless people and fishermen who depend on water</p>	<p>The fishery and poultry will help in additional income at the household level especially for the agricultural labours and landless</p>	<p>Some species of fish can be used with the crops for vector control. The safeguards on chemicals etc. Need to be taken if required.</p>

Components/Activities	Key Benefits (Direct)		
	Social	Economic	Environmental
Component 4: Solar pumping system for efficient use of water in select crops based on vulnerability	The intervention addresses the energy equity without using the fossil fuel and part of the global movement to shift to renewable source	The intervention is likely to ensure efficient use of water and reduce the risk of crop failure.	This has not adverse environmental impact and helps in reducing the over-exploitation of aquifers.
Component 5: Achieving sustainability by linkages with Pani Panchayats for water management	Pani Panchayats are village based, member controlled organizations and ensure participation of all stakeholders as mandated under act. The villages in ayacut will be linked to it. They will also help in conflict reduction.	The pani-panchayats are empowered to collect water tax under the act and also linkages with FPOs would help them in accessing additional equity and grant to take comprehensive economic activities and would help them increase their income.	They will be given input on efficient water management techniques and use of environmentally sustainable cropping practices. This will help improve the local ambient environment.
Component 6: Develop resource material and tool for monitoring of the climate change adaptation and mitigation co-benefits	This will capture the equity issues in greater detail including climate justice and access issues. It will also help in developing a greater understanding adaptation benefit and mitigation co-benefits for all stakeholders and requisite safeguards.	It will improve the understanding of the economic benefits and risk avoidance benefit (in monetary terms) both at enterprise level, ecosystem level	It will also help in identification environmental benefits at the ecosystem level and indications of impact on local climate variability.

(c) Sustainability of the Intervention:

The structural intervention rejuvenates a hill spring and this would ensure long term recharge in the command and make most of the agricultural intervention sustainable. The soil moisture conservation measures will be based on long term climate proofed design hence it will sustain the stress Horticultural crops provide ready market and with assured irrigation the risk is less and are sustainable. The social

institutions like Pani Panchayats will have linkages with users and would be front ending with FPOs. There will be water budgeting, there will have business plans aimed at sustainability. They will also receive equity and grant form other programmes to enhance their capital base.. The risk transfer instruments like micro-finance and insurance would add to the sustainability of the programme. This will also provide seamless linkages to other programme for mainstreaming climate change agenda. Efficient micro-irrigation would ensure water conservation and better water user efficiency.

(d) Analysis of the Cost-Effectiveness of the Project / Programme:

(i) Alternative Options

Activity	Proposed Alternatives	Benefits (of Proposed Activity)
C1. Structural intervention to rejuvenate natural stream	Other alternative is to have a dam which is much more costlier and mega lift is fossil fuel intensive. Typically a drip system may look costly but if we take the whole system concept (based on water balance), it may be one third that of flood-irrigation.	Natural recharge
C2. Diversification to horticulture	Coarse grain and cereals heavily dependent on public procurement and MSP; but has its own problem of delay.	Better liquidity
C3 Fishery and other allied activities	Alternative is migration which has a much higher societal cost with disruption in education and health issues	Income and nutrition security
C4. Solar Pumping	The fossil fuel based elect city is cheaper however it aids to global warming with intergenerational cost	Renewable source, mitigation co-benefit

(ii) Weighting of the Project Activities:

Type of Activity	Funding Requirement
Capacity Building Activity (27%)	5,49,42,718
Investment Activity (53%)	10,64,45,631
Project Management Activity (20%)	3,86,11,651

(e) Alignment with National & State Action Plans & Other Policies/Programmes:

The activity conforms to the objective of National Water Mission (integrated water resource management and water use efficiency) of NAPCC, it also aligns with activity streams of water sector under SAPCC (water conservation and water use efficiency: Key priority 5 and 8). It also ties up with other poverty alleviation initiatives in the western Odisha region to reduce regional disparity and poverty.

(f) Component wise Technical Standards

Civil construction would follow OPWD code. The irrigation projects have standard structural guideline. FPO promotion will be as per the published norm of SFAC. The solar pumps as per the MNRE specified standard and notified by OREDA. Pani Panchayat formation and management as per the act and operational guideline.

(g) Duplication Check:

Project	Objectives	Complementarity	Geographical Coverage/Agency
OIAWP-ADB	Improvement of the MIP and basins/sub-basins	The area is different and even the approach; regular conservation measures and irrigation are complementary. However restoration natural springs is unique	Different approach and also different area
RKBY	Agricultural development	Some convergence, that has been shown in the budget and only additional activities for this project has been budgeted	No duplication

Project	Objectives	Complementarity	Geographical Coverage/Agency
		For SRI only training component included For drip and sprinkler	Only uncovered areas

(h) Details on Stakeholder Consultation:

Consultation	Date / Place	Participation	Objective	Outcome
Department level chaired by Principal Secy	Rajeev Bhawan	All technical officers, knowledge partner (CTRAN) and nodal officer CC cell	Idea generation for developing the PCN	PCN
Consultation on visioning	25/8/2015 Rajeev Bhawan	Department staff, CBOs, PPs, Knowledge partners, Nodal officer CC cell	Formulation of DPR	Detailed PCN cum DPR

Field consultation will be conducted after project approval.

(i) Learning and Knowledge Management Component:

This project will have a strong capacity building, learning and knowledge management component. It will start with participatory vulnerability analysis at the basin level and based on that both structural and non-structural measures will be developed. A specialized agency CTRAN having experience in climate adaptation and mitigation areas would develop the baseline and also help in monitoring and learning components. The project will develop participatory micro plan as well as operation and maintenance guidelines. The M&E protocol would be based on the logical framework. Various measures such as the formation of Pani Panchayat and heir capacity building would follow the standards already adopted in the states and evolved modules, the additional elements relating to climate chare related risks and measures to increase adaptive capacity would be added.

The components related to FPO formation and their planning is already implemented by partner CTRAN in Odisha and is in line with RKBY and similar process shall be followed. The additional element related climate smart cropping system would be included.

Participatory guide for adopting climate smart approaches in crop planning, soil health management and vector control would be added.

This project is first of its kind. A process documentation would be made, policy brief shall be prepared and learning, materials on various approaches will be developed for wider replication.

(j) Sustainability of Project / Programme Outcomes:

Project / Programme Components	Expected Concrete Outputs	Expected Outcomes	Sustainability mechanism	Responsible parties
Component 1: Protection of the natural streams near the basin undertaking structural measures such as check dams based on future climate variability analysis along the basin for checking run-off and use measures for both drought	3 check-dams in the Jonk basin to protect the natural spring Enhance the command of to 145 ha Provide farm level water management through drip and sprinkler in stressed areas	Reduced risks of adverse impacts of climate change (drought and flood) in water and agriculture sectors and rejuvenation of hill stream for long term sustainability	Rejuvenation of natural stream would ensure recharge downstream	Water Resource Department and pani panchayat

Project / Programme Components	Expected Concrete Outputs	Expected Outcomes	Sustainability mechanism	Responsible parties
and flood control endemic to the area				
Component 2: Diversify livelihood from paddy monoculture and introduce horticultural crops (fruits and vegetables)	About 500 no of farmers take additional horticultural crops in the command area after paddy based on the water use efficiency	Poverty alleviation, livelihood security an enhanced awareness of community on efficient water use in the economic activity	Will ensure livelihood security, nutrition security and enhance adaptive capacity, better water use efficiency will ensure long term water security	Department and Agriculture
Component 3: Link fishery and poultry as part of livelihood diversification initiative	Fishery activities are taken up in the command and farm ponds User associations to work with about 100 no of landless people to involve them in fishery activities Backyard poultry unit established	Enhanced adaptive capacity through livelihood diversification from non-land based activity as well as fishery, especially for the landless	Will ensure equity for the landless	Department of AH, Common Interest Groups
Component 4: Solar pumping system for efficient use of water in select crops based on vulnerability	Pilot programme on solar pumping to be introduced and 15 units made operational for efficient use of water	Reduced dependence on fossil fuel and efficient management of water in the stressed region	Fossil fuel substitution with alternate energy reduces global warming and is part of climate justice	DoWR with OREDA and private suppliers

Project / Programme Components	Expected Concrete Outputs	Expected Outcomes	Sustainability mechanism	Responsible parties
Component 5: Achieving sustainability by linkages with Pani Panchayats for water management	3 no of pani panchayats to be formed and capacity of the members enhanced on issues relating to climate risk and vulnerability related to water and efficient use of water.	Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	Pani panchayat has self sustainable roadmap including collection of water taxes and creation and managing corpus	DoWR and PP
Component 6: Develop resource material and tool for monitoring of the climate change adaptation and mitigation co-benefits	Modules on climate adaptation at the local level developed for the PP The adaptation benefit and mitigation co-benefits to be determined through concurrent monitoring Knowledge products/best practice documents developed	Maximized multi-sectoral, cross-sectoral benefits/co-benefits to meet the challenges of water and food security	Lesson learning and dissemination and mainstreaming and sustainability	DoWR project partners

(k) Overview of the Environmental & Social Impacts & Risks:

The proposed project, at this stage, does not seem to have any potential risks or negative environmental and social impact. Rather it will be helpful to bring better adaptive capacity to farming community and expected to exert a positive impact on the local environment.

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
<i>Compliance with the Law</i>	Mostly	Will be ensured

<i>Access and Equity</i>	Ensured	Ex post monitoring
<i>Marginalized and Vulnerable Groups</i>	Ensured	Ex-ante required
<i>Human Rights</i>	NA	Indeterminate at this stage
<i>Gender Equity and Women's Empowerment</i>	Ensured	Will be monitored based on the composition of group
<i>Core Labour Rights</i>	Will be ensured	Ex-post, concurrent
<i>Indigenous Peoples</i>	Protected (PESA)	Ex-post, concurrent
<i>Involuntary Resettlement</i>	Not envisaged	Not envisaged
<i>Protection of Natural Habitats</i>	Will be done	Will be assessed
<i>Conservation of Biological Diversity</i>	After site identification	Will be assessed
<i>Climate Change</i>	Addressed	Will be assessed
<i>Pollution Prevention and Resource Efficiency</i>	Will be done if required	Will be done
<i>Public Health</i>	Will be done	Will be done
<i>Physical and Cultural Heritage</i>	Ensured	As per site if any
<i>Lands and Soil Conservation</i>	Ensured	Ex post monitoring

3.0 IMPLEMENTATION ARRANGEMENT:

(a) Describe the Arrangements for Project / Programme Implementation:

The project will be implemented by Department of Water Resources and a dedicated PMU will be executing entity.

(i) Who will implement the project?

There will be a district level project committee at the basin level in Nuapada headed by Divisional level officer and will be supported by technical teams acting as PIA for under taking various structural and non structural measures. This will be termed as a spear head team. The PMU will sign MoU with other PIAs from horticulture, agriculture, soil conservation, fishery department, OREDA and knowledge partner CTRAN for specific components. In addition specific expertise shall be sought from OUAT, IIT Bhubaneswar as and when required.

It will also interface with NIE (NABARD) on issues related to external monitoring, fund management.

(ii) How will the Project be Coordinated with (and/or mainstreamed in to):

The state already has an institutional framework for implementation of SAPCC. The committee is headed by Chief Secretary.

The climate change cell has been mandated to coordinate as focal with Department of Water Resources as the executing entity, MoEFCC for funding and other matters and NIE (NABARD) for project cycle support.

(b) Measures for Financial and Project / Programme Risk Management:

Risk	Rating (High / Medium / Low Etc.)	Mitigation Measures
Programme	Medium	The structural measures to rejuvenate only functional hill stream had to be proper technical investigation based on the geomorphology of the area. Others are follow up measures.
Financial	Low	Apart from project funding, the department also has plans to invest in many complementary measures in the area
Environmental	Low	It is aimed at environmental restoration and all applicable standards will be maintained
Social	Low	PP and FPOs ensure equity access

(c) Monitoring and Evaluation Arrangement:

Monitoring & Evaluation Plan Activities	Responsible Person	Yr. I	Yr. II	Yr. III	Yr. IV	Total	Time Frame
Inception	DoWR	*				1	1 month
Indicator development for baseline	Knowledge partners	*				1	15 days
Baseline development	Knowledge ² partner with PIAs	*				1	3 months
Project MIS	DoWR	*				1	
Fund flow MIS	NIE	*				1	

² CTRAN will act as knowledge partner

Monitoring & Evaluation Plan Activities	Responsible Person	Yr. I	Yr. II	Yr. III	Yr. IV	Total	Time Frame
Concurrent Monitoring	Knowledge partner	*	*	*	*	4	About 16 person months
Mid term evaluation	NIE with partners		*			1	1 month
Special report on Adaptation cost benefit	CTRAN			*	*	2	2 month
End term evaluation report	About 16 person months				*	1	2 months

Reporting Mechanism for Monitoring and Evaluation:

The project level MIS will capture data every month and would be part of the existing integrated project management system already available with department. The concurrent monitoring report will be shared with climate change cell and NIE every month and the other special reports would be shared as per the specified time frame based on the project implementation plan that would be developed during the inception.

(d) Result Framework:

Attached in Annexure 1

(e) Detail Budget with Budget Note:

Components	Activities		Funds Required
Component 1: Creation of structural measures such as check dams.	1.1 Check Dams / water harvesting structures in the water stress / rain-fed areas	2,90,45,000.00	7,85,00,000.00
	1.2 Fencing , peripheral development , Earth work for ponding water for fishing Pump house construction, Approach road etc.	1,41,30,000.00	
	1.3 Farm level water management in rain-fed & water stress areas through drip/sprinkler systems;	3,53,25,000.00	
Component 2: Diversify livelihood from paddy monoculture and introduce horticultural	2.1 Assessment of feasibility of inter-cropping / mixed cropping and its promotion;	30,00,000.00	2,00,00,000.00
	2.2 Integration of suitable horticultural species	28,00,000.00	
	2.3 Credit linkage and convergence of other existing schemes at farmer and area level;	26,00,000.00	
	2.4 Formation of FIGs around clusters and crops	32,00,000.00	
	2.5 Federating FIGs in to FPOs and Business Planning	28,00,000.00	
	2.6 Registration of FPOs	6,00,000.00	
	2.7 Input and output market Linkage	50,00,000.00	
Component 3: Link fishery and poultry as part of livelihood diversification initiative	3.1 Promotion of Integrated Farming System, taking in to account livestock and agriculture;	60,00,000.00	1,00,00,000.00
	3.2 Promote scientific inland fishery	40,00,000.00	
Component 4: solar pumping system for efficient use of water in select crops based on vulnerability	4.1 Procurement and installation of Solar Pumping System in the proposed location	1,21,16,504.85	1,51,45,631.07
	4.2 O & M cost of the Solar Pumping System	30,29,126.21	
Component 5: Achieving sustainability by linkages with Pani Panchayats/ Village committee for water management	5.1 Training / Orientation of target farmers on climate resilient agriculture / horticulture using water resource	75,72,815.53	2,52,42,718.45
	5.2 Extension services and hand holding support to target farmers from time to time;	63,10,679.61	
	5.3 Allocation of fund to pani panchayats/Village Committee for self sustainability and maintenance of harvesting structure	50,48,543.69	
	5.4 Organising dissemination workshops on project learnings at State level;	63,10,679.61	

Component 6 : Develop resource material and tool for monitoring of the climate change adaptation and mitigation co-benefits	6.1 Vulnerability analysis, specific to water resource and allied sectors, including agriculture sector;	62,50,000.00	2,50,00,000.00
	6.2 Identifying priority areas of intervention within the sector along with target mass, crop specificity etc.;	25,00,000.00	
	6.3 Setting benchmarks for project execution and linking it to common and specific adaptation actions;	25,00,000.00	
	6.4 Mobilisation of community, consultation and finalization of overall strategy in a participatory manner;	25,00,000.00	
	6.5 Documentation of project learning from time to time;	25,00,000.00	
	6.6 Mapping climate benefit of adaptive practices and overall adaptation benefits;	12,50,000.00	
	6.7 Tracking / documenting climate specific parameters in the project locations;	12,50,000.00	
	6.8 Constitution of Project Steering Committee (PSC) and review of project dimensions;	-	
	6.9 Constitution of Technical Advisory Committee (TAC) and review;	-	
	6.10 Project monitoring, Supervision and Reporting.	62,50,000.00	
Project Execution Cost (incl Rs 10 lakh for formulation)			2,02,86,405.83
Total Project Cost			19,41,74,757.28
Project Cycle management Fee (NABARD)			58,25,242.72
Amount of Financing Required			20,00,00,000.00

(f) Disbursement Schedule with Time bound Milestones:

As per guideline and to be detailed out after sanction.

Rs 9 crore in first six months and rest in each year based on utilization.

ANNEXURE A- RESULT FRAMEWORK

Outcome/Output	Indicator	Baseline	Target	Sources of Verification	Risks and Assumptions
Component 1: Protection of the natural streams near the basin undertaking structural measures such as check dams, based on future climate variability analysis along the basin for checking run-off and use measures for both drought and flood control endemic to the area					
<i>Outcome 1: Reduced risks of adverse impacts of climate change (drought and flood) in water and agriculture sectors and rejuvenation of hill stream for long term sustainability</i>	Scientific treatment measures for the upstream is prepared	The current hill stream (Khakhara nala) is only surviving stream is highly vulnerable	By the end of the project the planning process would have taken up measures to climate proof the surviving hill stream and improved recharge downstream	Detailed project report based on the hydrological investigation	Unforeseen geo-morphological changes
Output 1.1 Three check-dams in the Jonk basin to protect the natural spring 1.1.1 Participatory Micro Plan and management plan 1.1.2 Treatment operational manual incorporating climate proofing measures 1.1.3 Upstream treatment	The detailed project report, microplan			Community Vulnerability report Operational manual Treatment schedule	Sensitization of the departmental staff to develop operational manual taking into future climate scenario and community level assessment
Output 1.2 Structural measures of climate proofing the canal & stream implemented and command area increased at Khakhara nala	The command increased to 145 ha	Current command	The enhanced command would have met the needs of the dependant users and residual moisture would have provided scope for	Check measure, Hydrological data Concurrent Monitoring Report	Quality of work

ANNEXURE A- RESULT FRAMEWORK

Outcome/Output	Indicator	Baseline	Target	Sources of Verification	Risks and Assumptions
			diversification of crop.		
Output 1.3 Provide farm level water management through drip and sprinkler in stressed areas 1.3.1 Identification of stressed areas in the command (ex post measure) 1.3.2 Identification of users to be provided with drip and sprinkler	About 100 no of drip and sprinkler set to be provided	No apparent source of irrigation	Recharge improved, new crops get protective irrigation	User database Concurrent Monitoring Report	Procedural delay, beneficiary contribution
Component 2: Diversify livelihood from paddy monoculture and introduce horticultural crops (fruits and vegetables)					
<i>Outcome 2: Poverty alleviation, livelihood security an enhanced awareness of community on efficient water use in the economic activity</i>	500 no of farmers to take additional horticultural crops in the command area after paddy based on the water use efficiency	Cropping practices adopted are sensitive to monsoon variability and yield loss. Number of targeted small scale farmers (cooperating farmers) that are cultivating only one crop due to un-availability of residual moistures are on the margin of poverty	By the end of the programme at least 75% of the targeted beneficiaries would have grown more than one crop due to enhanced command and have remained food secure and income secure	Field verification, monitoring report	Sensitization of the departmental staff Timely input for additional crops Support of extension machinery
Output 2.1 Area under horticulture increased			Better moisture regime at the lower ends of the command	Hydrological investigation Monitoring report	Sensitization of line departments

ANNEXURE A- RESULT FRAMEWORK

Outcome/Output	Indicator	Baseline	Target	Sources of Verification	Risks and Assumptions
2.1.1 Participatory crop calendar development 2.1.2 Water Budget			area, command area increased		
Output 2.2 Enhanced crop production due to availability of adequate moisture	Yield per ha increased		Crop plan for the block reflects additional crop and results	District agricultural plan	Timely inputs
Component 3: Link fishery and poultry as part of livelihood diversification initiative					
<i>Outcome 3: Enhanced adaptive capacity through livelihood diversification from non-land based activity as well as fishery, especially for the landless</i>	100 no of landless people form common interest groups to take up fishery and/or poultry for livelihood enhancement	Landless people are not included in the water use related planning process	X no of groups would have been formed	Micro-plan Concurrent Monitoring Report	Sensitisation of extension staff Timely input
Output 3.1 Households are included in fishery activities through Water User Association 3.1.1 Identification of landless households 3.1.2 Fishing rights delineated	100 no of landless to take up fishery	No such activity	Additional income source for landless	Monitoring report	Conflict Poor culture/mortality
Output 3.2 Common interest groups are formed for poultry	About 50 no of CIG to be linked to poultry companies/federation	No systematic intervention of this nature	X no of landless HH take up scientific poultry rearing	Manuals Training Material Transaction Record	Noncompliance to standard guidelines, distress sale
Component 4: Solar pumping system for efficient use of water in select crops based on vulnerability					

ANNEXURE A- RESULT FRAMEWORK

Outcome/Output	Indicator	Baseline	Target	Sources of Verification	Risks and Assumptions
<i>Outcome 4: Reduced dependence on fossil fuel and efficient management of water in the stressed region</i>	15 no of farmers use solar pumping system	No solar pump usage		Training manual Audio-Visuals Monitoring report	
Output 4.1 Solar pumping system for efficient use of water in select crops based on vulnerability	10 no of programmes covering 20 no of participants from among different kinds of stakeholders	No such training module existed	Yr 1 x 2 no of programmes Yr 2 x 2 no of programmes Yr 3 x 4 no of programmes Yr 4 2 refresher consolidation	Crop stats Animal mortality Disease burdn (water borne)	Resistance to adoption Poor extension
Output 4.2 Policy briefs and knowledge products, videos produced capturing the lesson	20 no policy briefs to be produced, AV documentation	No such training module exists	As per the evolving scenario (minimum 6)	Policy briefs, learning materials	Poor O&M
Component 5: Achieving sustainability by linkages with Pani Panchayats for water management					
<i>Outcome 5 Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level</i>	3 no of pani panchayats are formed and capacity of the members enhanced on issues relating to climate risk and vulnerability related to water and efficient use of water	Existing coverage	Users of the area are integrated in to pani panchayat	Database Monitoring report	Conflict
Output 5.1 Coverage of targeted beneficiaries and sensitisation to link to PP	500 no of users including landless to be integrated in to PP			Database Monitoring report	

ANNEXURE A- RESULT FRAMEWORK

Outcome/Output	Indicator	Baseline	Target	Sources of Verification	Risks and Assumptions
Output 5.2 Training and capacity building of members	20 no of programmes		75 % coverage with annual increment	Database Monitoring report	
Component 6 : Develop resource material and tool for monitoring of the climate change adaptation and mitigation co-benefits					
<i>Outcome 6: Maximized multi-sectoral, cross-sectoral benefits/co-benefits to meet the challenges of water and food security</i>				Monitoring report	
Output 6.1 Community Resource persons mobilisation 6.1.1 selection criteria 6.1.2 ToT	Local communities to participate in use of information and methods relating to adaptation and mitigation	New activity	100 per cent coverage in the command	Monitoring report Training material	Poor involvement or delivery
Output 6.2 material and processes , toolkits M & V and process documentation 6.2.1 conceptual issues and pictorial tool kits 7.3.2 Participatory indicator development and Micro Plan 7.3.2 audio-visual documentation (local language and English sub-title)	Models, Methods, Programme audio-visual materials on the values and threats to the area developed	No such model exists in the target village	Knowledge materials on process, content of adaptation and mitigation co-benefits	Documentation Policy brief Monitoring Report Carbon rating of the project	