SASHANKA®
AGRICULTURE TECHNOLOGY NEXT GENERATION

PROJECT COMPLETION REPORT

Solar Based Irrigation System
Under
SCA to TSS Scheme



Implemented By: - **SASHANKA AGRO TECH PVT. LTD.**

Supported By: - **JHARKHAND TRIBAL DEVELOPMENT SOCIETY (JTDS)**
DEPARMENT OF ST, SC, MINORITIES & BC WELFARE (GOJ)
KALYAN COMPLEX, BALIHAR ROAD, MORABADI

COMPLETED

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1. Executive Summary

The Indian agricultural sector is driven by smallholder farmers, who own more than 85% of the landholdings and contribute 51% of the country's production. Climate change, natural disasters and soil degradation have added to the economic aftermath of the COVID-19 pandemic to create a challenging environment for agriculture. Indian farms are expected to support the food security of more than 1.5 billion people by 2030. This situation calls for a complete transformation of India's agricultural sector.

The convergence of responsible cropping practices along with artificial intelligence and emerging technologies with agriculture provides a brilliant opportunity for India to make its agriculture more agile, data-driven and efficient, while continuing to focus on farmers' well-being, uplifting rural households' standard of living, feeding the population and aligning agriculture to face the climate challenge.

2. Introduction

Globally, 2 billion people depend on 500 million small farms for their livelihoods.

India's marginal and small farmers (who own less than two hectares of land) possess 86% of land holdings, covering 47.3% of the total cultivable area and contributing to 51% of the country's agricultural produce. With every passing generation, land holdings have fragmented further.

These smallholders struggle to capture much of the value of their products, which typically travels through numerous intermediaries with whom farmers negotiate from a position of disadvantage due to their lack of access to markets, pricing and grading information and services. Farmers receive as little as 25% of the final selling price of their crop, throttling productive investment and slowing the transition from subsistence to market-oriented farming.

Farmers' limited access to modern machinery, logistics and analytical data – such as on soil composition and climate patterns – leaves them at a disadvantage. Added to that is the worsening fallout of climate change in a sector already prone to the worst effects of adverse weather and natural processes such as soil degradation and pest attacks. The Indian Council of Agricultural Research predicts that climatic changes could reduce irrigated rice yields by 7% by 2050.

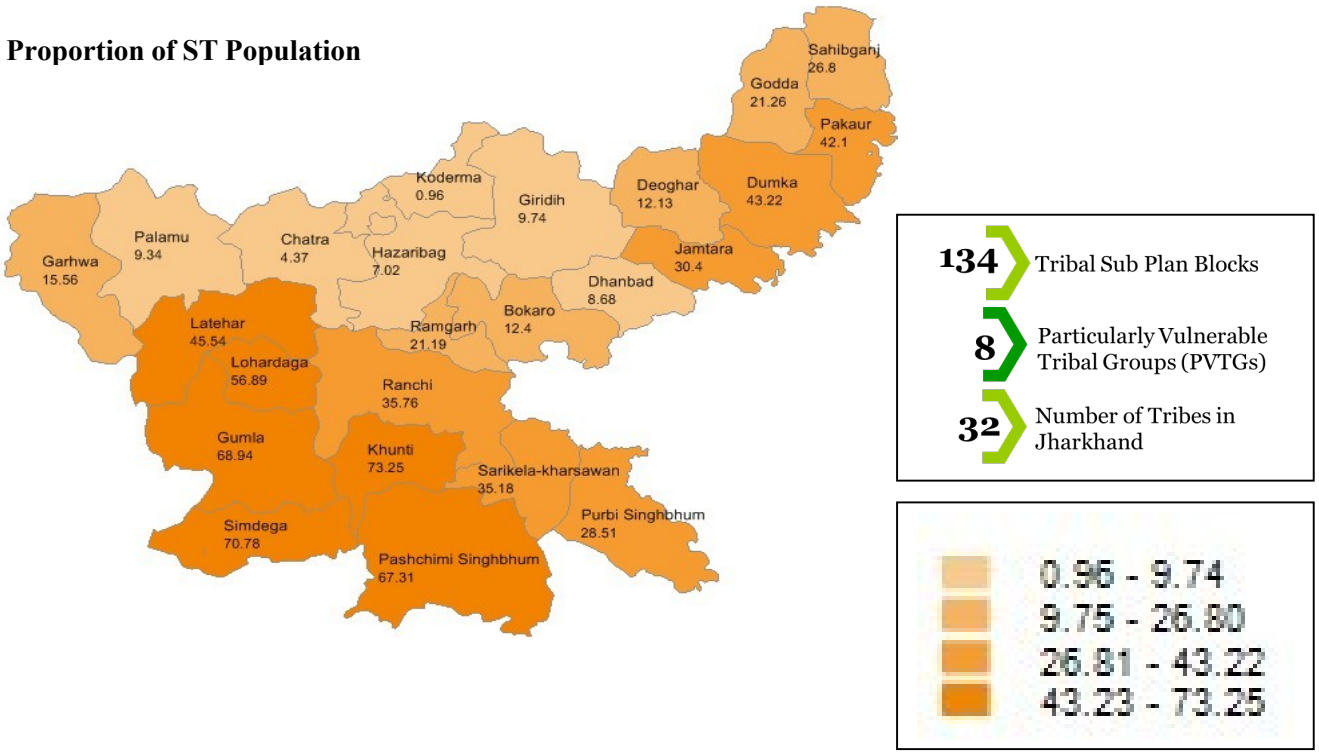
While facing these critical systemic challenges, Indian agriculture is expected to continue producing more food – enough to feed an estimated 1.5 billion people by 2030. In this situation, the welfare of farmers, especially smallholder farmers, and improvement in farm income are essential to ensure that agriculture provides a viable livelihood for existing and coming generations. Yet, rising input costs and low returns from farming, as well as increasing wages in the non-farm sectors, have caused investment in agriculture to shrink even as young people become reluctant to take up farming. Meanwhile, increasingly erratic and unpredictable rainfall is compounding farming risk.

3. Jharkhand at a glance

A. Demography:

Indicators	Jharkhand Census 2011	India Census 2011
Total Population	**329.88 lakh**	**121.05 crore**
ST Population – Total	**86.45 lakh**	**10 crore**
Proportion of ST Population	**26.2%**	**8.63%**
PVTG Population - Total	**2.92 lakh**	**107 lakh**
Literacy Rate – Total	**67.63%**	**74.04%**
Literacy Rate – ST	**57.13%**	**57.96%**

Proportion of ST Population



Around 80% of rural population of Jharkhand is directly or indirectly dependent on agriculture. The agricultural economy of the Jharkhand state is characterized by dependence on nature, low investment, low productivity, mono-cropping with paddy as the dominant crop, in inadequate irrigation facilities and small and marginal holdings. The dependence of agriculture on the vagaries of the rain-God can be gauged from the fact that as much as 90% of the total cultivated area is un-irrigated. Primarily a rain dependent state, Jharkhand is witnessing deficient rainfall for the past few years now and even its relatively well-off farmers are becoming daily-wage workers or force to take up otherlivelihood source.

The period of rain is restricted to only four months in a year, June to September, when monsoon arrives. The remaining eight months are dry. There is some rainfall during the months of December and January in some parts of the state. Even during monsoon, the rainfall is scanty and undependable in many parts of the country. Sometimes the monsoon delayed considerably while sometimes they cease prematurely. Due to lack of different water conservation structure at village level, many a times, in spite of good rainfall the situation become worsen for the farmers to get a good agriculture return. This pushes large areas of the state into low production in agriculture and facilitates them to migrate and leads to remittance-based economy. With the help of different water conservation structure like staggered trenching, bonding, plantation, small water harvesting structure at the suitable location etc. to conserve the water as well as irrigation infrastructure for betterutilization of water during the time of water scarcity can effectively enhance the food security as well as cash income for the rural mass.

Therefore, water conservation as well as use of the conserved water through irrigation helps in stabilizing the output and yield levels. It also plays a protective role during drought years. Since, both income and employment are positively and closely related to output, prevention of fall in output during drought is an important instrument for achieving stability of income and employment in the state.

Irrigation confers indirect benefits through increased agricultural production. Employment potential of irrigated lands, increase production etc. is improving income of government from agriculture. Availability of regular water supply will increase the income of farmers imparting a sense of security and stability in agriculture.





AGRICULTURE PRODUCE

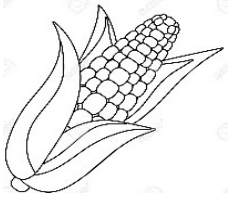


➔ **Lohardaga**

➔ **Ranchi**

➔ **Khunti**

➔ **Gumla**



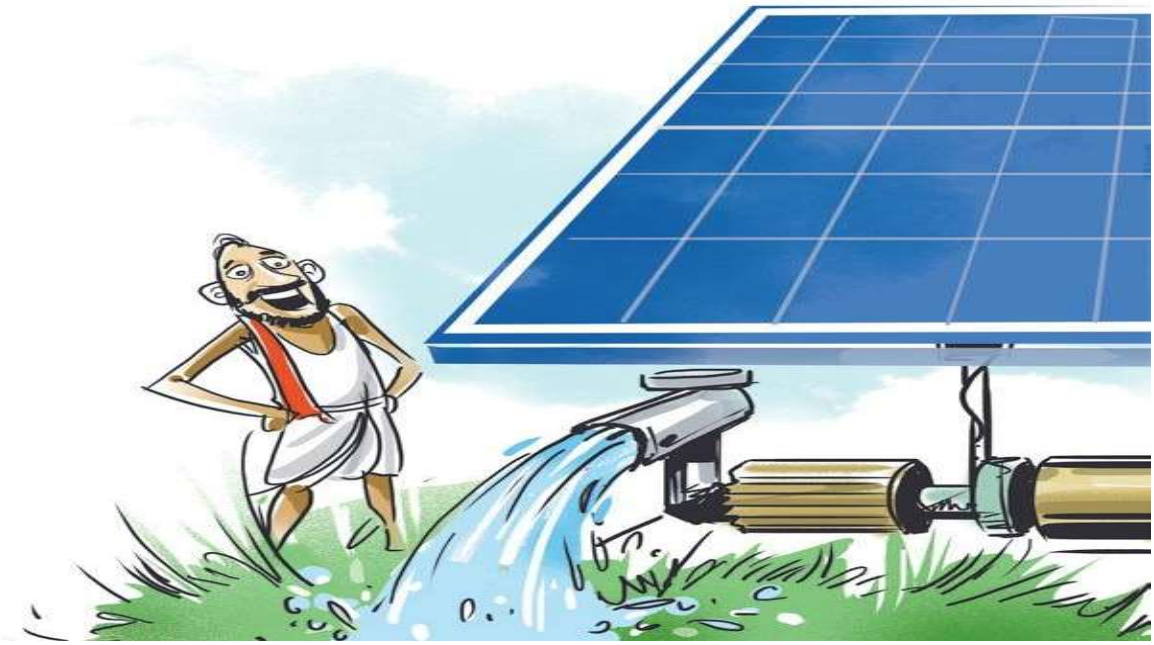
➔ **Latehar**



RAIN FALL

DISTRICT	MM
Lohardaga	1832.0
Ranchi	1766.9
Khunti	1506.0
Gumla	1045.6
Latehar	1409.6

Rainfall Statistics of India -2021



4. Details of scheduled area in Jharkhand (data as per 2011 census).

Sl. No	District	No. of TSP Blocks	Total Population	ST Population	% ST Population
1	Sahebganj	9	1150567	308343	26.80
2	East Singhbhum	11	2293919	653923	28.51
3	Jamtara	5	791042	240489	30.40
4	Seraikela Kharsawan	9	1065056	374642	35.18
5	Ranchi	18	2914253	1042016	35.76
6	Pakur	7	900422	379054	42.10
7	Dumka	10	1321442	571077	43.22
8	Latehar	9	726978	331096	45.54
9	Lohardagga	7	461790	262734	56.89
10	West Singhbhum	18	1502338	1011296	67.31
11	Gumla	12	1025213	706754	68.94
12	Simdega	10	599578	424407	70.78
13	Khunti	6	531885	389626	73.25
14	Godda (Sunderpahari, Boarijore)	2	166592	127068	76.27
15	Garhwa (Bhandaria)	1	51488	39653	77.01
Total		134	15502563	6862178	44.26

5. Jharkhand: General features of the population with focus on Scheduled Tribes

The State of Jharkhand was formed by carving out the Chhotanagpur, Santal Pargana and Hazaribagh Divisions of undivided Bihar in November, 2000. It has a geographical area of 79,714 sq km and a population of 26.95 million (Census 2001), 26% of whom are Scheduled Tribes and 12% Scheduled Castes. Jharkhand is also mostly rural, with 78% of the State's population in villages. Salient demographic features of the State are enclosed as Annexure 1.

About 3.8 m ha or 48% of the State's geographical area is cultivable. However, the net sown area is only 1.8 m ha[1] or about 23% (all India 47%) of the geographical area and more than half of the cultivable land remains fallow. Per capita net sown area is about 0.067 ha (all India 0.15 ha). Only 0.16 m ha or about 8% of the net sown area is irrigated from all available sources. About 30% (2.33 m ha) of the geographical area is classified as forests. About 70% of the farms are smaller than 1 ha in size and another 15% 1 to 2 ha (with an average of about 1.2 ha). Only about 2.5% of the farms are larger than 10 ha.

The State has a sub-humid climate with average annual rainfall of 1,300 mm[2]. However, due to high variability of monsoon rains, low moisture holding capacity of soils, absence of developed aquifers due to the hard rock substrate and high run-off due to the undulating terrain, agriculture is fraught with high risks[3]. Even in years of "normal monsoons" with overall rainfall around the long-term average, farmers are often faced with the spectre of total crop failure due to long dry spells at critical junctures in the crop cycle during the wet season when almost 90% of the crops are cultivated.

Social profile, livelihoods and property relations:

On the basis of the social profile of the people, the broad pattern of livelihoods and property relations, Jharkhand can be divided into three distinct regions. The northern, northwestern and central districts of Garhwa, Palamu, Chatra, Koderma, Giridih, Hazaribag, Deoghar, Bokaro and Dhanbad represent the transition zone between the south Bihar plains and the Chhotanagpur plateau. The population of Scheduled Tribes in these districts is significantly less than the State average and that of Scheduled Castes proportionately more.

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[1] Government of India, Planning Commission, Agro-climatic Regional Planning Unit (ARPU), Working Paper No. 10, August, 1998, page 28.

[2] Except in parts of Palamu division where rainfall is in the range of 800-1,000 mm.

[3] As per the categorisation by Indian Meteorological Department, Jharkhand figures in the "drought corridor" of the country, which also includes Rajasthan, Gujarat, Andhra Pradesh (drought prone districts of Rayalaseema and Telengana regions), West Uttar Pradesh, Madhya Pradesh (including Chhattisgarh), Bihar and parts of West Bengal adjoining Jharkhand.

Land distribution is highly skewed in favour of the upper castes. Many Scheduled Caste families, such as *Bhuyian*s do not even have homestead lands of their own. Agriculture is the main source of livelihoods for landowners. The landless subsist as agricultural workers locally or migrate in search of work to all parts of the country. In certain pockets, coal mining is a source of livelihood for the landless. The north-eastern districts of Dumka, Godda, Sahebganj and Jamtara are "agglomerates", a large number of predominantly Scheduled Tribe villages interspersed with a few predominantly non-tribal villages (Latehar in the west and Saraikela in the south have similar composition). The non-tribal communities represent incursions by the settled agrarians from the northern plains (and in the south from Orissa). Though agriculture is the main livelihood source, dependence on forests is significant, especially for Scheduled Tribes. Shifting cultivation is practiced widely in parts of the Rajmahal hills in the northeast. Migration to neighboring West Bengal and to the tea gardens in the northeast supplements' livelihoods. Southern and southwestern Jharkhand comprising of East and West Singhbhum, Ranchi, Lohardaga, Simdega and Gumla have a uniformly high proportion of Scheduled Tribes (more than 50%), especially in rural areas (Pakur in the northeast has a similar composition). Land distribution is fairly even and landlessness insignificant. Agriculture is the main source of livelihoods, supplemented by collection and trade of firewood and other non-wood forest products, and seasonal migration.

Farming systems and rural livelihoods in Jharkhand:

Rice/paddy, the principal crop of the State sown over 1.3 m ha in 1994-95[4] had an average yield of only 1 ton/ha[5]. Maize, minor millets and pulses are the other principal crops and together occupy about 25% of the net sown area, with similar low yields. Oilseed production is very less. Horticulture and floriculture are yet to pick up in the State While the entire State has an undulating and hilly terrain, there are local differences in topography and it is convenient to classify the landscape as upper-, middle- and lower watersheds. The level of development in agriculture and the overall pattern of livelihoods vary with local topography and distance from urban centers. Forests were the principal source of livelihoods until recently in the upper watersheds that have steeper slopes and are almost entirely populated by the Scheduled Tribes. Each household here would own some homestead land, often as much as a tenth of an acre or more, used to cultivate maize, finger millets, beans and some tuber crops. Traditional varieties of broadcast rainfed paddy(*godadhaan*) would be cultivated in the upper and middle portions of the cultivated land.

[4]Planning Commission, *ibid*.

[5] The average yield for India during the year was 1.9 ton/ha, with Tamil Nadu having the highest average yield at 3.2 ton/ha. Yields vary a great deal within Jharkhand due to the undulating topography and varying levels of development of agriculture.

Productivity here is abysmally low and risk of crop failure very high. The narrow valley portions are used to cultivate traditional varieties of transplanted paddy, with low but fairly reliable yields. Modern seed varieties, chemical fertilizers, irrigation and farm machinery are yet to enter these places. Agriculture is entirely for subsistence. Cattle are reared for draft power and manure. A few hens and pigs that scavenge the homesteads serve as buffers. Forest produce, various beans and wage income are sources of cash. Migration increasingly is taking the place of gathering in the livelihood basket.

The middle watersheds with gentler slopes occupy the largest area of Jharkhand. ScheduledTribes, in majority here, have been settled agriculturists longer in these parts compared to their counterparts in the upper watersheds. However, farming practices remain rudimentary. Chemical fertilizers and improved seeds are used on a limited scale by the more entrepreneurial and less food-insecure. Vegetables and tubers are cultivated on a small scale in the homestead besides maize and millets. *Goda dhaan*,millets, pulses and oilseeds are the upland and midland crops. Transplanted paddy is cultivated in the low lands. The valleys are broader. Paddy yield averages from 0.5 ton/ha in the upland to about
1.5 ton/ha in the valleys. Even short spells of rain failure can significantly reduce crop yields in the uplands and midlands. Open wells capable of irrigating about a tenth to half an acre are now fairly widespread, because of various government schemes, though mainly the non-tribal farmers make good use of these. Land and water management practices, are more evolved than in the upper watersheds. The practice of open grazing after paddy is harvested inhibits winter cultivation even where irrigation is available. Cattle are reared primarily for manure and draft power. Pigs, goats, poultry and a few fruit trees (jackfruit and tamarind) constitute the household economic buffer.

Farming systems in the lower watersheds, comprising gentle slopes and wider valleys, have been influenced to some extent by the green revolution-led advances in agriculture. Small pockets of economic vibrancy have developed near cities and towns. Markets and market routes have been established. Though the Scheduled Tribes are in a minority here, they too have adopted better agricultural practices compared to their counterparts elsewhere. Double cropping, year-round vegetable cultivation and small pockets of sugarcane can be seen in such areas. Cultivated land is managed fairly well in the valleys though water resources have not been harnessed adequately and yields remain below potential. Uplands and forests are poorly managed. Tractors can occasionally be seen in use for ploughing and agricultural transport. Dairy, mainly among non-tribal people, supplements agriculture.

Historically, public interventions by way of capital investment, research and extension to improve agriculture in India have largely been guided by concerns of aggregate food sufficiency and have focused on the irrigated plains and deltas, considered high potential areas.

In case of undivided Bihar, itself far behind other States even in terms of agricultural development, the high potential areas were the northern plains. As the "low potential" part of one of agriculturally the least developed States, Jharkhand thus suffered doubly in terms of policy attention to agriculture. As markets typically follow demand, channels for supply of implements and inputs are virtually non-existent due to absence of demand, and further constrain development of the sector.

Subsidiary farm-based activities like dairy, poultry, etc. generally follow growth and development in agriculture. These have not developed in the State in spite of increasing demand for the products. The State has a large population of scrub cattle, kept principally for draft power and manure. However, due to the practice of free grazing and non-descript breeds of cattle, their contribution to agriculture by way of manure is limited in spite of a large population. This would in the long run hamper intensification of agriculture given the low fertility of soils.

Forests continue to be an important supplemental source of livelihoods for the Scheduled Tribes. Tasar silk and shellac rearing, collection and trade of firewood and a variety of fruits, nuts and leaves are the sources of cash and non-cash income from forests. Jharkhand produces about 60% of the country's raw tropical tasar silk and 56% of its shellac. Declining forests, low capital investment, low levels of technology and a trade chain unfavorable to primary producers are marginalizing this once important source of livelihoods for the Scheduled Tribes.

Low productivity of agriculture, one-dimensional nature of the farm economy and lack of development in non-farm livelihood sectors make food security[6] and subsistence the primary concern of farmers in general and tribals in particular.

6. Jharkhand Tribal development Society (JTDS) at a glance

Jharkhand Tribal Development Society (JTDS) was established with the objective of improving the living conditions of tribal people in general and PVTGs in particular. This is sought to be achieved by "organizing and enabling the communities to adopt sustainable and productive natural resource management regimes, adopt market-oriented production systems and learn the skills and gain the experience of planning and implementing development plans relevant to their villages".

JTDS was established on 2002 as a society under Dept. of Welfare, Govt. of Jharkhand. Since its inception it is continuously working for the betterment of Tribal people of Jharkhand. It has successfully implemented the International Fund for Agricultural Development (IFAD) funded Jharkhand Tribal Development Programme (JTDP).

[6] Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. (NC Saxena, Report on the Food Assistance Programme in India, Planning Commission, 2002)

After completion of the JTDP, IFAD again funded for another project called Jharkhand Tribal Empowerment and Livelihood Project (JTELP), which started in October 2013 and will be completed by December 2021. Under JTELP, JTDS has worked with 2.11 lakhs households in 1779 villages of 32 blocks spread across 14 districts of Jharkhand.

7. About Agency

Sashanka Agro Tech Pvt. Ltd. is an Indian company established in 1999. Company started its operation from in an around Ranchi, India.

The company has successfully completed various projects in, Horticulture, Center of Excellence, Livelihood Promotion, Integrated Farming, Forestry, Rural & Tribal Development & Allied Sector and has a wider range of customer base ranging from Government, Research Institute, Corporate and Farmer. Currently its operation are divided into four division.



The company has successfully completed more than 750 projects in cold climatic zone of high altitude areas to scorching heat of dessert and from heavy rainfall areas to windy zone of sea shores. The company has more than 2 hundred fifty thousand satisfied customers.

- ✓ ***The company has more than 250 thousand satisfied customers.***
- ✓ ***Manufacturing & Production facility setup spread over more than 80,000Sq.mtr. of land.***
- ✓ ***Automatic & Semi-Automatic production line for Greenhouse manufacturing.***
- ✓ ***State of the art Plant Biotechnology & Mushroom Lab.***
- ✓ ***More than 200^{+} Professionals are engaged in our company.***

  More than 50^{+} Engineers, Agronomist, Agriculture Scientists, Biotechnologist and Technicians are engaged in offering services for complete or partial project planning and implementation

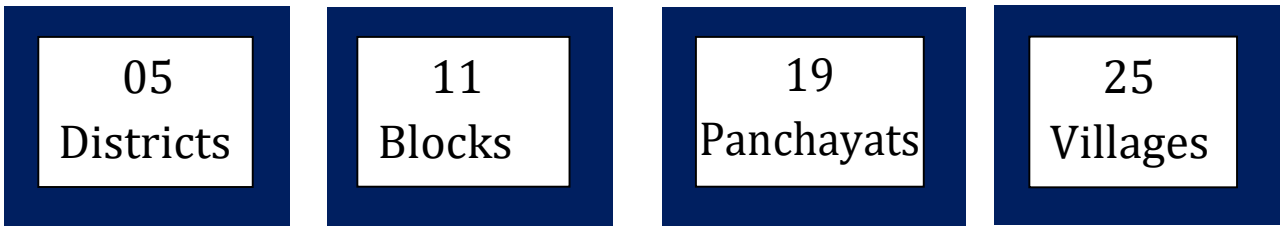
8. Central sponsored scheme SCA to TSS at a glance

Special Central Assistance to Tribal Sub Scheme (SCA to TSS) is part of the Umbrella Scheme for Development of Scheduled Tribes which is now a Core of the Core Scheme.

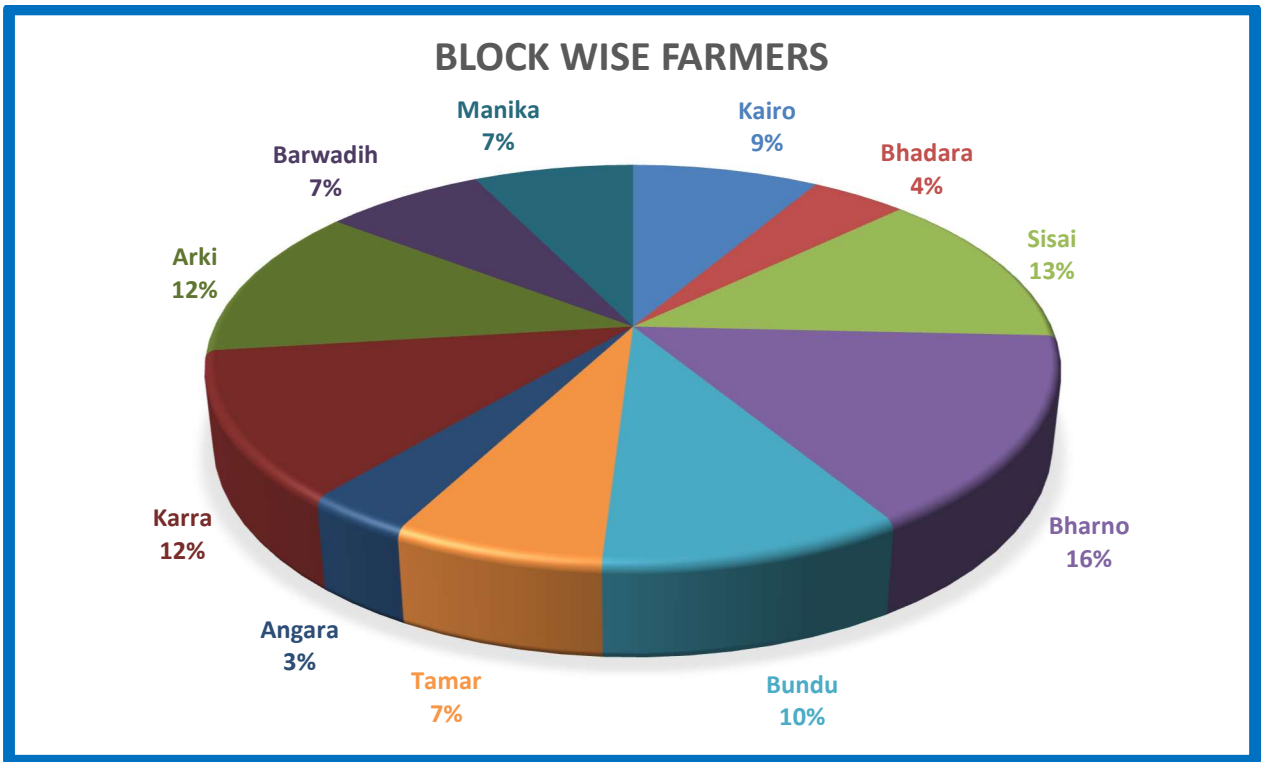
Special Central Assistance to Tribal Sub-Scheme (SCA to TSS)is 100% grant from Government of India (since 1977-78). It is charged to Consolidated Fund of India (except grants for North Eastern States, a voted item) and is an additive to State Plan funds and efforts for Tribal Development.

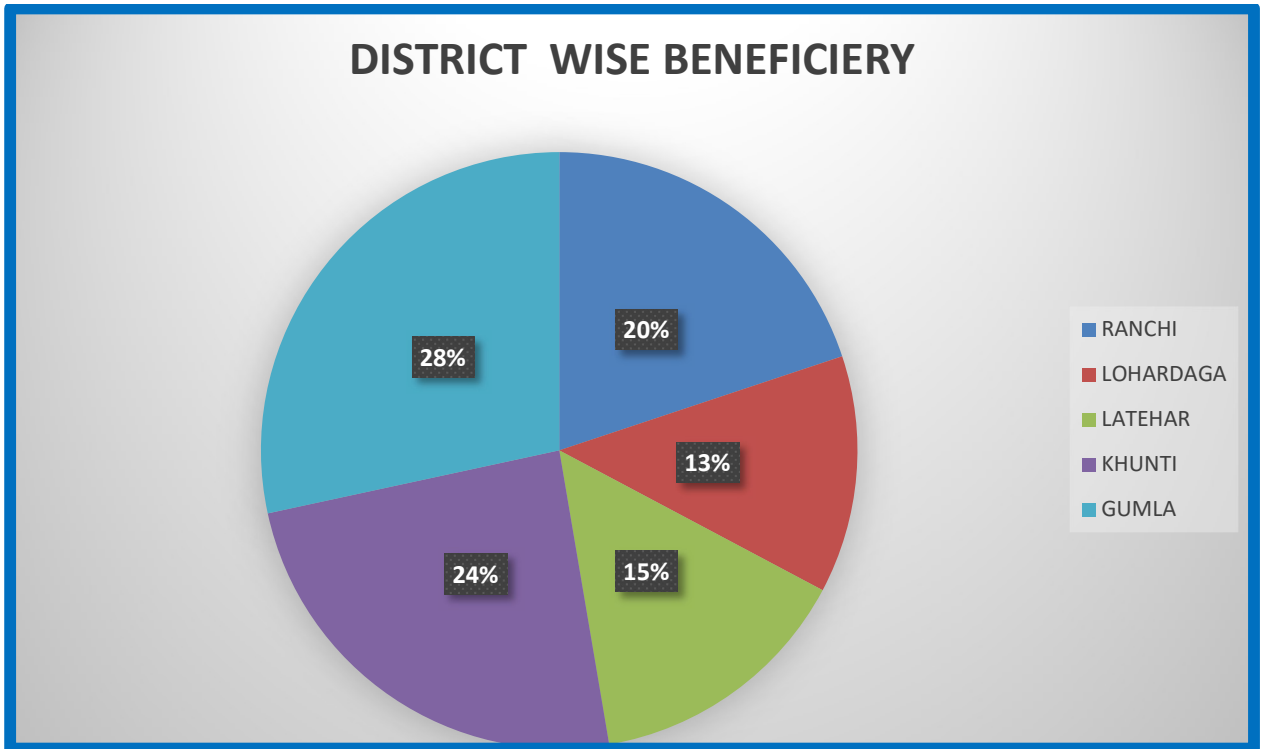
This grant is utilized for economic development of Integrated Tribal Development Agency (ITDA), Integrated Tribal Development Project (ITDP), Modified Area Development Approach (MADA) Pockets and Clusters, PVTGs and dispersed tribal population.

9. Project Brief



Beneficiary details			
Sr. No.	**District**	**Block**	**No. of Beneficiary.**
1	**Lohardaga**	Kairo	35
		Bhandra	18
2	**Gumla**	Sisai	53
		Bharno	64
3	**Ranchi**	Bundu	40
		Tamar	28
		Angara	14
4	**Khunti**	Karra	49
		Arki	51
5	**Latehar**	Barwadih	30
		Manika	30
Total			**412**


BLOCK WISE FARMERS
Manika
7%
Kairo
9%
Barwadih
7%
Bhadara
4%
Sisai
13%
Arki
12%
Karra
12%
Bharno
16%
Angara
3%
Tamar
7%
Bundu
10%


DISTRICT WISE BENEFICIERY
20%
13%
15%
24%
28%
RANCHI
LOHARDAGA
LATEHAR
KHUNTI
GUMLA

10. Project Objectives

Making farmer aware regarding Solar based irrigation system and use of solar pump

Knowledge Transfer related to production at village level.

- **Training of farmers.**
- **Demonstrations at site.**

Strengthening the knowledge base of farmers in close co- ordination with SPMU and DPMU.

- **Converging with agri-tech start-ups to deliver government welfare schemes and programme.**



10. Project Outcome

- **The community-owned solar irrigation model could be economically very attractive: -** The tribal community members cultivated their homestead lands, typically ranging between 3 and 4 acres, using irrigation from the pump. Solar pumps are expected to have the most impact in the Non-Kharif season by enabling cultivation through irrigation access, particularly during summers. All the tribal members uses the solar pump during the Kharif season and maintain the fertilizer of the soil for the upcoming period.









There were no diesel-pump-using farmers among the survey respondents to compare the cost of irrigation with diesel pumps. Overall, the model proved to be very economical for participants.


Latitude: 23.860242
Longitude: 84.400482
Elevation: 371.15±5 m
Accuracy: 3.1 m
Time: 27-06-2023 11:54
Note: solar irrigation system
Jungur
Powered by NoteCam


GPS Map Camera
Bundu, Jharkhand, India
5H8Q+GH7, Bundu, Jharkhand 835204, India
Lat 23.166178°
Long 85.588703°
13/04/23 11:45 AM GMT +05:30
Google

The additional income was about 30-32% of the project participant's annual agriculture income from the previous year. Most of the respondent's self- consumed their harvest, while some were able to sell it within their village. Hence, the overall impact on income was to difficult to estimate. Beyond cultivation, the pump also helped improve the quality of life of participants. Almost half of the participants used water from the pump for household needs and livestock rearing. All group whose pump was connected to a borewell, used the water for drinking purposes as well. Overall, 100% of participants expressed complete satisfaction with the projects and said that the investment was fully worth it.









- **Group building is a long-term exercise. Community projects developed around existing social structures are more likely to sustain: -** Group members satisfy most of these criteria due to their inherent design, but they need to be supported through training and capacity building.

The programme design took each habitation as a unit.





Remarks: - Above photograph are of cultivated land after the installation of Solar Water pump

The project as a result of a series of activities taken up by GRAM PRADHAN



Most Groups in the project were formed with the support of GRAM PRADAN

Group Foundation



GRAM PRADHANGRAM PRADAN initiated livelihood promotion activities, particularly vegetable cultivation with additional support in the form of training, inputs, and market linkages.

Group Based Livelihood



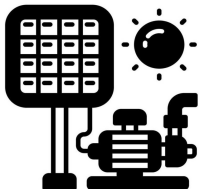
GRAM PRADAN conceptualised the solar pump project for increasing non-Kharif production.

Project Ideation



GRAM PRADAN co-ordinate with the farmers group for handle all the technical planning, including area identification and coordinated with district officials for work.

Technical planning & coordination with Department

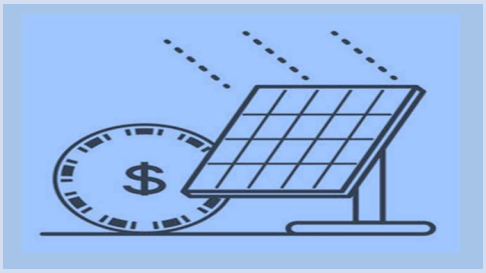


The farmer group worked with the vendors allotted to them by the department. The members contributed all the labour required, including installation of the project.

Pump deployment

12. Project Impact

Project impact is assessed on Quantitative and Qualitative parameters and farmers experience shared during different interactions:

Quantitative impact	Qualitative impact
Economic impact (Forecasted) ➢ Improvement in yield ➢ Decrease in cost of cultivation. ➢ Increase in revenue (farm-gate price) ➢ Profit/loss from sale of produce ➢ Increase in net household income ***Environmental impact*** ➢ Uses of diesel and electricity decreases. ➢ Ozone free system ➢ No emission of CO2 Gas ➢ Free from other heat trapping greenhouse gases ➢ Noise free ➢ Best use of renewal Energy ***Inclusivity Impact*** ➢ Maximum number of impacted due to water source ➢ Better family well being ➢ Change in life style of the farmer	***Trust and transparency*** ➢ Information asymmetry removed. ➢ Improvement in Knowhow regarding Solar water Pumping system ➢ Clean energy system ➢ Promise benefit over the long term ➢ solar energy, trust is non-negotiable ***Behavior and adoption*** ➢ Adoption and active use of renewal source of energy ➢ Adoption of SOP in crop cultivation round the year ➢ Contribute to 50-60% of growth ➢ Economical system adopt by the farmer group 

13. Solar Based Irrigation System



What is solar Irrigation

Solar irrigation uses the sun's energy to power a pump which supplies water to crops to help growth. Solar energy can be used in agriculture and irrigation in a variety of ways. One common application is using solar panels to power irrigation pumps, which can save farmers money on electricity costs and reduce their dependence on fossil fuels. Solar-powered drip irrigation systems can also be used to deliver precise amounts of water to crops, reducing water waste and increasing crop yields. Additionally, solar energy can be used to power temperature control systems in greenhouses, allowing farmers to grow crops year-round. The use of solar energy in

agriculture and irrigation can also help to reduce greenhouse gas emissions and promote sustainable farming practices

Why is solar Irrigation Important

To grow the highest quality crops in the most efficient way they must have the right amount of water at the right time. Too little or too much water will lead to crops wilting, soil erosion and poor nutrient uptake of the plants. Irrigation is the controlled application of water to respond to crop needs.

Types of Solar Irrigation System

Surface Irrigation

- In which water is moved across the surface of agricultural lands

Localized Irrigation

- like spray or drip or trickle system where water is applied to each plant or adjacent to it

Sprinkler Irrigation

- In which water is piped to one or more central locations within the field and distributed by overhead high-pressure sprinklers or guns

Uses of Solar Irrigation System

The benefits of using solar water pumps in agriculture are numerous. Reduce the cost of irrigation, which can be a significant expense for farmers. Provide a reliable source of water, which is essential for crop growth. Eco-friendly and does not contribute to global warming.

Solar Water Pumps vs Electrical/Diesel Pump

Energy Source



- Solar water pumps use renewable solar energy, whereas traditional water pumps typically rely on grid electricity or fossil fuels. Solar water pumps are environmentally friendly and can help reduce carbon emissions, while traditional water pumps can increase greenhouse gas emissions depending on the source of electricity

COST



- The initial cost of installing a solar water pump may be high because of the cost of solar panels and other components. However, solar water pumps can achieve long-term energy and electricity savings by utilizing free solar energy, whereas traditional water pumps require continual payments for electricity or fuel

Grid Independent



- Solar water pumps can operate independently of the grid, making them suitable for remote or off-grid areas where electricity supply is limited or expensive. Traditional water pumps require a reliable grid connection or a constant supply of fuel to operate

MAINTENANCE



Solar water pumps typically have fewer moving parts than traditional water pumps and require less maintenance. Traditional water pumps may require more frequent maintenance, repairs and replacement parts, which can increase the total cost of ownership

Environmental Effect

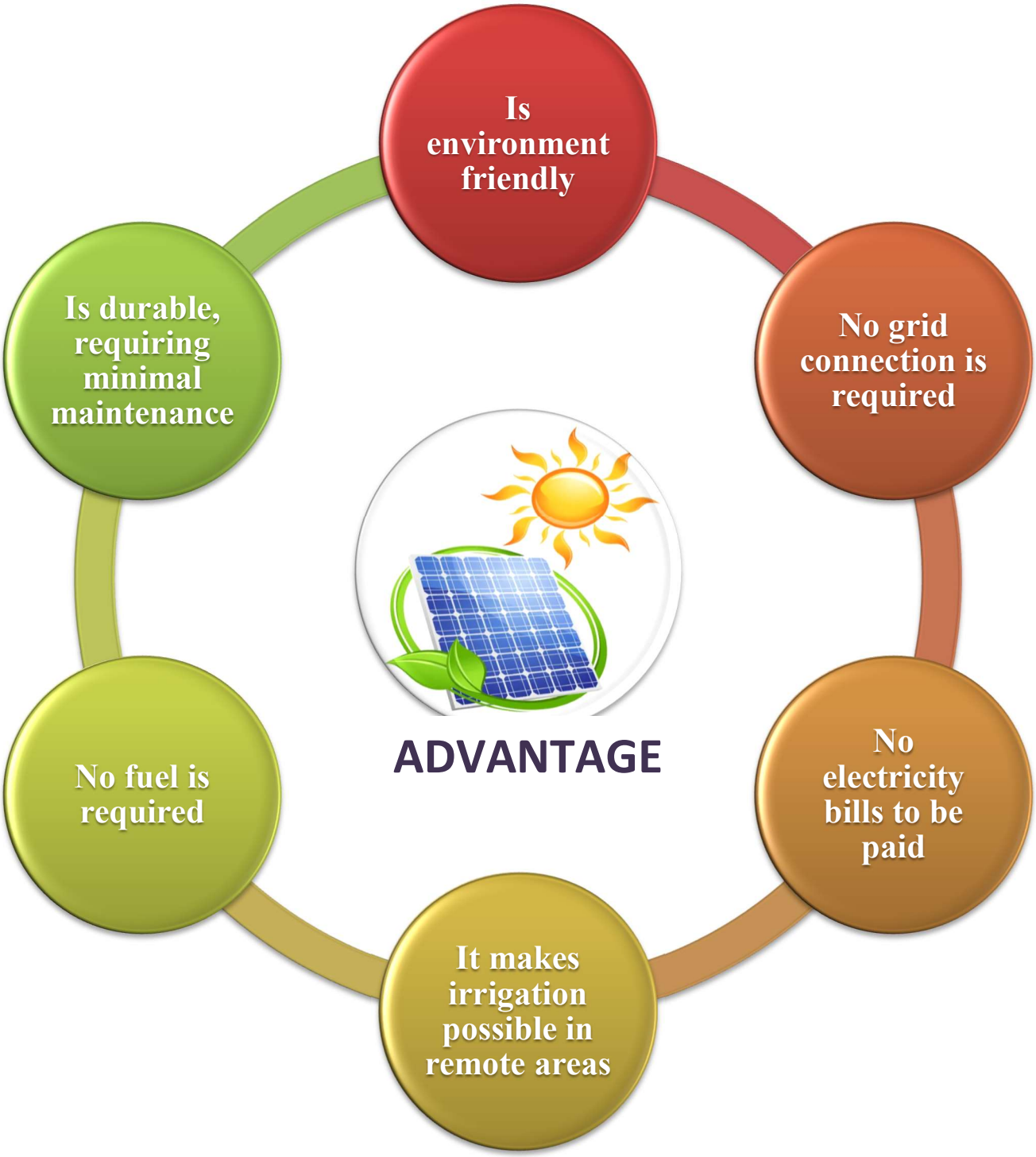


Solar water pumps are environmentally friendly as they do not produce harmful emissions whereas traditional water pumps can pollute air and water sources depending on the type of fuel used.

RELIABILITY



Both solar-powered and traditional pumps can offer a dependable source of water when properly designed, installed, and maintained. However, the performance of solar water pumps depends on the availability of sunlight and may be affected by weather conditions and seasonal changes. Traditional water pumps can be disrupted by power outages or fuel shortages.


Is environment friendly
No grid connection is required
No electricity bills to be paid
It makes irrigation possible in remote areas
No fuel is required
Is durable, requiring minimal maintenance
ADVANTAGE

14. Methods of preparation/Installation/Execution

Step1:- Meeting Conducted with the selected district DPMU Team for working on Solar Based Irrigation System under SCA to TSS Scheme.

Step2:-
Gram Sabha organize at the selected village and necessary document are collected from the selected farmer.

Step 3:-
Jointly site survey of listed farmer has done with Geologist, company representative & concern district DPMU team.

Step 4:-
After receiving the Geologist Report Boring work has started on listed farmer site.

Step 5:-
Solar Based Irrigation System structure has delivered to farmer site and installation of structure had completed.

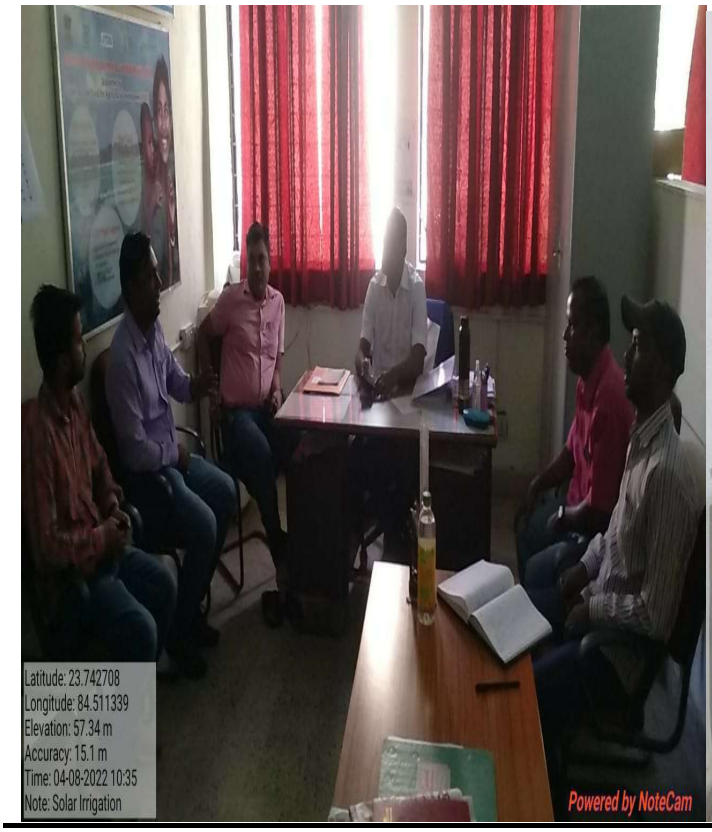
Step 6:-
Solar Module and pump has delivered to farmer site then our engineer has installed the solar pump with QRC outlet was built on site.

Step 7:-
All completed site had been jointly visited by agency representative, Geologist and concern district DPMU Team. Bore well discharge report was prepared by Geologist.

Step 8:-
After Installing of Solar Pump Fencing work has completed for safety of solar based irrigation system.

Step:-9
Training session was conducted by the company representative on site. Then Installed Solar Based Irrigation System was handed over to beneficiary for utilization of water.







OFFIFIAL MEETING WITH CONCERN DPMU TEAM BEFORE THE EXECUTION OF WORK







GRAM SBHA ORGANIZE AT VILLAGE WITH DPMU TEAM



SITE SELECTION AT BENEFICIERY FILED



WATER TESTING DONE AT BENEFICIERY FILED





BORE WORK DONE AT SELECTED BENEFICIERY FILED





WATER LEVEL TESTING AFTER THE BORE WORK COMPLETED WITH DPMU TEAM

INSTALLTION OF SOLAR PUMP AT VARIOUS PLACE AT SELECTED BENEFICIERY







KHUNTI AND LATEHAR DISTRICT



RANCHI DISTRICT



LOHARDAGA DISTRICT



LOHARDAGA DISTRICT



GUMLA DISTRICT


NAME- SANTOS NAAG
BARUHATU
Panchyat - BARUHATU
Block - ARKI
Dist - KHUTI
GPS Map Camera
Baruhatu, Jharkhand, India
NH 143AG, Baruhatu, Jharkhand 835210, India
Lat 23.01237°
Long 85.520727°
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143AG
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GPS Map Camera
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02/01/24 11:55 AM GMT +05:30
Google

15. Case Study

A. District- Ranchi



Introduction About District: **-** Ranchi lies at 23°22′N 85°20′E near to the Tropic of Cancer. The city covers an area of 175 km2 (68 sq mi) and its average elevation is 651 m above sea level. Ranchi is located in the southern part of the Chota Nagpur plateau, which is the eastern section of the Deccan plateau. It consists of 18 blocks and 305 panchayats. Under Ranchi Sub Division, there are 14 blocks and Bundu SubDivision consists of 4 blocks. The annual rainfall is about 1430 mm (56.34 inches). From June to September the rainfall is about 1,100 mm.

Objective: **- Crop cultivation round the year**

JTDS Contribution: - JTDS launch Solar Irrigation System (funded under SCA to TSS Scheme) project for marginal SC/ST farmer in Ranchi District. Total seven no. of Solar Irrigation System has been installed in different villages of Ranchi District for benefit of 200 nos. of farmer

Village	Panchayat	Block
Burudih	Amlesha	Tamar
Amlesha	Amlesha	Tamar
Ulidih	Ulidih	Tamar
Reda	Boruhatu	Bundu
Alna	Kanchi	Bundu
Ulida	Gabhriya	Bundu
Rangamati	Nawagarh	Angara

According to the weather office Jharkhand's rainfall deficit was at 27% less than normal rainfall in last year that decreases the crop cultivation for marginal farmers, so intervention through JTDS, Solar Based Irrigation System is big step for farmer for farming round the year without any interruption.

Further to increase the livelihood for farmer, Small village BURUDIH under TAMAR Block is selected under this scheme. Burudih village is good communication connection via road to its nearby hatia/market. Currently 15-20 marginal farmers having progressive trend are taking benefit through this project.



Past Scenario: -

In previously JTDS support various activities in agriculture sector like farm planning, selection of seeds, Progressiveness, quick adaptive to new technologies, promptness under JTELP projects. Small farmers of **VILLAGE-BURUDIH, BLOCK-TAMAR** chose to be different from the typical resource- poor farmers struggling to make a living in the degraded dry lands. Previously farming areas are not fully utilized by the farmers due to lack of water resources. Paddy cultivation are only option for farmer.



Paddy Cultivation

Solution for round the year cropping JTDS comes with solution of free water resources availability at farmer filed. Installation of Solar Based Irrigation System supported farmers for maximum utilization of their land for entire years. That increase the value of the land as well as increment of annual income of farmers too.



Note: - Land are unused due to unavailability of water resources.

Current Scenario: **-**



Note: - Crop cultivation after installation of Solar Irrigation System.



	Name of Crops
Before Installation of Solar Pump	Paddy Cultivation 
After Installation of Solar Pump	Beans, Tomato, Bitter Gourd, Chilly, Okra, Brinjal. 



After solar pump installation farmers vigilant towards the cultivation of different crop with irrigation facilities. Its also increases the cultivation areas. Currently farmers groups are utilizing 3.5 to 4 acres of land for cultivation purpose and earning 40-50l approx. per crop per season, which increases the yearly income of farmers.



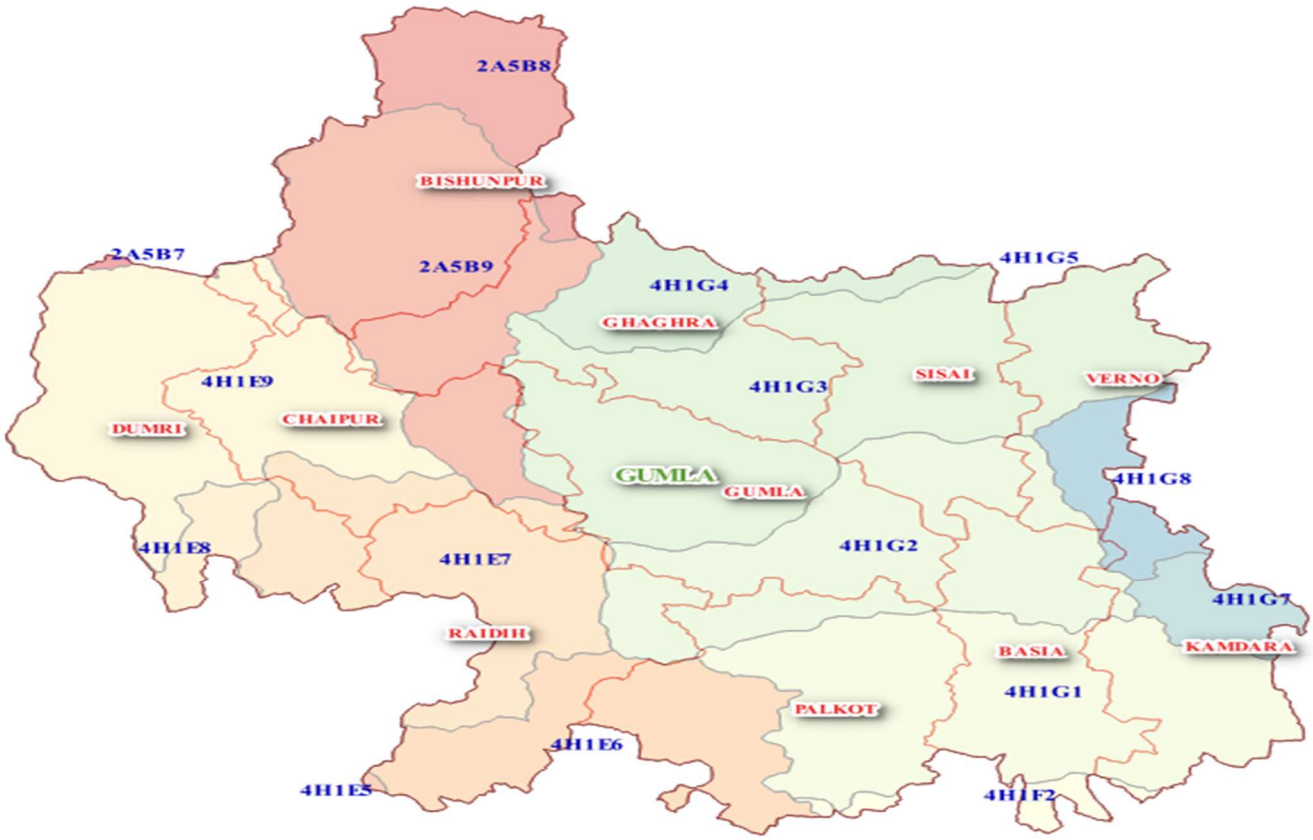


MORE CROP MORE MONEY

Farmers were delivered thoughts that though successful solar irrigation facilities in big areas, farmers will get good income from his small holding will be quite high to run a comfortable and high quality life.

Conclusion: - Solar water pump for irrigation is cost effective especially for small scale farmers. Solar water pumps, on the other hand use solar energy, which is free and abundant.

B. District- Gumla



Introduction About District: - Gumla is in the southern part of the Chota Nagpur Plateau. On 18 May 1983 Gumla District was established by Bihar Chief Minister Jagannath Mishra. There are 3 sub-divisions and 12 blocks in Gumla district. Gumla has a temperate, sub-tropical climate, with an average high of 40 °C (104 °F) in summer and an average low of 3 °C (37 °F) in winter. Average annual rainfall is about 1,450 millimetres (57 inches). 93.7% of the population lives in rural areas. There are 3.17% Scheduled Caste (SC) and 68.94% Scheduled Tribe (ST) of total population in Gumla district.

Objective: - **Solar Based Irrigation System act as a Game Changer to improve agriculture practices for farmers.**

JTDS Contribution: - Jharkhand Tribal Development Society (JTDS) has initiate one big step toward the SC/ST community to improve the agriculture practices in favour of farmers with the help of installing solar based irrigation system in farmer's field under SCA to TSS scheme. This solar based irrigation system works without any extra cost i.e no electricity required to run the system and it is maintenance free too. Farmers just need to start the system and required water is available for crop. With the help of this system small marginal farmers can earn more money and increase his livelihood. Farmer's attitude toward the agriculture practices has improve. Availability of water resources changes the living standard of farmers.

Currently 20-25 farmers of group are directly/ indirectly dependent upon the solar based irrigation system.

Village	Panchayat	Block
Chitagutu	Karanj	Bharno
Burka	Kudra	Sisai
Algori	Domba	Bharno
Olmunda	**Olmunda**	**Sisai**
Nagri	Dumba	Bharno

Total 5 nos. of solar based irrigation system has been installed in Gumla District covered by 2 Block followed by 75 farmers. Thus after the installing of system more farmers are joining according to their needs. Above listed in VILLAGE-BURKA, DISTRICT-GUMLA total 206 nos. of family are situated who directly or indirectly dependent upon farming. This village is nearby 5 km with NH-43. Transportation facility is available for selling of crops in the market and also to the distributors in Gumla District.

Past Scenario:



Previously villagers are depend on rainy season and accordingly farming was conducted for kharif like almond, corn, rice, soyeben etc.

Current Scenario: **-**

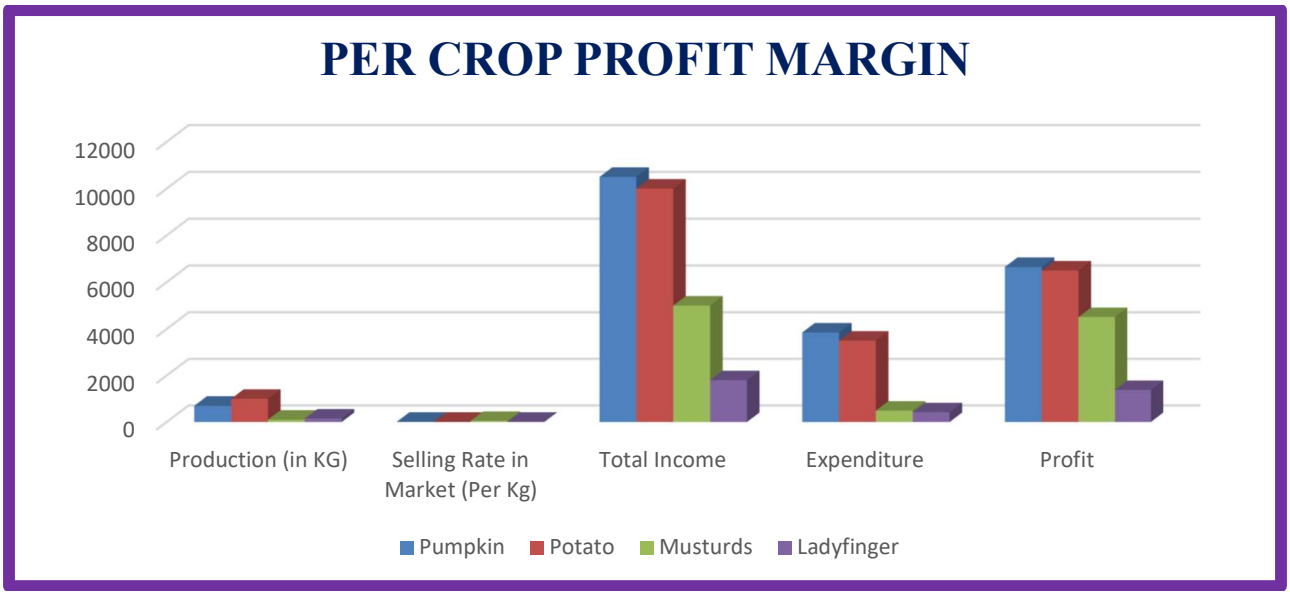


- ***After Installation of Solar Based Irrigation System Farmers Focus on Rabi Crops***

Farmers are using the water resources in such a manner to produce all type vegetable cultivation round the year and increasing the annual income. This help for better livelihood society in the village. In other way water resources are used for drinking purpose also.



Chilli Cultivation after availability of water

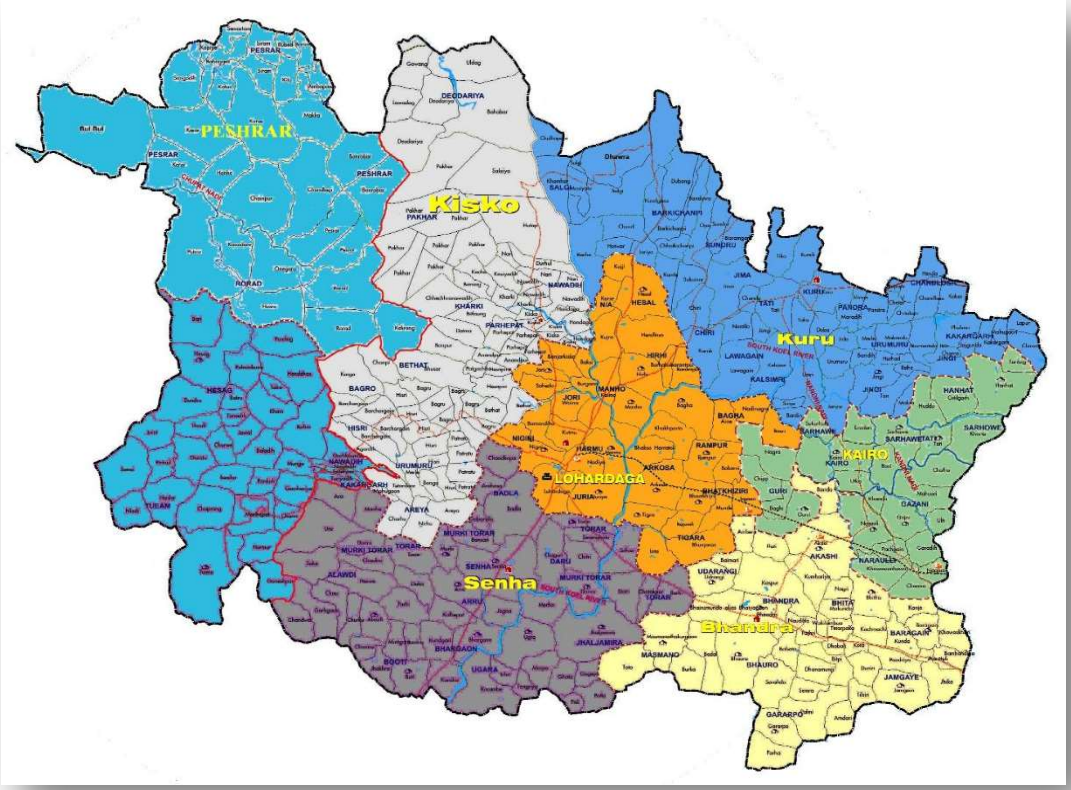


Above chart clearly indicate profit margin according to the crops are valuable for the farmers and motive farmers for more cultivation. Thus more crop can give more profit to the Farmers. Now a day farmers are covering more area and cultivating more crops.



Conclusion: - Solar Base Irrigation System make an impact on famers of Gumla for earning more money by cultivation round the year. On day time presence of sunlight help farmer to spread their field without any cost. No Irrigation cost increasing the earning formula.

C. District- Lohardaga



Introduction About District: - Lohardaga is located at 23.43°N 84.68°E. It has an average elevation of 647 metre. 12.43% of the population lives in urban areas. Scheduled Castes and Scheduled Tribes make up 3.32% and 56.89% of the population respectively. The per capita agriculture land is around 0.28 Ha. Net irrigated area is 13.4% of net sown area (0.8% by canals, 7% by wells, 2% by tanks & 3.6% by lift irrigation and others). The monsoon sets in by the middle of June and continue till the middle of October. The annual average temperature is 23° centigrade and the district receives an annual average rainfall of 1000-1200 mm. Scheduled Castes and Scheduled Tribes make up 3.32% and 56.89% of the population respectively.

Objective: - **To reduce dependence on electricity or diesel for farming Purpose**

JTDS Contribution: - Jharkhand is known for land of forest and mostly population are depend on agriculture. Farmers earn living on agriculture sector and most population are of SC/ST community. They don't have better resources and knowledge for farming. JTDS (Jharkhand Tribal Development Society) work for SC/ST Community for their livelihood promotions. Every year for increment of better live JTDS introduce different Scheme/activity for ST/SC community. Currently for better result in agriculture sector JTDS has introduce Solar Based Irrigation System for marginal farmer.

Past Scenario: - Previously farmers depend upon the rain water, well, river etc for crop cultivation process. Thus one season farming was conducted or till availability of water in river/well. Rest of the time they need to work outside of native place for livelihood purpose. During the gap of 2 season fertilizer of the field get decreases and they need to fertilize the field before the crop. In such condition extra work and money are require. Although the farmer borrow some marginal amount from others to fertilize their farm and this make the crop more expensive.

This is happen only due to non-availability of water resources at village during the winter and summer season. Farmers have to wait for rainy season for water so that they can crop paddy cultivation. Well are previously dug by the help JTDS department but due to unavailability of water all the time farming was not conducted at off season.

The soil in the region are characterized as low water storage capacity. The agriculture economy in the region is rain fed, small-scale crops, livestock and integrated crop-livestock/agro pastoral farming system. Any type of agricultural activities post kharif season was a big challenge for the farmers due to limited or no availability of irrigation facilities.

Current Scenario:-



Solar water system were installed by JTDS under SCA to TSS scheme for marginal ST/SC community farmer who are ready to increase their income from farming. Such kind of activity

help for small marginal scale farmers belong to SC/ST community to utilize of water round the year for cropping different types of crop. Dependency on rainfall decrease via solar based irrigation system. This show the result on better life style of small rural farmer. For this purpose only JTDS come with new idea of Solar Pump System for anytime availability of water in day time.

Total 5 nos. of Solar Based Irrigation System was Installed at Lohardaga District

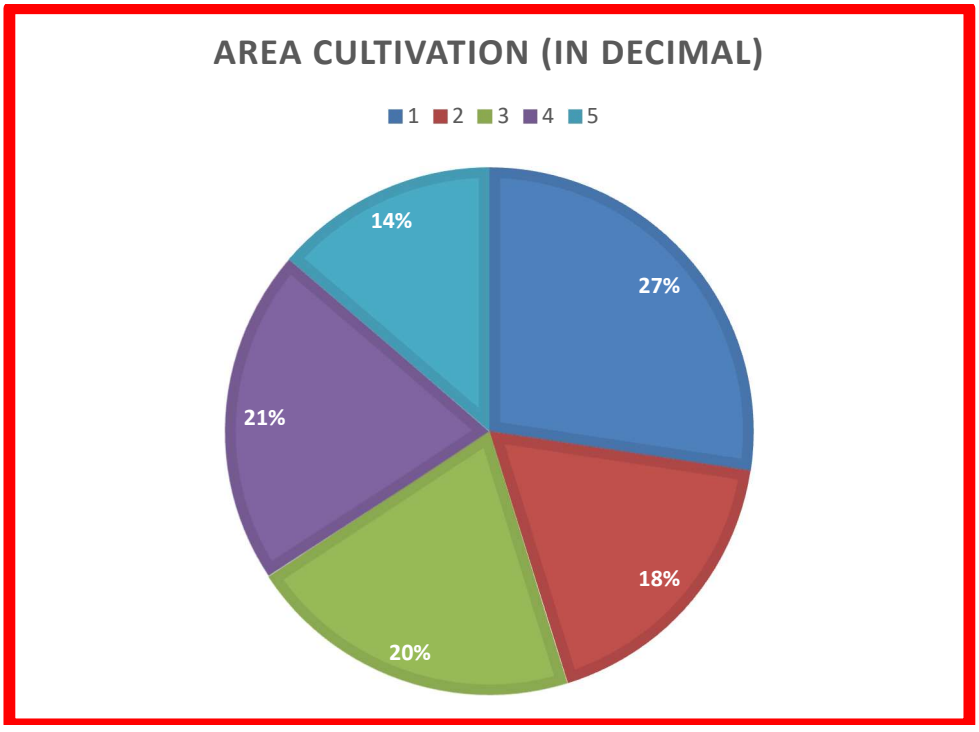
Village	Panchayat	Block
Baragain	Baragain	Bhandra
Chalho	Gajni	Kairo
Narauli	Naurali	Kairo
Bhitha	Bhitha	Bhandra
Baksi	Sarabhe	Kairo



INNOVATION OF WATER RESOURCES IN FARMING

This kind of new idea for farming with the help of solar water pumping system farmer need not be pay any electrical bill for water. This system is environmental and free of maintenance. Agriculture productivity is low due to unavailability of water resource and lack of knowledge in the field of cultivation. Famers understand the water management system with the help of Solar Based Irrigation System. Sustainable and efficient water management practices are key to improved small and marginal holders agricultural productivity.

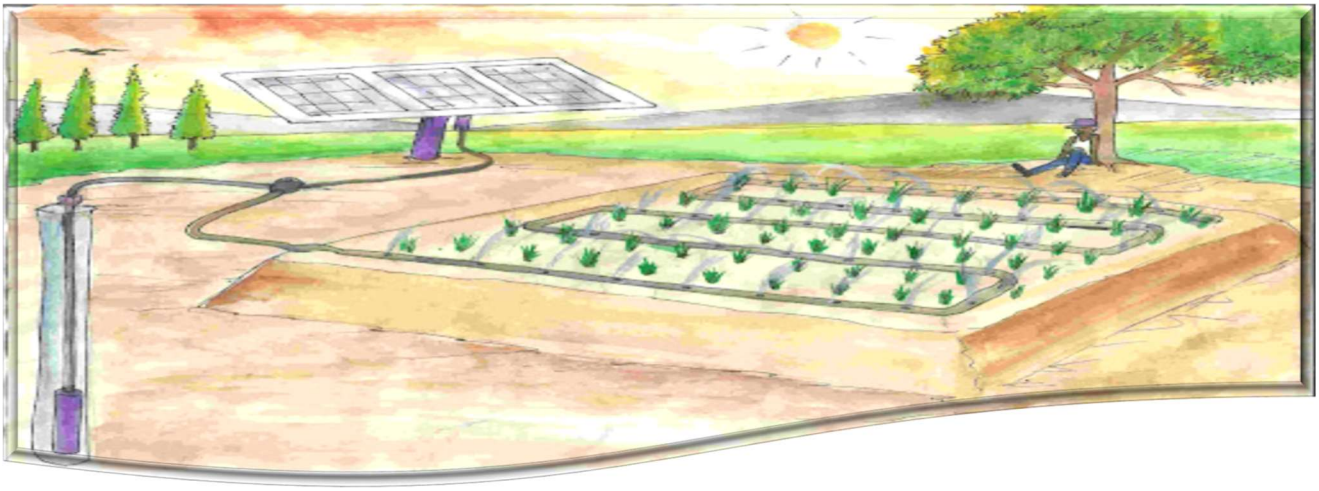
Total Area Cultivated after the installation of Solar Based Irrigation System					
Sr. No.	Village	Block	No. of Farmers associate	Total Area cultivation (in Decimal)	Name of Crop
1	Chalho	Chalho	15-18	10	Paddy, Green Pea, Wheat
2	Narauli	Naurili	9-14	6.5	Chilli, Couliflower, Potato, Green Pea, Wheat, Chilli
3	Sadhabe	Bakshi	11-15	7.5	Paddy Green Pea, Potato, Wheat, Mustard
4	Bitha	Bhita	9-12	7.5	Maize, Potato, Green Pea, Cucumber, Wheat
5	Bargai	Bargai	9-11	5.0	Paddy, Green pea, Wheat



Thus above chart indicate that with the help of available water resources installed by JTDS Solar Bases Irrigation System farmers are cultivating maximum no. of the area listed farmer and cropping round the year. Now a day more farmer are joining in a group accordingly there needs of water. Further they are using for drinking and home purpose also. This needs the fulfill of water to the marginal farmer in village.

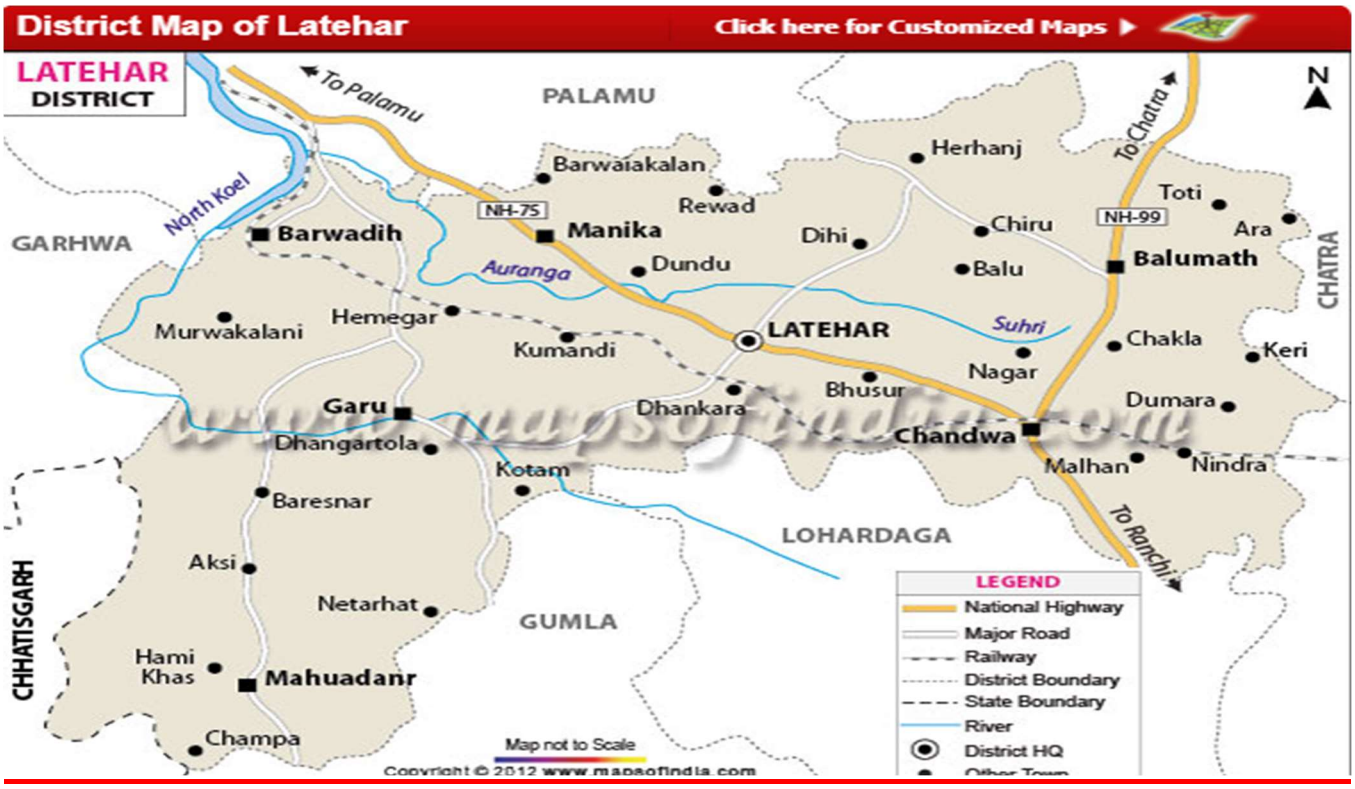


In VILLAGE- NARAULI, BLOCK – NARAULI, DIST-LOHARDAGA, JTDS installed the Solar based irrigation system at farmer site. Now a day farmer is using the solar based irrigation system for cultivation purpose round the year. In day time water are used to store in a well and with the help of electric pump they are irrigating there farm in the night also. Thus farmers of village Narauli are working hard in cultivation of different crop.



Conclusion: - Solar energy is a clean, pollution free and renewable source of energy. Development of this source of energy requires an accurate detailed long-term knowledge of the potential taking into account seasonal variations.

D. District- Latehar



Introduction About District: - Latehar is known for its natural environment, forest, forest products and mineral deposits. Jharkhand's second largest waterfall is situated in Latehar. The economy of the people revolves round the forest produces, agriculture and minerals. Rice, fruits, maize, wheat, etc. are the major crops grown here. It is mainly tribal district, about 45.54% of the population Scheduled Tribes and more than 66% of the total population includes Scheduled Castes and Scheduled Tribes. Remote villages are scattered between dense jungle, mountainous areas and agricultural areas. The number of Scheduled Castes and Scheduled Tribes is predominantly highest and Latehar belongs to tribal sub-planning area. Latehar FD areas have usual three characteristic seasons namely summer, rain, and winter with a mean annual rainfall of 1178 mm.

Objective: - Agricultural practices in all season Kharif, Ravi and Zaid including vegetable cultivation

JTDS Contribution: - Mostly villages of Latehar district is situated at jungle areas and SC/ST community population are dense. So the farmer depend upon agriculture for their livelihood activity. As JTDS work on development of ST/SC community for better future. Related to this JTDS done Solar Irrigation System under SCA to TSS Scheme for availability of water for marginal SC/ST community for agriculture purpose. Due to non-availability of water farmer just cultivate crop in rainy season. This system help farmer to crop in kharif and Ravi season.

Past Scenario: - As farmer of latehar district mostly dependent on rainy season and just cultivate the crop according to the season. Maximum farming land areas are inclined due to situated in jungle. In rainy season rain water doesn't stay for a long time for cultivation purpose round the year. They have to store the rain water with the help of Dhobha and depend upon that for the rest of the season for water. But in summer that dhobha become dry and farmer don't have water to irrigated their land. So just rain crop is cultivate throughout the year.



Current Scenario:-

For outcome from the water problem JTDS make a big step towards marginal ST/SC community farmer who are willing to improve livelihood in the field of agriculture sector. Total cultivation areas has been increases after the installation of solar water system. Dependency upon the rain in now day is negligible.



Thus Total 4 nos. of Solar Based Irrigation System was installed at Latehar District.

Village	Panchayat	Block
Juruhar	Chippadohar	Barwadih
Ukamar	Ukamar	Barwadih
Jungur	Jungur	Manika
Auratarn	Jungur	Manika

This installation helpful to farmer to irrigate their land throughout the year.



At **VILLAGE- JUNGUR, BLOCK-MANIKA** Solar Based Irrigation System has installed. According to the report the famer name Dwarika Oraon having 2.25 Acres of total irrigation land in which he did the agricultural practices in all season Kharif, Ravi and Zaid including vegetable cultivation as well after implementation done by JTDS. He is active member of GSPEC too so he is hardworking and active farmer. Currently he is irrigating 2.5 acre of total land with the help of Solar Water Pumping System.

Later on 15-18 member of farmers joint in this scheme for irrigation of their land. All the member of this group are active and properly using water resource plan wise to their land.
More crop is cultivating through the farmer group to earn more and water issue is also resolved for farming, Drinking and Washing purpose. Now a day there is no need to store the water for the future. Whenever the water is require for any purpose they need to just start the solar water pumping system in day time. This change the daily activity of farmers and villagers too.





Conclusion: - Solar energy help farmers to produce crop all the seasons and earn money according to their crop cultivation. Now a day famers are not dependent on rain water or store water. They are not storing the water for future also. Just cultivating their land as per need with the help of solar water pumping system and earning more profit excepting rainy season.

E. District- Khunti



Introduction About District: - Khunti district is one of the twenty-four districts in state of Jharkhand. It is historically known as the birthplace of Birsa Munda, and being the centre of activity of the Birsa movement. Khunti district has one sub-division and 6 blocks. Scheduled Castes and Scheduled Tribes collectively account for 77.77% (SC 4.52% and ST 73.25%). Khunti district is one of the educationally backward district and the major inhabitants are Munda tribes who have been excluded from education system for long. The condition of STs and SCs is not very good and they are still struggling for their basic rights and dignified life. Most Munda peoples are agriculturists. They also collect minor forest products from forest to supplement their economy; Hunting, Fishing and Animal husbandry are subsidiary to agriculture. They also work as agricultural labourers and unskilled labourers. The territory they now occupy was until recently difficult to reach and remote from the great centres of Indian civilization; it is hilly, forested, and relatively poor for agriculture.

Objective: - Supplement of economy in agriculture field though Solar Based Irrigation System for ST/SC Munda community Farmers.

JTDS Contribution: - As Khunti District's SC/ST community are mostly farmers and agriculture is the main source of income for their livelihood. JTDS working for related SC/ST community for fulfill their need and for development too. Farmers are not capable to install such kinds of project by their own cost so, to change their livelihood JTDS has installed Solar Based Irrigation System according to the groups of farmer who are active & willing to go-ahead one step towards earning from agriculture sector. Previously also JTDS has contribute more scheme for such kind of farmers. This help to a group of farmers in a village to cultivate their field free of cost.

Past Scenario: - SC/ST community's farmers was practicing agriculture by the traditional method from long period with the help of available water resources. With the help of other department sources of water was created for the farmer for agriculture purpose. Well, Handpump and cannel was created to cultivate their farm land. With the help of above water resources limited and in less volume crop was able to produce. These crop was just able to live their normal life in daily basis and not able to increase their earning.



Traditional Method of farming





Current Scenario: - Now a day as solar based irrigation system has been installed to different-different group of farmer, they are cropping their field round the year via availability of water resources. Currently at **VILLAGE-SAURA, BLOCK- KARRA** solar based irrigation system was installed with the help of JTDS.




Latitude: 23.226782
Longitude: 85.152189
Elevation: 695.79±13 m
Accuracy: 158.3 m
Time: 19-01-2024 12:00
Note: Sarita Lang ka kadu ki kheti sawra
Powered by NoteCam


Latitude: 23.217375
Longitude: 85.153
Elevation: 684.07±4 m
Accuracy: 6.0 m
Time: 06-03-2024 12:07
Note: Solar &Vermi verification visit by Ved Prakash Sir at Khunti saura village
Powered by NoteCam

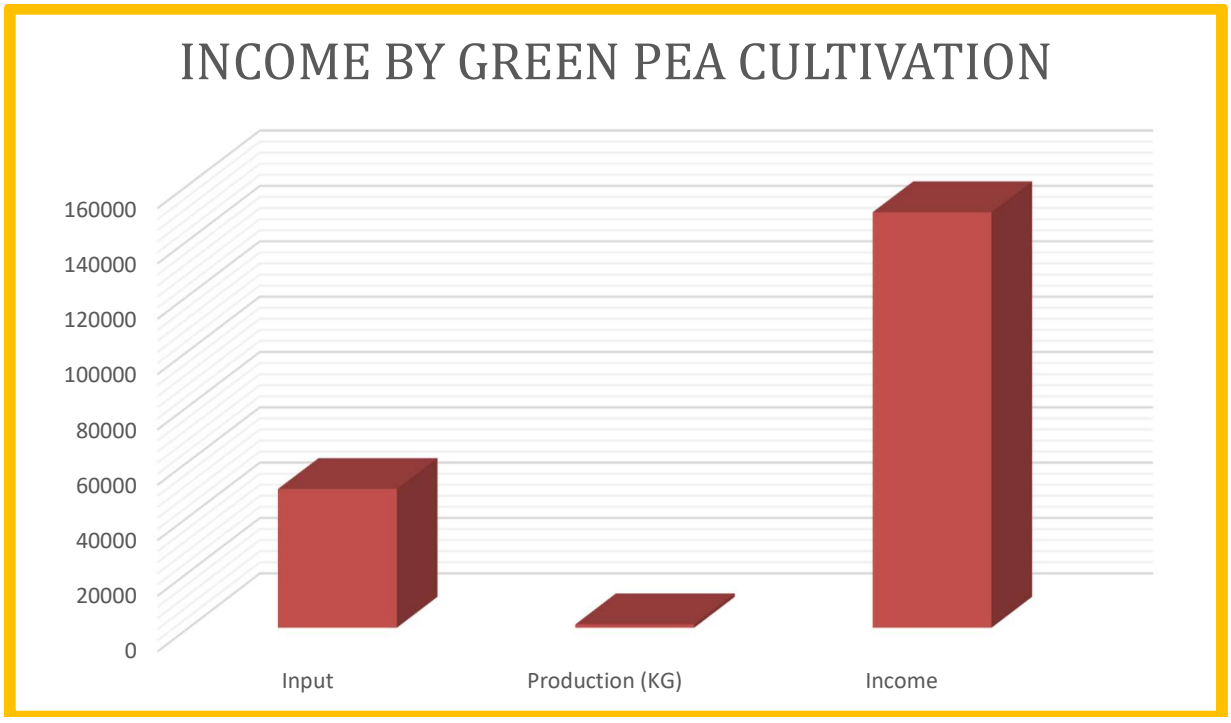
After the installation of solar pump farmers are using drip irrigation for agriculture purpose. Due to this they are using the water resources in proper way to cultivate their farm also they are learning how to crop more in less water too.

Total 4 nos. of Solar Based Irrigation System are Installed at Khunti district.

Village	Panchayat	Block
Belsiring	Chata	Karra
Sawara	Karra	Karra
Baruhatu	Hunth	Arki
Dundi	Sosokuti	Arki

They are improving methods of agriculture and linked with other line departments for minimizing the limitation on expanding agriculture. Such type of establishment helped SC/ST farmers to cultivate their maximum areas and also helping in ravi season too. Now a day with the help of irrigating facility approximately 25 acres of land are cultivating and maximum no. of farmers are joining for this new agriculture system of irrigation. They are storing the water in well to irrigates their farm in the night time also.

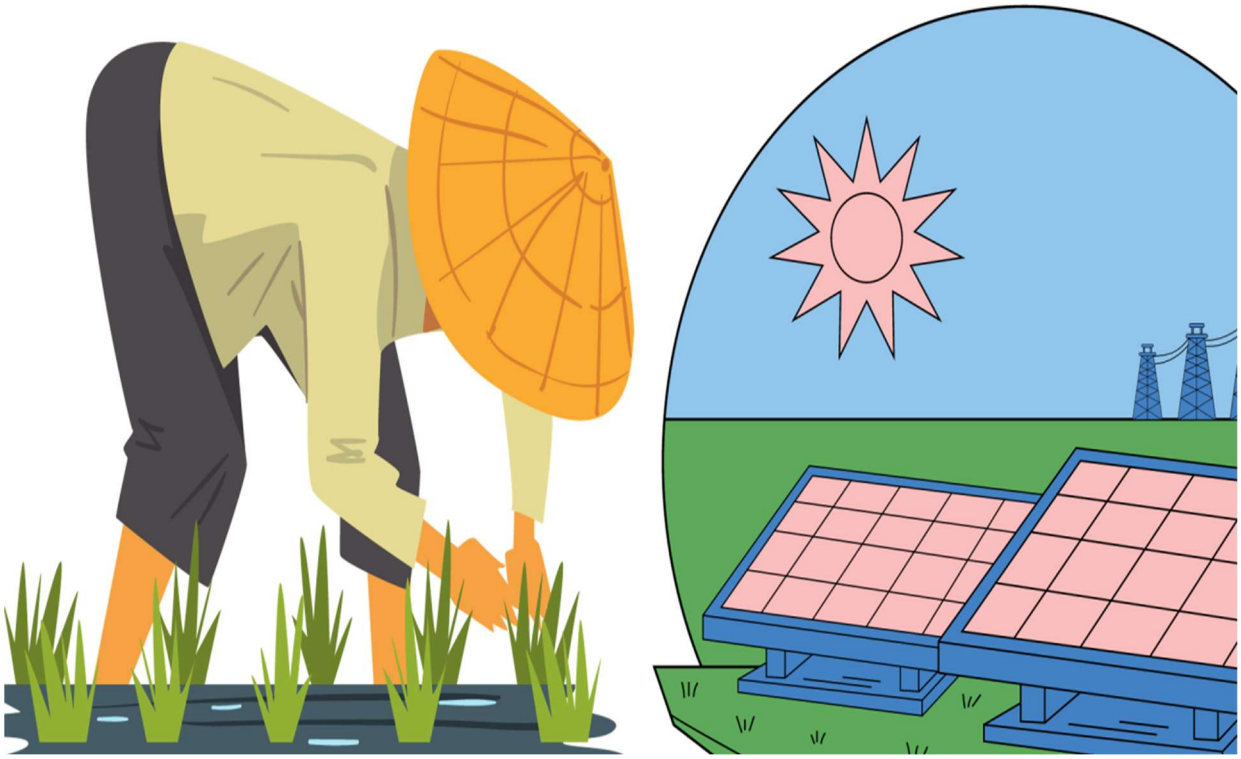
After the installation of solar based irrigation system at saura village farmers are cultivating the crop which they can earn more profit i.e. green pea. It is cash flow crop in which farmer get instant cash by selling. After cultivation of green pea farmers has earn approx. total 1.0 lakh in a season.



Meanwhile rice was cropping but currently farmers are also cultivating wheat for home

purpose. Rather than green pea crop they are also showing interesting in different types of vegetable also like beans, tomato, mustered etc. These crop are more valuable in the market. One of the farmer has cultivate beans and earn aprrox. 30-32k in a single season. With the help of mustered farmer earn approx. 5-6k in a season. Previously they are cropping the some area (20-30 dec.) in ravi season as per their home need but currently they are cultivating 1-2 acers of land. That help them to earn more profit with suitable crop selection.

Thus farmers are using the water for drinking purpose also. Because in summer season wells, river and other resources are empty/dry/less and they need to travel more distance for drinking water purpose. So, Solar Base Irrigation System fulfill the necessary requirement of the ST/SC farmer.

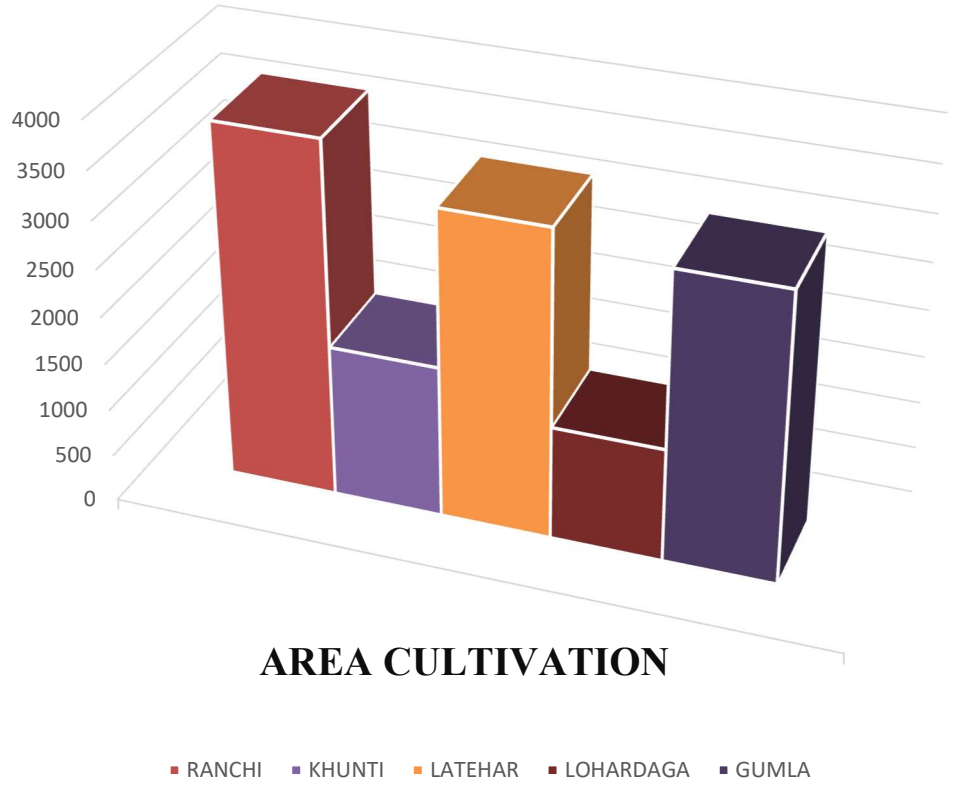


Conclusion: - By the installation of Solar Based Irrigation System by JTDS under SCA to TSS Scheme it helpful for the ST/SC marginal farmers who are agree to use modern technique in their farm filed. This water resources help and motivate farmers for smart irrigation. Thus without any investing free of water are available and helping farmers to grow more crop which change their livelihood.

16. Annexure1: Consolidated list of beneficiaries benefitted

Solar Based Irrigation System

S. No	Name of District	No of Unit	Block covered	Panchayat Covered	Village covered	No of HH Benefitted	Area Cultivated in Decimal (From SBIS)
1	**Ranchi**	7	3	6	7	82	**3760**
2	**Khunti**	4	2	3	4	100	**1615**
3	**Lohardaga**	5	2	5	5	53	**1208**
4	**Gumla**	5	2	4	5	117	**3065**
5	**Latehar**	4	2	3	4	60	**3265**
Total		**25**	**11**	**21**	**25**	**412**	**12913**



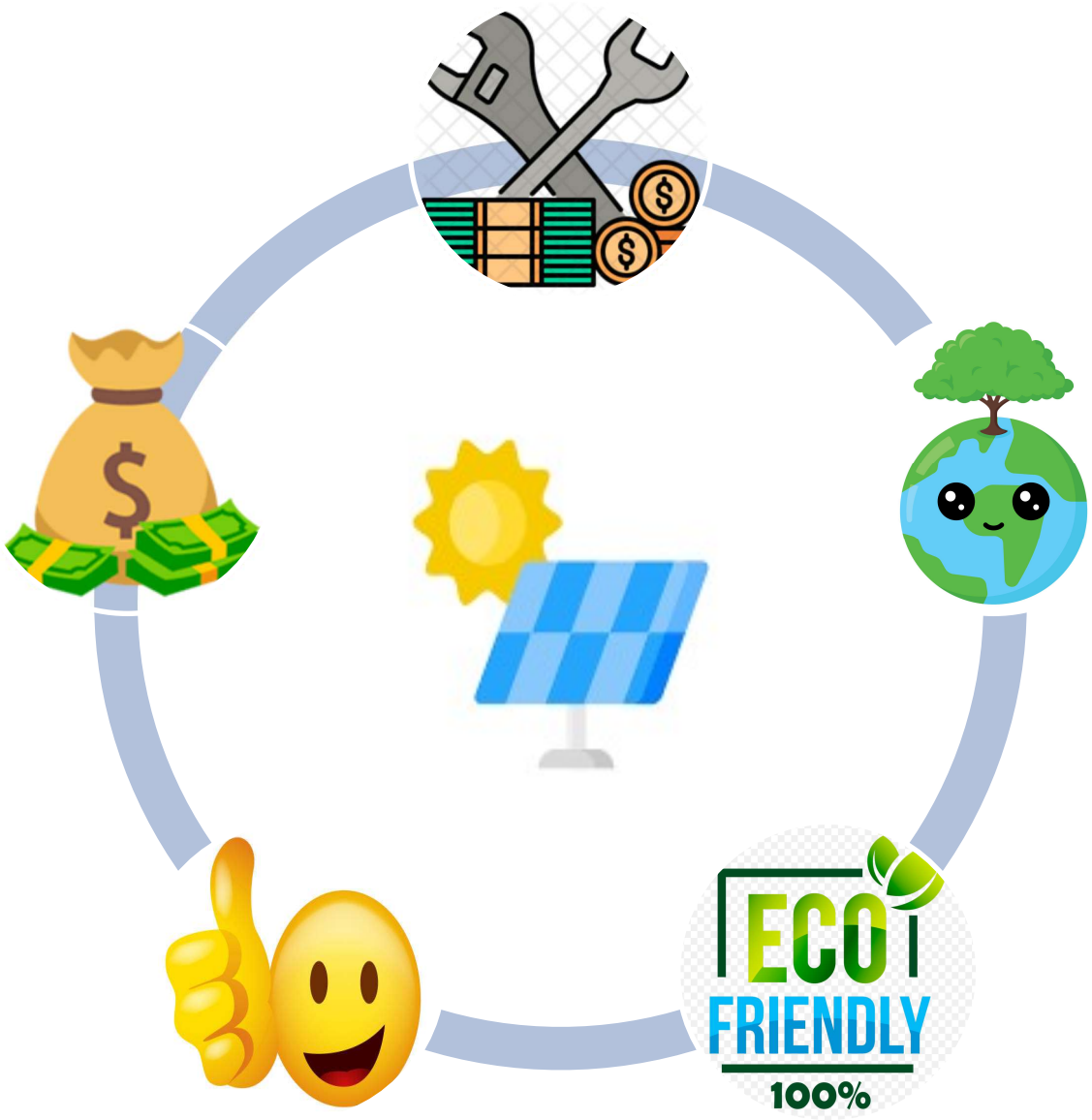
Total Farmer List

Sr. No.	Farmer Name	Village	Panchayat	Block	District
1	Vinod Singh	Ukamar	Ukamar	Barwadih	Latehar
2	Dwarika Oraon	Jungur	Jungur	Manika	Latehar
3	Dhamku Oraon	Auratnad	Jungur	Manika	Latehar
4	Ganauri Singh	Juruhar	Chippadohar	Barwadinh	Latehar
5	Shivnath Singh Munda	Dundi	Sosokuti	Arki	Khunti
6	Santosh Nsag	Baruhatu	Hunth	Arki	Khunti
7	Kunjal Munda	Sawra	Karra	Karra	Khunti
8	Arsit Kerketta	Belsering	Chatta	Karra	Khunti
9	Dilip Oraon	Bargain	Bargain	Bhandra	Lohardaga
10	Bhuneshwar Oraon	Baksi	Sarabe	Kairo	Lohardaga
11	Sakal Oraon	Narauli	Narauli	Kairo	Lohardaga
12	Laldeo Oron	Chalho	Gajni	Kairo	Lohardaga
13	Mina Oroan	Bitha	Bitha	Bandra	Lohardaga
14	Bhagwati Oraon	Burka	Kudra	Sisai	Gumla
15	Bhavesh Oraon	Nagri	Dumba	Bharno	Gumla
16	Ram Munda	Chittagutu	Karanj	Bharno	Gumla
17	Muni Oraon	Algori	Dumba	Bharno	Gumla
18	Jagarnath Lakra	Olmunda Chatitoli	Olmunda	Sisai	Gumla
19	Ravindra Munda	Burudih	Amlesha	Tamar	Ranchi
20	Kanhai Singh Munda	Alna	Kanchi	Bundu	Ranchi
21	Purendra Sing Munda	Reda	Baruhatu	Bundu	Ranchi
22	Laxi Kumari Gajpati	Ulidih	Ulidih	Tamar	Ranchi
23	Sobhod Bediya	Rangamati	Nawagarh	Angara	Ranchi
24	Badri Devi	Ulida	Gabriya	Bundu	Ranchi
25	Vimal Chandra Munda	Amlesha	Amleaha	Tamar	Ranchi

PROJECT CONCLUSION: -

Solar Water Pumping System are cost-effective, reliable, and environmentally friendly.

- Cost-effective: Solar water pumps have lower operating costs than traditional pumps. They require no fuel and have minimal maintenance costs.
- Environmentally friendly: Solar water pumps are an environmentally preferable option to conventional pumps because they don't emit any hazardous gases.



Solar Water Pumping System

