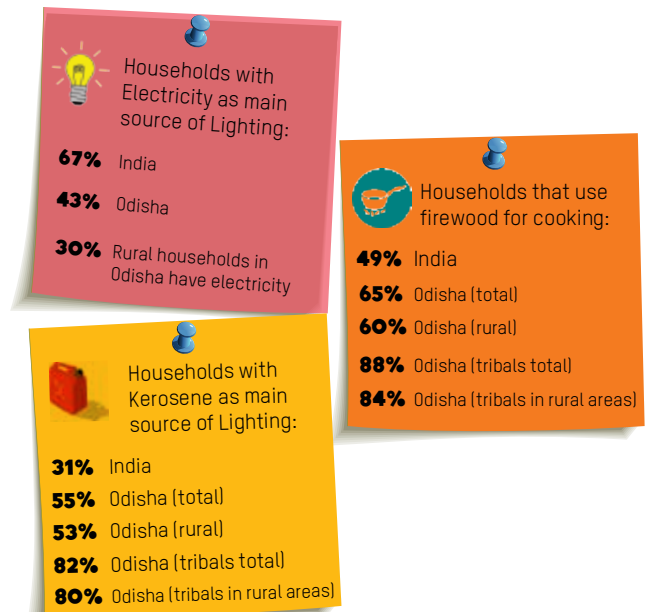


Oxfam India, through its rights-based framework, has been working towards strengthening livelihoods of forest communities. Through its programme, Fair Sharing of Natural Resources, Oxfam India is working towards securing forest rights of forest dwellers by improving the implementation of the Forest Rights Act, 2006. Together with its implementing partners, Oxfam India has attained some success in securing Individual Forest Rights (IFR), and Community Rights (CR), in three of the focus states¹— Jharkhand, Chhattisgarh, and Odisha. In many cases recognition of rights has also translated into strengthening forest-based livelihoods. Addressing the energy poverty situation in these states is an important component of livelihoods of forest dwelling communities. Oxfam India is supporting Regional Centre for Development Cooperation (RCDC), a Bhubaneswar-based NGO, to provide renewable energy solutions for irrigation and home lighting to improve their livelihoods and make the communities resilient. Though they have worked together on implementation of Forest Rights Act (FRA) since 2011, the interventions with Renewable Energy began in 2015. It is supporting 10 villages in Mayurbhanj district.

The *Adivasis* comprise 8.6 per cent of the total population of the country i.e. 104.3 million; they are one of the most marginalised communities in the country. Odisha, Jharkhand, and Chhattisgarh are home to one-third of the tribal population of the country and 90 per cent of this population resides in the forests². These states alone hold 69 per cent of the country's coal reserves. Though, these states are the storehouse of these rich resources yet they are among the poorest in the country. The percentage of population living below poverty line (BPL), in these three states combined is much higher than the national average of 25.7 per cent³.

Energy security, or rather the lack of it, is critical and affects livelihoods and the well-being of poor households, especially tribal households. Though, in India 67 per cent of households use electricity as the main source of lighting, in the three states this is available to only 4.5 per cent of the households. Jharkhand and Odisha are among the five states where majority of households depend on kerosene for lighting. Almost half of the households in India (700 million people) still use firewood for cooking. Consider this, 88 and 82 per cent of Scheduled Tribes households in Odisha rely on firewood for cooking and kerosene for lighting, respectively; share of rural households in this is 84 and 80 per cent, respectively. Women in rural India— still dependent on biomass— are affected due to increased workload and poor health.

In places where grid power has not reached a large number of households, there is a clear demand for decentralised renewable energy solutions. In addition, villages that lie within Protected Areas like Tiger Reserves are unlikely to get any conventional source of energy. While this ensures the safety of wildlife, the non-availability and lack of access to energy sources severely affects the standard of living and scope to improve livelihood for the tribals residing in these villages. For instance, in Odisha's Simlipal Tiger Reserve and Biosphere Reserve in Mayurbhanj district, the District Administration has identified 91 such villages.



Source: Census 2011

Oxfam India has been supporting RCDC in Mayurbhanj since 2014 for the implementation of FRA in 10 villages in Thakurmunda block in Mayurbhanj district. These villages have filed their claims for IFR, CFR and CR under FRA 2006. While 86 families have got IFR titles, CFR and CR claims are pending at the district level for recognition. These villages lie in the Simlipal Tiger Reserve and the Simlipal Biosphere Reserve.

During their intervention on forest rights, RCDC identified 10 villages with over 500 households with no access to electricity. For home lighting, these villages use lanterns; the community gets kerosene for these lamps through Public Distribution Scheme (PDS). Apart from home lighting, lack of electricity also meant that there were no irrigation facilities, thus affecting their livelihood. The community, exclusively tribal, are either dependent on minor forest produce (MFP) or hilly terrain Kharif crops. There are a few perennial streams but since they do not have access to electricity they were unable to lift water for irrigation. They either used the traditional water lifting system, known as *tenda*, or carried water manually to the close-by fields. So barring the strips of land close to the stream, most of the land lay barren for most part of the year. During some months they are employed through the rural employment guarantee scheme, MGNREGS, in the village. In worst case scenario, they migrate to neighbouring districts as labourers. Though the forest is well endowed, all the households in these villages are below poverty line. Thus, a need was felt to strengthen their livelihoods by ensuring water reached the fields throughout the year. RCDC decided to install a solar micro-irrigation pump in Benuedarsahi as a pilot project. This hamlet is within the reserved forest area.

SOLAR MICRO-IRRIGATION UNIT

Oxfam India and RCDC worked with the community in Benuedarsahi village from 2014; they assisted the village to file their IFR, CFR and CR claims. The village comprising of *Kolha Adivasis*, all 28 households, are yet to receive their forest rights. The claims of this village is with the District Level Committee (DLC)⁴. However, after filing claims for forest land and resources, the community formed the CFR Management Committee, also known as the 4(1)(e) Committee. This Committee has been carrying out conservation, protection and management of forest; the village has laid claim on 500 acres of forest land. "We have done gully plugging⁵ to prevent soil erosion due to rains. When the seeds fall into these soil traps there is natural regeneration of the forest. Fire lines⁶ have been dug to prevent forest fires. And then there is '*thengapalli*'; we take turns to guard the forest," says Martam Singh Kudatta, a member of the 4(1)(e) committee.

Sal⁸ leaves, mahua⁹ flower and seeds (for oil), amla, char seeds¹⁰, *haritaki*¹¹, and *karanja*¹² seeds are the main sources of forest income. Traditionally, making sal plates and sale of these forest produce have been their source of livelihood. The community has now been trained on lac cultivation; they propose to start this year.



Lakshmi Priya Kudatta, panchayat samiti member from Benuedarsahi village waters her plot with the water drawn from the irrigation unit



Bira Singh Ugarsande, President, Soura Shakti Committee stands in the field irrigated by the solar micro-irrigation unit (in the background).

Benuedarsahi was selected for the solar micro-irrigation project because in the course of working on forest rights, the community came across as united, with good village institutions and a large patch of available unirrigated land. Several people in the village had their plot of land within this 20 acres. The land, though, adjoining a perennial stream — *Janumlor Nala* — was left barren due to lack of lift irrigation facilities. The *Nala* was named after *Janumlor pahad* (hill), the source of the stream; now it is called the Benuedarsahi *Nala*.

The solar micro-irrigation unit was installed in January 2016. The set-up included a 2 Horsepower (HP) submersible water pump. This pump was fixed in the middle of the stream. Clay was dug out, cement rings were placed to form a small well, and the pump was placed within this well. The purpose of the cement rings is to prevent siltation of the pump. This is connected to a 2000WP¹³ solar panel module mounted not far from the stream. The solar panels come with a three-year warranty period. The pump has two outlets - 250 metres long water pipe on both sides of the stream. This pipe, waters the 20 acres of land. A switch board, attached to the module, controls the water supply.

Of the 28 households, 22 have plots of land in the 20 acres of land that is being watered by the solar micro-irrigation unit. For the last one

year, these 22 families have managed to supplement their paddy with vegetables grown in the irrigated field. They have started growing a range of vegetables — okra, bitter gourd, tomato, *barbatti* (Chinese long beans), mustard, spinach, chili, bottle gourd, cauliflower, and maize.

"The solar micro-irrigation unit has improved our food intake. We have enough vegetables for our family, there is also surplus to share with families and friends who come to visit us. Anything that is left after that is sold," says Lakshmi Priya Kudatta, panchayat samiti member from Benuedarsahi village.

Since they have started growing vegetables, they have managed to earn upto Rs 15,000 for two seasons; a few have managed to get up to Rs 8,000 per season. The input costs are very low; apart from initial seed costs, the farmers do not spend on fertilisers and pesticides. Cowdung and goat droppings are used as fertilisers; the community has undergone training in goatery and call their goats 'assets'. In the last one year, these fields have not suffered pest attacks so there has been no expense on pesticides. So, what they have grown in the last year is organic vegetables.

Following the success of the production of crops in the last one year the community has now decided to include the remaining six landless households as sharecroppers on this 20 acres of land. "They will work with the others on the fields and get their share of profits from the field," she adds. Moreover, Benuedarsahi has received several people from neighbouring and far away villages who want similar solar micro-irrigation unit set up in their water-scarce village.

In order to run the solar micro-irrigation unit, the community formed the Energy Committee. This resolution, listing the names of the members and the function of the committee, was then passed in the Gram Sabha. The *Soura Shakti* Committee comprises 15 people — 11 men and 4 women. The Committee meets once every month and this is open for others to attend as well. This committee is trained to operate, maintain and repair the solar micro-irrigation unit in case of a breakdown. These committee members are sort of barefoot engineers trained by Oxfam India—RCDC.

"When the panel was newly mounted, we used to take turns to stand guard, especially at nights. This was to ensure that there were no elephants attack. Initially, the members of the committee were responsible for operating the pump. Now everyone has been trained; so whoever needs water can now operate pump whenever they want," explains Bira Singh Ugarsande, President, *Soura Shakti* Committee.

Until a year ago, there was some employment generated under the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA). Then, the Re 1 per Kg rice scheme of the state government, stitching sal leaf plates, and earnings from the forest produce took care of the basic requirements. In the initial years of working on FRA, Oxfam India and RCDC helped set up an *Anganwadi* Centre that has been functional. However, growing vegetables has ensured better nutrition and extra income to the households, who have now started spending more on education and health.

Some in the hamlet, attribute the reduced drinking habit of the community to their employability in the fields. Women earlier were involved in stitching

sal plates, and brewing and selling country liquor. "Though we continue stitching sal plates, we also work in the farms. This has increased the work pressure but it is not a problem. We have to a large extent stopped selling liquor as well," says Lakshmi.

The availability of water and the subsequent success in farming, has managed to arrest migration to a large extent. "Earlier, the youth used to go to Bhubaneswar or Cuttack for employment. But irrigation has ensured that farming is viable and we can really profit from it if we invest ourselves. It is true that we can earn more outside but this has strengthened the sense of community and unity within the hamlet. If we have to stay here it is all worth it," says Bira.

Pradhan Singh Purty, secretary, *Soura Shakti* Committee adds that now there is healthy competition among the villagers. "All of us want to better our farms. We learn a lot from each other and improve our crops every season. We are going back to our traditional systems and some of us are saving seeds and we can share it with the others, cutting down the only input cost that we incur in farming at the moment," he says. At the end of the first year, some have started preserving seeds of tomato, maize and Chinese long beans to reduce their dependency on the market.

The community is confident of continuing the work even if Oxfam India and RCDC withdraw their support. One, the committee is well-trained to maintain and repair the solar micro-irrigation unit. Two, the committee proposes to collect maintenance fee of Rs 50 per households per cropping season i.e. three seasons. Though the solar panel comes with a warranty of three years, a financial backup will ensure the sustainability of this project beyond the three years.

Though each household hasn't yet paid the maintenance fee, the Energy Committee in Benuedarsahi have collected Rs 15,500 in their account in



the first year. At present, some of the households have also deposited earnings through sale of MFP. Once we raise all, the money, it will be deposited in the bank," says Pradhan. This money can then be used for agricultural development, operation and maintenance of the irrigation system, and even for health purposes.

The solar micro-irrigation unit cost Rs. 1.75 lakh. "The income earned by the farmers in the first year has been positive. We hope to reach a break-even point on the investments within three years. Then the project will go into an auto-pilot mode. With the Energy Committee and maintenance fund, the solar micro-irrigation unit will be taken care of," says Pravat Kumar Mishra, RCDC project manager.

SOLAR HOME-LIGHTING UNITS

Oxfam India-RCDC set up a street light and demo home lighting — with two lights and one fan — in one house in each of the 10 villages that they work in. These models have been set up to encourage people to opt for solar home lighting. The households in these villages use a lantern or a *dibri* light (a bottle with a wick). These lamps are run on kerosene, which the community gets every month from the Public Distribution System (PDS) shops.

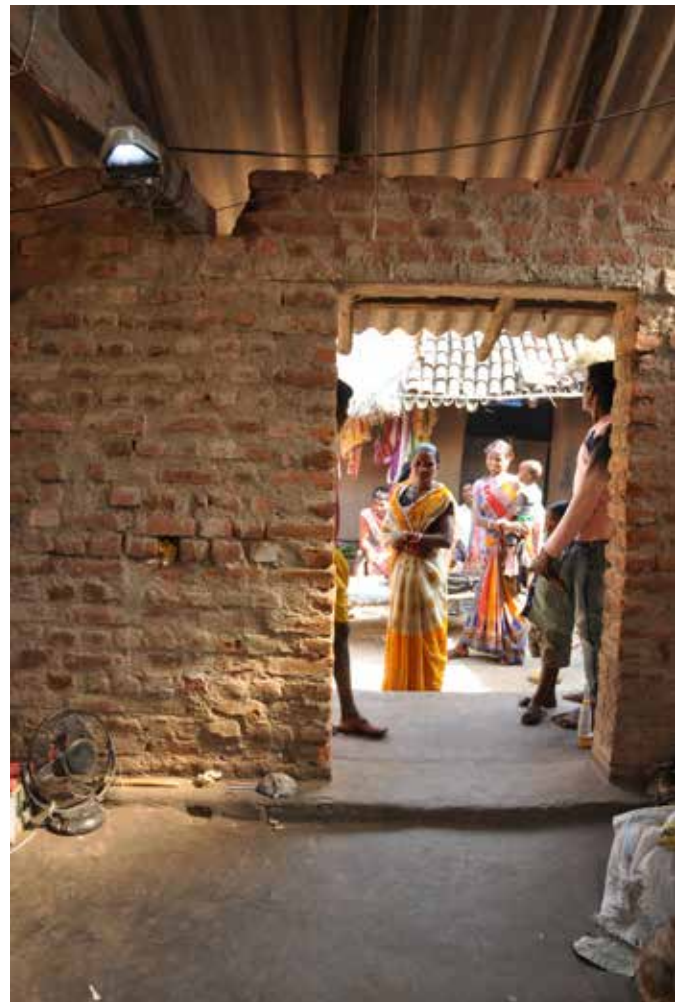
Each of these solar home lighting units cost Rs 17,000. "The communities here are not used to light and fan. But more and more people want it now. The demand should come from within the community. Though it is expensive, there is a chance that the money collected by the Energy Committees could be used for financing home lighting in the days to come," says Pravat.

In Benuedarsahi village, the solar home lighting has been set up in Pradhan's house. "One light and fan has been fixed in the biggest room of the house. This is where children study in the evenings now, and we can spend some more time stitching sal plates," says Pradhan. He often gets visitors, both from his village and neighbouring villages, who want to have the same for their homes.

In neighbouring Baula village, also in the Tiger Reserve, the forest department has provided solar home lighting as part of their convergence scheme. Of the 58 households, 26 were given solar lights and four streetlights were set up in November 2016. Baula is a forest village which will soon be converted to a revenue village. All 58 households are *Kolha adivasi* households and are below poverty line. Oxfam India-RCDC have worked on FRA in this village since 2014; 54 have received IFR while the CR and CFR claims have been filed and at present is with the DLC.

This is one of the 10 villages in which Oxfam India and RCDC set up the demo solar home-lighting system. An Energy Committee was formed and trained on the maintenance and upkeep of the solar home lighting unit. The members of this Committee were taken for exposure visits to neighbouring Mandaljhari village to enhance their skills on minor repairing works and interact with other energy committee members.

"When the demo was set up we could spend more hours stitching sal plates. It meant more money. A bundle of 1000 plates gets us Rs 130. Our children could study at night. During one of the visits by the forest department, we submitted an application to provide solar lights for all



Light and fan run on solar energy at Pradhan's house. This was a demo unit set up by Oxfam India and RCDC.

the households in the village. They provided in half the households and provided street lights as well. This is a big victory for us," says Ramaya Banara, President, Baula Energy Committee.

The forest department provided three bulbs per household for 26 homes in the village. This was done through a one time grant of Rs 100,000 received by department under the state plan to provide home lighting to villages¹⁴. This does not include operations and maintenance.

The Energy Committee of Baula village have sent an application for the remaining homes as well. Forest officials informed us that this was a one-time intervention and only when they get any further allocations for this purpose from the state can they provide lighting for the rest of the homes.

In Baula village, of the 26 households that were given solar lights, one needs repair. "Since forest department will not take care of operation and maintenance, it will have to be done by the barefoot engineers that have been trained by us. This is an important skillset and it will be required whether they get solar home lighting through any government scheme or install it using their own money," says Pravat. Further, the money collected by the Energy Committee can be used for operation and maintenance, promotion of home lighting.

The community in Baula village have been to Benuedarsahi village on an exposure visit to see the solar micro-irrigation unit. "Right now we have to manually lift water for irrigation and this is neither easy nor sufficient. We would want to have a similar solar micro-irrigation plant like Benuedarsahi. This would not only improve our agricultural productivity but also the nutrition of the community," says Sukra Purty, secretary, Baula Energy Committee.



This street light in Baula was installed by the forest department

NOTES

- 1 Oxfam India works in six states — Jharkhand, Chhattisgarh, Odisha, Bihar, Uttar Pradesh, and Assam
- 2 Chandra Bhushan and Srestha Banerjee 2015, Losing Solid Ground: MMDR Amendment Act, 2015 and the state of the mining sector in India, Centre for Science and Environment, New Delhi
- 3 Chandra Bhushan and Srestha Banerjee 2015, Losing Solid Ground: MMDR Amendment Act, 2015 and the state of the mining sector in India, Centre for Science and Environment, New Delhi
- 4 According to the process followed under FRA: The Forest Right Committee (FRC) files claims with the Gram Sabha, which recommends it to the Sub-Divisional Level Committee (SDLC). The claims are then recommended to the District Level Committee (DLC) which finally approves the claims and distributes the titles
- 5 Gully Plug is the technology for soil

- 6 conservation. It prevents soil erosion from rain, water flood. It is stone-based construction system. It passes water through it but stops soil flowing through. It works like a soil trap, thus preventing soil erosion.
- 6 A fire line (also called a fire road, firebreak or fuel break) is a gap in vegetation or other combustible material that acts as a barrier to slow or stop the progress of forest fires. These gaps could be a small path, a river etc.
- 7 *Thenga* means stick and *'pali'* loosely translated means turn. The guards go into the forests at night armed with a stick. The next morning, when they are back from the forest they leave the stick in the house of the person who is next on duty. The guard duties are rotated and schedules are made in advance
- 8 Shorea robusta
- 9 Madhuca longifolia
- 10 The kernels of the Char seeds (Buchanania lanzan) are used in sweets, ice creams, and also to make face powders. *Chironjee*

is obtained after decortication of the Char seeds. (see: www.banajata.org/pdf/ntfp-profile/or-char.pdf)

- 11 Medicinal plant
- 12 *Karanja* is an important Ayurvedic medicine, used predominantly in skin diseases. *Karanja* twigs were used as toothbrush in ancient times. Its botanical name is *Pongamia pinnata*.
- 13 Solar Modules are rated in Watt Peak (WP). Watt peak (sometimes Kilowatt peak is used for PV plants) stands for peak power. This value specifies the output power achieved by a solar module under full solar radiation (under set Standard Test Conditions). Solar radiation of 1,000 watts per square meter is used to define standard conditions. Read more at: <http://www.solarmango.com/dictionary/watt-peak>
- 14 This was done in collaboration with RRDO, a local NGO and partner of TERI, that provided technical support. RCDC facilitated the process

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