Department for International Development

Case Studies from ICRG Project States

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Infrastructure for Climate Resilient Growth in India (ICRG) Programme

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Background

The Infrastructure for Climate Resilient Growth (ICRG) is being implemented in 103 blocks in the three states of Bihar, Chhattisgarh and Odisha. ICRG seeks to incorporate elements of climate change in the way the MGNREGA assets are planned and designed and, seeks to reiterate and demonstrate convergence to strengthen livelihoods. Based on two key documents – Climate Modelling Study and Vulnerability Assessment – ICRG demonstrates scientific choice of locations for various NRM assets and, prepares improved designs based on climate projection data.

The ICRG programme describes 'climate resilient works' as a cluster of interlinked MNGREGS NRM works at a site benefiting families that are directly and indirectly gaining from them. The works are individually designed and are to be constructed in phases for the full benefit of climate resilience to be apparent to those depending on them.

Under implementation since October 2016, the programme is now seeing some success stories of lives being positively impacted because of the ICRG approach. This document presents some case studies from the project states.

BIHAR

CLIMATE ADAPTIVE LIVELIHOOD PLANNING; BEGUSARAI

Background

Begusarai district is on the Northern bank of the River Ganga. The Chorrahi Block is in the northern part of the district between 25040'27.864'' - 25086'31.438'' North Latitude and 8603'33.877'' - 8609'20.478'' East. This Block consists has 10 Gram Panchayat's with 57 villages. As per Census 2011, the population of the Chhorahi Block was 124191 of which 64686 were Male and 59505 Female.

Ekamba Gram Panchayat: Climate Resilient Works and Flood Conditions

The total geographical area of the Block is 9037 ha; the average elevation is 28 m. Chorrahi is a flood affected block with every flood causing massive destruction of earthen embankments. This leads to huge personal and livelihood losses for the population. To address this issue, it is imperative that focus be on renovating existing natural resource management and conservation structures and increase plant cover – the combination of these interventions will contribute to managing the losses. MGNREGA can play a significant role in combatting the perennial flood problem in the area.

According to the Climate Variability Report[1], it is projected that the average temperature of the Block will rise by 3.9°C by 2035. It is also projected that the average June-July-August-September (JJAS) rainfall will decrease by 8 % but the number of rainy days will increase by 32% by 2050.

The ICRG project is working in the Ekamba gram panchayat. The topography is very gentle with the slope varying from 0-3%. Out of 2940 Ha of gross cropped land in the gram panchayat, about 646 Ha area is un-irrigated; there is no forest cover; there are landless casual labourers (384) and women headed households (62); and about 21.11% of the community are classified as SC&ST. Most members of the community have small and marginal landholdings varying from 0.5 - 2 hectares. The Block is heavily dependent on agriculture but has the potential to diversify its economy through cultivation of cash rich vegetables and fisheries.

It is estimated that about 12-13% of the population of Ekamba belong to the Mushar community (a community that traditionally catches and feeds on rats) living on the outskirts of the gram panchayat with other OBC and SC populations. The houses of these groups are generally built of bamboo sticks and collapse during floods. The Ekamba gram panchayat has made notable progress in terms of

[1] The ICRG project commissioned the Indian Institute of Science, Bengaluru in 2016-17 to undertake the Climate Variability Study. The study includes projections of kharif rainfall – June-July-August-September – for the period upto 2050 as well as temperature variations. The projected climate data is the basis of design of MGNREGS assets under the ICRG programme.

implementation of social welfare schemes and other government programmes. However, because of changing climate and rainfall patterns in recent years, the elders of the gram panchayat voiced concerns about the new areas subjected to flash flooding and water scarcity both occurring simultaneously. The community felt that there is need to implement multiple interventions to tackle the problems being faced. A PRI leader of Ekamba, Mr. Rajesh Kumar concedes *"We have made much progress through government schemes like Swacch Bharat Abhiyaan but often neglected our environment and this comes to haunt us every year. Judicious use of waste and converting it into organic manure and using it for economic upgradation is very important. We are responsible for Climate Change and we must make efforts to correct it. We had ideas, and with ICRG we were able to act on them. Every household here even those living in bamboo houses have livestock, and we need to take steps to manage, protect and help them through available schemes for improving livelihoods."*

The ICRG Intervention

The ICRG team started with mapping the gram panchayat following initial meetings. The possible issues and areas for interventions were discussed with the gram panchayat and the consensus was to create an integrated natural resource management work model in each ward of the gram panchayat. The community felt that such an approach would be helpful for sustained income generation in the long term as well. The intervention includes a small farm pond, along with poultry, fishery and cattle shed. The cow-urine and dung will be used for vermi composting and organic manure and this will be beneficial to the entire gram panchayat including the Mushar households.

Capacity building on integrated natural resource management planning and Resource Map of Ekamba

In April 2017, the ICRG Team undertook a series of trainings for the community on climate change, selection of CRW works and benefits of creating climate resilient infrastructure with livelihood options. This was followed by mapping of the ponds of the gram panchayat and suggested design recommendations for three possible pond sites that would benefit 110 households. The selected site for the climate resilient work contributed to increased storage of water for irrigation and fisheries - 13 hectare for farming; 5 Sahni families (traditional fisherman caste) for fishery and recharging 12 bore wells located nearby. The intervention also supports two units (400 plants) of horticulture and timber plantation on common land near the pond and in and around the climate resilient work. The community is preparing for one more unit of plantation. (1st row of gauva, 2nd row amla (goose berry) and 3rd row mahogany (timber)). The PRI members have appointed a member of the community (a widow) for protection and maintenance of the trees.

The gram panchayat has planned the holistic development of the village with the creation of replicable models like integration of farm pond with fishery and duckery. In addition, 80 families mainly from the OVG community have been identified for model cow dung management with cattle shed.

The Impact

Agro – horticulture plantation at the climate resilient works site

The intervention is directly benefitting 25 families that own a total of 13 ha of land with irrigation and fisheries. The guava and amla has just been planted and will bear fruit four times a year – this will enhance incomes. The mahogany trees will provide bio-protection. The integrated planning exercise done by the ICRG Team has contributed to broadening the mind of villagers and changing the outlook of the gram panchayat. The mapping and planning with each of the marginalized households has enabled holistic development of the through integration of activities - animal waste management and introducing possibilities of fishery, duckery and other aquaculture in the ponds.

Who is benefitting?

Mukesh Raj Kumar at his farm pond

Mukesh Raj Kumar (47), is a progressive farmer and enjoys a position of respect and trust in the village. His efforts have resulted in successful implementation of government schemes particularly in making his gram panchayat open defecation free and improving the public distribution system. After attending ICRG's trainings and capacity building initiatives, his inclination and awareness towards climate change and integration for sustainable livelihood opportunities has increased. He has planned for the renovation of three other ponds in the village with complementary plantation work and fisheries.

Rice-fish farming model

Plantation at site of climate resilient work by PRI member

This integrated approach of ICRG to tackle climate threats along with farmer's priorities on livelihood activities has spread to other neighbouring gram panchayats in the area. Harishankar (52), a farmer in Ekamba was fascinated by the integration models of farm ponds and has constructed a farm pond in his backyard with his own resources and is using it for fishery and duckery and has recently ordered another dozen duck. The pond design is such that runoff water from his field moves through normal gravity flow into his pond. On similar lines in the neighbouring gram panchayat of Parora, many farmers have started taking up dual models of paddy cultivation with fishery in running water along with a small pond. This increases productivity with the fish being harvested at nearly the same time as paddy.

Rajesh and Satyendra, a young energetic Panchayat worker, agree that the ICRG approach to design and integration is very much needed in today's context. Satyendra says "*Society has progressed, and earlier days of just labor are no longer enough for a family. We need livelihoods and income generation options to sustain. We should continue with the approach ICRG has shown us."*

INFRASTRUCTURE FOR FARMING IN FLOODED AREAS; MUZAFFARPUR

Background

Muzaffarpur district lies northern Bihar. Rivers like the Burhi-Gandak, Baghmati and Kamla Balan flows through the district in a south easterly direction and finally merge with the Ganga at different places in the state. Though all three rivers and their several tributaries in the district are perennial, they become very devastating during the rainy season and cause flooding and water logging. On an average, the district receives 1280 mm rainfall annually with 85% concentrated between June to September.

Flooded area of Barri gram panchayat

Muzaffarpur district belongs to agro climatic category I which is characterized by flood proneness, water logging and poor drainage with abundance of large water bodies like chaur areas leading to low agricultural productivity and highly prone to risk. Agriculture in the district faces many challenges like low productivity and low level of diversification and absence of allied enterprises. Katra block of Muzaffarpur is one of worst flood affected blocks in the district and remains submerged during monsoons and subsequently dries up in the rabi (winter) season. In the 1950's – '60's, the River Lakhandahi that used to flow in block and covered three gram panchayats including Barri dried up. However, due to siltation in the original line of flow of the River Bagmati, in later years, the main course of the River Bagmati merged with the flow line of the River Lakhandahi and this became the main course line of the River Bagmati. This change in the river course is one of the reasons for the high sensitivity to flooding in the block of late and causes huge loss of life and property every year.

The Katra block has a low reach of government schemes and interventions are very limited especially MGNREGA. Some flood control measures like construction of a kaccha road for transportation during flood and some other small constructions to prevent water logging have happened in the block but these are insufficient. Discussions with the community revealed the need for substantial infrastructure that could cater to the prevailing agriculture and livelihood practices in the village. The farmers are facing huge challenges like low productivity, water logging, and insufficient drainage channels in their agriculture lands. The combination of these factors is now resulting in distress migration.

The ICRG Intervention

Despite being affected by annual floods and non- availability of conservation infrastructure, the area faces both flood and drought like situation. To counter this and to support livelihood of farmers, the ICRG Team planned two interventions in the Barri gram panchayat in consultation with the community.

The restoration of the pyne[2] was the most important demand of the community in the gram sabha. The ICRG Team proposed some design changes including inter-connection of pynes. Plantation around the bunds to strengthen the structure were also recommended. The selected pyne work in Barri is directly benefiting 22 families at present however, following completion of the detailed plan, especially the inter-connection with other pynes, more than 2500 households in the area will be benefitted. The entire area lies in chaur land (low land), water logging and sand deposition on agriculture fields due to flooding is a major issue in the area.

Pond rejuvenation work in progress in Barri gram panchayat

To address the identified issues, planning has been done in phases. In Year 1, the plan is to desilt the pynes and start the plantation under MGNREGA. It is also planned that this pyne will be connected to other pynes in the area. Based on discussions with the community, the ICRG Team suggested a half-moon slope at turning points to reduce velocity of water, maintenance of the bed and side slopes and widening and deepening of the drainage channel bed and its sides.

The second intervention being taken up is the rejuvenation of a community pond in Bhavanipur village in Barri gram panchayat. The design recommendations include strengthening of embankment, inlet-outlet construction and staircase for protection of wall and easy mobility of women and disabled. All these measures will contribute in draining the flood water and simultaneously conserving water for irrigation in the dry season.

The Impact

The rejuvenation of the section of the pyne has helped around 22 farmers in their rabi (winter) and zaid (summer) cropping and 175 farmers of the adjoining villages. The half-moon slope at turns has prevented the embankment from breaching due to high velocity of water. Widening and deepening of the drainage channel bed and sides will help maintain the natural and dynamic flow of water easily during peak rainy season and reduce flood risk for the agriculture land and standing crops. It will also reduce surface runoff and increase life and use of the structure for agriculture.

Chandoli village pyne last year with mustard crop

[2] Bihar has a traditional irrigation system called 'ahar-pyne' where the 'ahar' is a water storage structure and the 'pyne' is a water distribution channel. These systems are age old and fallen into disuse because of siltation and encroachments.

Post the construction of the climate resilient work in the command area last season, farmers have taken up wheat cultivation on 250 acres, maize cultivation on 150 acres, potato, lentil and oilseeds on around 100 acres.

The pond construction work in Bhavanipur village of Barri gram panchayat is partially complete. This structure has benefited 66 families through irrigation on 75 acres. This pond design ensures easy access by women and disabled. The agro horticultural plants on the bund of pond will help in preventing erosion and economic benefits. The farmers are planning to plant a combination of timber and horticultural trees however, this work is yet to start.

This MGNREGA intervention in Barri gram panchayat has generated 2333 person-days employment for 256 labourers in the village.

Who is benefitting?

The intervention in the flood prone Barri gram panchayat Katra block will benefit 250 acres belonging to 175 farmers by ensuring additional irrigation water post the monsoons. Ashrafi Sahi, 60 is a farmer with 5 bigha of land in the Chandoli village near the site of the climate resilient work. He says, *"Main 10 saal ka tha jab Baghmati nadi ko apne gaon aate pehli baar dekha tha. Sab ghar kheti dub gaye the. Hum kheti ko nahi kar pa rahe the, barish ke baad pani khatam ho jaata tha. Ab thoda alag se designing karne se paani lambe samay tak ruk raha hai. Hum log aur ped bhi lagayenge jisse katav rukega. Mere gehu aur sarso ke khet aap dekhiye"*

("I was 10 years old when I had seen the River Baghmati entering our village for the first time. All our homes and agricultural lands were destroyed. We have tried a slightly different design and water is being retained for longer duration in the pyne. We will also plant more trees to control erosion. See my wheat and mustard fields".)

A lot more needs to be done in support of the farmers to manage the alarming flood situation in the gram panchayat. There is need for cleaning an additional connecting 1000ft of pyne that will support 750 acres of agricultural land. The ICRG Team is advocating with the state government for taking up this work under MGNREGA.

PERSISTENCE REAPING LARGER BENEFITS; NALANDA

Background

Nalanda district is in the agro-economic zone III-B (partly drought prone area). It is in the south- central part of the state and to the south of the River Ganga. The Nagar Nausa Block in the district relies on rains for agriculture. According to a ground water report of pre and post monsoon seasons, the ground water availability of the district varies between 2.35 – 9.13m bgl and 0.58 – 3.02 m bgl respectively. Thus, availability of ground water for irrigation is scarce. The soil moisture stress of the top soil is further aggravated by high temperature and erratic dry spells in the monsoons. These situations result in low agricultural productivity in the area - average 1487 kg/ha - during both the major agriculture seasons (kharif and rabi). An analysis of the main works taken up under MGNREGA in the last two-three years shows that the major focus has been on creating micro-irrigation and drought proofing to help farmers. The Vulnerability Analysis Report[3] of the area also indicates the ground water situation and forest cover as highly vulnerable. Recommendations made under the ICRG programme for all climate resilient work sites in the four blocks of Nalanda district focused on countering these vulnerabilities.

Damaged Chilkha in Diyawan after floods

MGNREGA mainly focusses on small infrastructure works, but for long lasting impacts, it is important that a holistic intervention for the entire drainage system is considered while planning. Since the pynes, the traditional irrigation structures in the district are linked to each other and connected to rivers, there is need to treat the sub-structures in the entire catchment area. This intervention has been demonstrated under the ICRG project in the construction of the Diyawan Chilkha (check dam) in the neighbouring Diyawan gram panchayat in the adjoining Karaiparsurai block. This check dam that linked to the River Lokayan was damaged in the last monsoons affecting farmers of five gram panchayats through reduced irrigation facilities and livelihoods in two blocks, Nagarnausa and Karaiparsuarai.

[3] The Vulnerability Analysis Report was commissioned under the ICRG project. This Report determined the vulnerabilities in the project blocks based on bio-physical and socio-economic parameters. This Report together with the Climate Modelling Study help in identifying the 'hot spots' and are a key input to design recommendations under ICRG.

The ICRG Intervention

The ICRG project created a demonstration structure comprising a pyne combined with check dam and plantation in Saidpur village in Ariyawan gram panchayat of Nagarnausa block in Nalanda. This climate resistant work is directly benefiting 44 households of Saidpur village for irrigation. Prior to the ICRG intervention, the incorrect interconnections between the pynes had a domino effect on the surrounding areas and, this is precisely what happened in this instance too. Due to flash flooding in the mid monsoon season last year, the diversion check dam in Diyawan gram panchayat which is 7 Kms away from the site of the climate resilient work was damaged and water got diverted to other location resulting in the main line of flow becoming dry.

Farmers raising the issue of damage of Chilkha in village meeting

The villagers were apprehensive this year about the timely repair of the check dam. This would affect all the crops in five gram panchayats on more than 2000 acres of land both on account of lack of irrigation and flooding. The villagers under the leadership of Mr. Bhushan Pandit, the Mukhiya (Headman) took up the check dam issue with the Block Development Office with no success.

Mukhiya and ICRG Community Worker at damaged Chilkha

This problem was brought to the notice of the ICRG Team and structured discussions began with the community to diagnose the main issues. The ICRG Team also had discussions with farmers of adjoining villages and tried to mobilize them for the common cause. The ICRG Team also began discussions with the Water Resources Department, Government of Bihar for repair of the Diyawan diversion on priority.

Mr. Samshad Alam, the Community Mobilizer of the ICRG Team met officials of the Sub Division Office and the Water Resource Department with community members in April 2018. However due to the high cost of repairs, the Executive Engineer did not sanction the work and the file was moved to the Chief Engineer. The ICRG Team escalated the issue with the Water Resources Department at a state level meeting and finally succeeded in getting approval for funds for the repairs. By the time the approval came through, the monsoons had arrived and the cement-concrete work at the site could not start. However, to prevent flooding and help in irrigation this season, the Water Resources Department installed a series of pitch dams using sand bags to help in maintaining water flow in the main pyne. The cement concrete work will start after monsoons.

The Impact

The Hasan pyne which is connected to the River Lokayan is the main source of irrigation in five gram panchayats covering 15 villages of 2 blocks of Nagarnausa and Karaiparsurai in Nalanda district. This pyne would be helping more than 2000 acres of irrigation. In addition, the flash flood situation could be controlled as it drains the excess water. There were also cases of failure of pumping sets in the region last year due to long dry spells and falling water levels. This intervention is expected to positively impact all 15 adjoining villages.

Repaired Chilkha in Diyawan

Who is benefitting?

This intervention will directly benefit about 525 farmers through flood prevention and getting lean season irrigation. Prominent progressive farmers like Bhushan Pandit, Sunil Mahato, Surendra Prashad, Umashankar Mahato and Ramvilas Paswan who depend who rainfed agriculture have worked hard to get the work done.

Beneficiary farmers along with PRI members at the site

Mr. Surendra Prashad Singh (56), a native of Diyawan Choti Bigha village, moved to Patna from his village 3 years back. In his young days he used to take issues of villages to Government officials. His hopes of working for increasing agricultural produce in the village received a setback with the damage of the Chilkha. He says *"Ye Chilkha bahut zaruri tha, nahi to 15 gaon dub jayenge aur hamari kheti barbaad ho jayegi"* (This check dam is very important else 15 villages will be flooded and our crops will be destroyed). He recognized the mobilization efforts done ICRG and agrees that the situation has been controlled this year. He feels that similar linkages and liaising is needed for all works for a holistic impact.

MOVING TOWARDS RESILIENT FARMING PRACTICES; WEST CHAMPARAN

Background

West Champaran district is in the north-west part of Bihar and is in the plains of the River Gandak. The district has several other small rivers originating from Nepal. All these rivers make the district flood prone.

Yogapatti Block in the district has most people practicing agriculture. The whole block is exposed to soil erosion, occasional floods and mild to moderate drought particularly in summer. Parts of the Block remain water logged throughout the year. The landscape includes ox-bow lakes, back swamps or flood plains and chaur land and, thse wetlands are mostly seen in southern part of the Yogapatti block. The gross cropped area in the block is 27959.26 ha, net sown area 13988.22 ha, area sown more than once is 13971.04 ha and cropping intensity of the block is 199%. The area grows cereal and sugarcane.

Farmer preparing his field in West Champaran

According to the Climate Variability Study[4], the average temperature in Yogaptti block will increase by >4.0°C by 2035. It is also projected that the average rainfall in June-July-August-September (JJAS) and the average number of rainy days will increase by 25% by 2050. This indicates potential production loss and increase the area of wetland in future if the present cropping systems are followed. In the last 25 years, the mean rainfall in Yogapatti block was 1154 mm for the monsoon months (JJAS) with the highest rainfall event occurring in one day being 278 mm.

Agriculture is the key economic activity with most farmers falling under the category of small and marginal farmers with size of landholdings varying from half to two hectares. Farmers practice mono-cropping due to lack of irrigation facilities. The absence of effective land treatment measures in the area leads to farms experiencing soil erosion and nutrient loss. The main emphasis under the ICRG programme was on construction, conservation, drainage structures, capacity building and enabling farmers to access available government programmes related to agriculture. Under the present agro-climatic vulnerabilities, the region has low in organic carbon nutrient content due to soil erosion and frequent occurrence of floods. Additionally, the existing practices in applying more fertilizers to increase production is detrimental to soil fertility in the long run. However, there is ample scope of independent interventions by which a farmer's agricultural production can be positively impacted.

[4] The ICRG project commissioned the Indian Institute of Science, Bengaluru in 2016-17 to undertake the Climate Variability Study. The study includes projections of kharif rainfall – June-July-August-September – for the period upto 2050 as well as temperature variations. The projected climate data is the basis of design of MGNREGS assets under the ICRG programme.

The ICRG Intervention

The ICRG Team undertook capacity building and orientation of PRI members, SHG groups, farmers and other beneficiaries. Under the ICRG programme, Yogapatti Block selected four climate resilient works comprising eight MGNREGA in 2017-18. The works include pyne[5] desiltation with agro-horticulture plantation in three villages in three gram panchayats. To ensure that the structures are resilient, convergence with other schemes, the need improving present agriculture practices were emphasized through awareness campaigns on detrimental effects of excessive fertilizer use and use of organic manure and vermicomposting.

Capacity building of farmers on vermicomposting and agricultural package of practices

Around 250 farmers residing near the site of the climate resilient works belonged to Schedule Caste (SC), Schedule Tribe (ST), and Other Backward Caste (OBC) families were trained on Vermicomposting pit construction in Balua-Bhavanipur and Nawalpur gram panchayats of Yogapatti block. An exposure visit of selected women SHG members from Nawalpur gram panchayat was also facilitated.

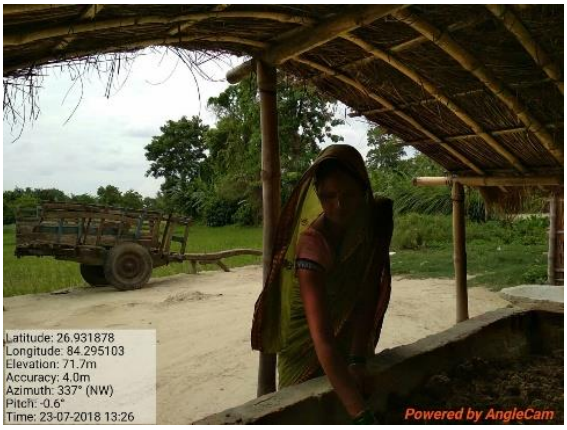
The awareness generation encouraged 13 farmers to construct a vermicompost pit and practice kitchen gardening with manure on 10 dhur (0.15 Acre) of land. Seeing the benefits, 12 other farmers also purchased vermicompost manure from them. This has also spread the demand for vermicompost in the area and now many progressive farmers of Nawalpur gram panchayat and around are purchasing vermicompost manure at Rs 6/kg from these farmers. This practice was promoted with a view to improve the soil health and provide additional nutrients in the food of poor farmer's family.

The Impact

The training and awareness programmes undertaken by the ICRG Team directly reached 250 farmers of five villages of three gram panchayats in Yogapatti block. They were trained in constructing vermicompost pit, kitchen gardening and benefits of organic manure use. 12 farmers have constructed vermicompost pit around the site of the climate resilient works independent of any assistance. Several other farmers in the area have demanded vermicompost pits under MGNREGA.

[5] Bihar has a traditional irrigation system called 'ahar-pyne' where the 'ahar' is a water storage structure and the 'pyne' is a water distribution channel. These systems are age old and fallen into disuse because of siltation and encroachments.

So far, 30 farmers have started using the manure for vegetable cultivation in their agricultural fields instead of chemical fertilizers. The ICRG Team had also conducted training on vegetable cultivation 'package of practices' for beneficiaries of the climate resilient works. The ICRG intervention has led to the very small farmers cultivating cucumber, lady's finger and other vegetables.

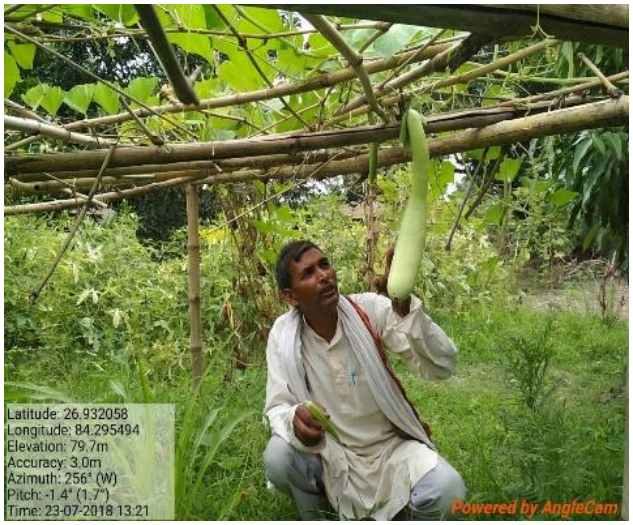


Women farmers with their vermicompost pit and kitchen garden

Farmers practicing kitchen gardening are earning about Rs. 1500-2000 in addition to meeting personal requirements. The total benefits in the last 3 months was Rs. 58,500 for 13 families. The soil condition has also improved as has the resilience of families.

Who is benefitting?

Madan Ram (45), is a progressive farmer of Bintoli village of Nawalpur gram panchayat in Yogapatti block. On receiving information about vermicomposting and kitchen gardening, he prepared five sets of vermicompost pits on his own and used the manure for kitchen gardening. In the current season he used his 1 kattha of homestead land to cultivate lady's finger, brinjal, gourd, spinach and other vegetables. He is expecting that the total produce till the end of the season will be 4.5 quintals. After meeting household requirements, Madan Ram will sell the vegetables in the local market and is expecting an additional income of Rs. 14,000. Madan Ram has also sold 70 quintals of vermicompost at Rs. 6/kg and will earn Rs. 42,000/ from this every year.



Madan Ram on his farm

Madan Ram's neighbours Gulabi Devi, Bechu Yadav and Reshmi Devi have also started kitchen gardening on the same lines. Encouraged by the benefits, other farmers are also replicating these examples in and around the village.

SMALL CHANGES – BIG IMPACTS; NALANDA

Background

Nalanda district is in the agro-economic zone III-B (partly drought prone area). It is in the south-central part of the state and to the south of the River Ganga. The average annual rainfall of the district is 1002.2 mm of which about 92.55% of the rainfall is received during June to October (monsoon season). In the last couple of years repeated drought conditions have intensified the challenges for small and marginal farmers with average holdings of 0.80 Ha.

The traditional 'ahar-pyne'[6] structures are the main source of irrigation in the district. The irrigation channels (pynes) are connected to rivers or ground water sources (tube wells or wells). In the monsoons and the rabi season these irrigation channels and ground water sources are the main source of irrigation. Farmers use sub channels and water lifting devices from the pynes to irrigate their fields. There are many water bodies and channels in the area but most of them are non-functional due to siltation over a period. While supplementary irrigation through canals is practiced, the canal beds and sides are not properly maintained leading to severe soil erosion and siltation during the rainy season due to high velocity of water and high surface runoff in the area. These factors result in very limited irrigation in the district affecting the livelihoods of the farmers.

Naganausa pyne before intervention

Villagers of Saidpur repairing damaged pyne wall

Kachiyawan gram panchayat in Nagarnausa block of Nalanda district faces similar challenges and this is an ICRG demonstration site. The gram panchayat has a total population of 8635 with majority being SC and OBC population.

The ICRG Intervention

The gram panchayat has an earthen irrigation channel as one of the main irrigation sources for the villagers for the rabi season crops and is a critical irrigation source for kharif crops. This channel is

[6] Bihar has a traditional irrigation system called 'ahar-pyne' where the 'ahar' is a water storage structure and the 'pyne' is a water distribution channel. These systems are age old and fallen into disuse because of siltation and encroachments.

directly to the River Phalgu and with three other small channels. The river and these channels provide water in the pyne that serves about 40 percent of the agriculture area for irrigation in Saidpur village.

Completed check dam at suitable site

In the past, desiltation of the pyne was taken up under MGNREGA. The ICRG Team interacted with the community and studied the water catchment area and proposed the construction of a check dam on the channel. The check dam would maximize benefits of harvested water and could be used as a walkway connecting fields on either side of the channel. The ICRG recommendations were implemented and led to direct positive impacts on the livelihoods of villagers as well as promoting plantations of trees and shrubs near the structure.

The ICRG Team made recommendations on the design of the pyne (irrigation channel) and check dam. The design recommendations were made keeping in mind the future climate projections. The pyne side slope maintenance recommendations are therefore expected to cope with the future has been maintained considering the historic and future rainfall using climate modelling study. The location of the check-dam was altered following discussions with the villagers and the new site is at the junction of three pynes. The specifications of the check dam were calculated based on peak discharge of water (Qp) cum/sec. ICRG also recommended the inclusion of a ramp and side rails for easy access by the differently abled, pregnant women, elder and children.

Women using friendly design to ferry water at check dam

The Impact

The intervention has provided direct benefits to 44 households of Saidpur village and 43.33acre land. The increased soil moisture content in the adjacent fields has meant a reduction in the requirement for irrigation water requirement has reduced - farmers will now cultivate crops with reduced number of irrigations especially in the kharif season. This will allow farmers to save irrigation water for use at the start of the rabi season and cultivate additional and diversified crop options like vegetables, wheat, pulses etc.

The additional water in the pyne flows through seven neighbouring villages covering 300 acre and is helping kharif irrigation.


Green gram cultivation for the first time by farmers in the command area

The productivity of all crops in the irrigation catchment of the climate resilient work site has increased. Wheat productivity has increased from 10.50q/acre to 15Q/acre, paddy and maize productivity has also increased by 11% and more. The water level in four wells near the climate resilient work site has increased by 5 feet.

Who is benefitting?

All 44 direct beneficiaries have had increased production in each of the three seasons. Further, seven villages located near the site were also affected by floods in the rainy season. The deepening of the channel bed has ensured smooth flow of water. In addition, 25 farmers were able to cultivate green gram for the first time with yields of 6 quintals; 6-7 farmers also cultivated vegetables for the first time.

Sabita Devi (45), a widow has 3 bigha[7] of land in the command area of the climate resilient works. She is illiterate and was married in 2010 into a farmer family in Saidpur village. Following her husband's death in an accident, she has sole responsibility for her 3 daughters. Sabita Devi started farming on her piece of land but due to limited availability of water, she was unable to meet her expenses. She married one daughter and is educating another. To meet her needs, Sabita Devi took a loan of Rs. 70,000 from Jeevika SHG groups. Sabita also worked as a MGNREGS labourer for additional income. The increased availability of water in the pyne this year encouraged her to lease 6 kattha land from others in addition to her own 3 kattha[8]. Sabita Devi has managed three crops along with vegetables. The total production from 3 seasons has increased by 50% along with production of additional crops like red lentil that she cultivated for the first time. She confidently says "Nimak *bhaat kha ke hum reh lenge, lekin kheti kar ke apni beti ko school bhejenge. Kheti se meri aas badh gayi hai."* (I can sustain by eating rice and salt, but I will send by daughter to school. My confidence in agriculture has increased.")

[7] Bigha and Kattha are traditional units of land used in India. 1 Bigha=20 Kattha=14,400sqft
[8] Kattha is also unit of area used for measuring land parts. 1 Kattha=1,361sqft

CHHATTISGARH

DEMONSTRATING FINANCIAL CONVERGENCE; BILASPUR

Background

Bharari gram panchayat in Bilha Block is only 15 kms away from the district headquarter and has been a good performer in implementation of developmental programmes including MGNREGA. Unfortunately, the panchayat faced annual flash floods from 2011-12 to 2016 during the rainy season due to the construction of two Power Grid Distribution centres of 765 Kw and 400 Kw covering an area of around 111 acres and supplying electricity to the adjoining districts and states. Prior to the construction of the Power Grid Centre, the runoff from the monsoon rain passed through various natural drainage lines. The construction obstructed percolation leading to heavy runoff from the large catchment area.

According to the Vulnerability Assessment Report[9], Bilha block has a high aggregate vulnerability index in terms of both biophysical and socio-economic indicators. In terms of bio-physical indicators, the areas of high vulnerability are net irrigated area, ground water availability and forest cover. In terms of socio-economic indicators, the block has many rural houseless who are landless and do manual labour work and have incomes of less than Rs. 5000 per month.

The ICRG Intervention

The ICRG Team undertook extensive consultations with the community and analysed the slope and run off patterns in the area. Subsequently, a recommendation was made for the construction of a feeder water channel from the Power Grid Centre to link with the community pond to tap the runoff.

Climate resilient work – Feeder Channel and Community Pond

This recommendation addressed two issues. Firstly, the huge volumes of runoff water were channelized to prevent flash flood in the adjoining area and secondly, the channelizing of this water into community ponds preventing them from drying up in the summer season and providing opportunities for life saving irrigation and *Nistar* (domestic use). The feeder channel helped in inter-connecting three community ponds that had storage potential of 9000 cum, 14500 cum and 25,500 cum. The feeder channel related to the first community pond and the outflow of the first community

[9] The Vulnerability Analysis Report was commissioned under the ICRG project. This Report determined the vulnerabilities in the project blocks based on bio-physical and socio-economic parameters. This Report together with the Climate Modelling Study help in identifying the 'hot spots' and are a key input to design recommendations under ICRG.

pond was connected to the inlet of second community pond and subsequently to the third community pond.

The Gram Panchayat identified and selected three different MGNREGA works to address the issue: construction of feeder water channel (Nali Nirman), de-siltation of community pond and construction of bathing steps. The feeder channel was constructed in the FY 2016-17 through financial convergence of three different schemes. The total cost of construction of the feeder channel was Rs. 5.91 Lakhs of which 40% was covered through MGNREGA, 20% through 14th Finance Commission funds and 40% through the gram panchayat and Samagra Vikas Yojana of Panchayat Department of the State government.

The ICRG team provided the following technical inputs to make the feeder channel a climate resilient work:

- The suggested dimensions of the feeder channel were 110mX0.6mX0.6m (LXWXD).
- The suggested bed slope of the feeder channel was 0.5 % at every 100 m.
- A silt trap chamber of size 4mX2mX1.2m (LXWXD) to be constructed at the connecting point of the feeder channel to reduce the influx of silt into the community pond.
- It was recommended that vegetation like grasses and shrubs be planted on the compacted soil to stabilize the bunds of the feeder channel.

In the current FY 2018-19, the ICRG Team with the support from the District administration facilitated bund plantation of 500 trees on the community pond with tree guard for protection. The beneficiaries of the community ponds were also trained on improved agricultural practices like 'system of rice intensification' by the Agriculture Department. The ICRG Team facilitated the linkages with the Agriculture Department and Krishi Vigyan Kendra for training and educational tour of farmers to see improved and resilient farming practices.

The Impact

The inter linking of the feeder channel with the community ponds has increased the storage capacity of the ponds and ensured water availability throughout the year for domestic use of the villagers. 25 households residing near the feeder channel used the stored water for life saving irrigation to kharif crops over a 20 Ha area during the intermittent drought spell. Under normal weather conditions water could be used to irrigate only 8 Ha during the season. The work generated 852-person days for 151 persons. Around 59% of the 151 persons i.e. 89 were from the SC Community and among them, around 54% i.e. 82 persons were women.

Protective irrigation in dry spell and cultivation of second crop

Who is benefitting?

Bharari Panchayat has 621 households with a population of around 2463. SC's constitute 373 households, ST's 4 households and others constitute 244 households. This intervention has directly

benefitted 25 households since their lands are located near the feeder channel and community pond. However, the entire gram panchayat has benefitted indirectly because of the water availability for domestic use throughout the year.

Jatanlan (40), is a farmer farming and does labour work to meet the basic needs of his family of six. He has 2.5 acres of land and cultivates paddy on 1.85 acres. Prior to the construction of the feeder water channel, he used to get around 15 quintals of paddy from his land. However, following the construction of the feeder channel in 2017, the production of the paddy increased to 24 quintals. This was possible because of the availability of water for irrigation at the time of sowing and more importantly during the dry spell. Irrigation water was also available in the rabi season to sow wheat on 1.3 acres of land leading to a production of 11 quintals.

Members of beneficiary household

Nandkumar (29), is a young farmer who does both farming and MGNREGA work to take care of his family of 5 members. He has 3.08 acers of land and cultivates paddy on 1.9 acres. With the construction of the feeder channel in 2017, his paddy productivity has increased to 26 quintals from 16 quintals in the previous years. He also cultivated about 11 quintals of wheat in the rabi season from 1.1 acres of land. Nandkumar also worked 176 days in MGNREGA in FY 2017-18 compared to 88 days in the previous years.

Deviprasad (50), manages his family of 7 members by agriculture and MGNREGA work. He cultivates paddy on 1.45 acres of his 3.2 acres of land and produced 20 quintals of paddy post the construction of the feeder channel compared to 13 quintals in the previous years. He is of the view that the construction of feeder channel brought great relief to the farmers of the village as their farms could be irrigated not only at the time of sowing but also during the dry spell. This helped increase their productivity and assured paddy harvests even in the event of intermittent dry spells.

TIMELY AVAILABILITY OF WATER FOR IMPROVED AGRICULTURE PRODUCTIVITY; KORBA

Background

Rainfed agriculture is practiced in most of the parts of Chhattisgarh leading to variability in productivity. Moreover, recurring intermittent dry spells lead to low productivity in major crops like paddy. The late onset of monsoons, cause delay in sowing and thereby reduction in crop productivity. The Pali block in the Korba district was selected under the ICRG programme due to its high aggregate vulnerability index in terms of both biophysical and socio-economic indicators. The Block also has many landless households who do manual labour work and earn less than Rs. 5000 per month.

Rainfed agriculture practice

The Saraipali gram panchayat is newly formed and has been carved out of the Damiya gram panchayat. The gram panchayat has many ST households (76.5 %) and faces water scarcity both for drinking and irrigation purposes.

The ICRG Intervention

The ICRG Team recommended the construction of a community pond in FY 2016-17 at a cost of Rs 6 lakhs. The community pond will meet the water requirements of the ST households for irrigation and livestock water requirements in the summer season. The specific recommendations made to enhance the climate resilience of the pond were as follows:

Climate Resilient Work: Community Pond

- The suggested dimensions of the pond of 58mX28mX1.8m (L*W*D).
- The suggested silt trap chamber near the pond to minimize siltation and maintain capacity.
- The suggestion of an inlet and outlet in a step form for safe flow of water for intake and discharge.
- The suggestions on the slopes of the pond considering the sandy loam soil - the inner side slope (1:1.5) and outer side slope (1:2) for stability and durability.
- The planting of vegetations like grasses and shrubs on the bunds to check erosion.

In FY 2018-19, the ICRG Team has facilitated planting of 45 saplings of species like mango, black berry, jackfruit on the bunds of the community pond in the rainy season. This intervention has been through

convergence with the Horticulture Department. These plants will contribute to making the structure more climate resilient and meet the consumption of beneficiaries in the future. The ICRG Team also facilitated training of 45 farmers on improved agriculture practices like SRI method of paddy cultivation and vegetable farming. This intervention was done through convergence with the Krishi Vigyan Kendra and RAEO of the Agriculture Department.

The Impact

The construction of the community pond in line with the design suggestions given by the ICRG Team has ensured life-saving irrigation in the kharif season and irrigation in the rabi season. Ten households living close to the community pond were able to irrigate 2.8 Ha of paddy in the kharif. Prior to the construction of the community pond, only 0.4 Ha of land could be irrigated. The intervention also generated 3419-person days labour to 1079 persons.

Protective irrigation in dry spell

Who is benefitting?

There are 10 households living near the community pond that are direct beneficiaries and have seen an increase in agriculture production. The whole village is benefitting with the availability of water for livestock and domestic uses.

Laxman Singh (50) is a farmer and does labour work in MGNREGA to maintain his family of 4 members. He did paddy cultivation in 0.98 acres of land and produced 14 quintals of paddy in FY 2017-18 against 8 quintals of paddy in FY 2016-17. He is now able to consume the paddy throughout the year. He has also worked for 130 days in MGNREGA in the FY 2017-18 and earned Rs 22360. In the FY 2018-19 he received training on SRI method of paddy cultivation and adopted this method on 0.5 acres of land.

SRI of paddy cultivation: Laxman Singh

Bhaddu Singh (65) owns 1.97 acres of land and cultivates it to meet the needs of his family of five. Prior to FY 2016-17 his land produced 14-15 quintals of paddy due to water shortages. Following the construction of the community pond, his agriculture productivity has increased to around 22 quintals of paddy. Bhaddu now plans to grow rabi crops to enhance his income. He also worked for 53 days in FY 2017-18 in MGNREGA in the village.

Jivan Singh (52) does farming and MGNREGA labour to take care of his family of seven members. He has around 4 acres of land and produced around 55 quintals of paddy in 2017 against 38 quintals in 2016.

ASSET CREATION TO IMPROVE LIVES OF VULNERABLE HOUSEHOLDS; SURGUJA

Background

Poverty rates in Surguja district are very high at 51.5% and Batauli block in the district is no exception. The Balampur gram panchayat in the Batauli Block has 70% ST households who depend on rainfed agriculture. Water shortages and non-availability of water for irrigation across most parts of the panchayat is a critical issue. The net irrigated area in the panchayat is only 0.25% and the increasingly small plot sizes linked to sub-division of holdings and increasing population further aggravate agriculture practices here.

The ICRG Intervention

The state government had advised the ICRG Team to identify one natural resource management work for climate proofing in FY 2016-17. The Team had selected a dug well in the Balampur panchayat of Batauli block as a demonstration. The dug well is in the low land of the farm and was used for irrigating paddy and vegetable crops using a pump set or other lifting devices. The location of the dug well is such that there was possibility for water being available in the summer months.

Climate Resilient Dug Well

The dimensions of the dug well are 4mX10m (Diameter*Depth) with stone pitching on the inner diameter up to 16 ft from ground level. The specific recommendations of the ICRG Team to enhance the climate resilience of the structure were as follows:

- To undertake complementary work of treatment of the upper ridge by trenches and plantation to increase the water percolation in upper catchment area and improve the yield of the well.
- Stone pitching of the inner side of the well up to 15-16 ft to prevent cave–in of the walls.
- Convergence with Agriculture Department for a pump set through CREDA, and Horticulture Department for vegetable cultivation and orchard development under the National Rural Horticulture Mission.

The Impact

The water table of the well is very high (nearly 0.5 to 1 m). It has potential to irrigate 2 Ha of land under paddy in the kharif season even in cases of intermittent spells of drought. In case of normal weather conditions, the dug well has the potential to irrigate 0.8 ha of land in the rabi season and summer season enabling the farmer to cultivate vegetables that increase the household incomes and adaptive capacity of the farmer.

The ICRG Team estimated that about 35% of the cost of the dug well would be for earthen work and therefore offering unskilled wage employment to wage seeker families of the village.

Paddy and maize cultivation

Who is benefitting?

Shivnandan Prasad (50) is an ST and the direct beneficiary of the dug well. His main occupation over the years has changed from agriculture to masonry due to absence of irrigation faciliites for agriculture. He travelled around the Block and District in search of masonry work. He worked for 120 days in MGNREGA in the FY 2017-18 and earned Rs 20640. He has 5 acres of land on which he does paddy cultivation in the kharif season producing about 7-8 quintals per acre. Following th desing suggested by ICRG, in 2017, his land harvested about 14-15 quintals of paddy per acre due to water availability at the time of sowing and during the dry spells. He sold around 30 quintals of paddy in the market for Rs 50000/- and earned another Rs. 9000/- by selling 3 quintals of groundnut grown on 0.4 acres. He also did cultivated maize on 0.1 acres of land for self consumption. Shivnandan continues to do masonry work in the rabi season to supplement his income.

Pigeon pea cultivation

In 2018-19, the ICRG Team focused on other means of strengthening livelihoods through extensive consultations with beneficiaries of climate resilient works. Shivnandan received training on different issues like SRI method of paddy cultivation, methods of mulch for vegetable cultivation, etc. from the Krishi Vigyan Kendra and RAEO. He received free pigeon pea seed packets from them and cultivated it on 0.3 acres of land. Today, Shivnandan does not go out of the panchayat for work and concentrates on agriculture in the rabi season.

DIVERSIFICATION OF LIVELIHOODS FOR VULNERABLE HOUSEHOLDS; JASHPUR

Background

Out of the 1083 Households in Sanna gram panchayat, ST households constitute 64%. Of the 936 registered job cards under MGNREGA, only 453 were active; indicating that MGNREGS was not functioning optimally prior to the ICRG interventions. According to the Vulnerability Assessment Report[10], overall vulnerability in the block is medium compared to the other blocks although the block has many households with a monthly income less than Rs 5000 as well as several households belonging to the Particularly Vulnerable Tribal Group (PVTG).

The Sanna gram panchayat was selected in consultation with the district administration to develop a prototype that demonstrates the potential of incorporating elements in MGNREGS works that promote climate resilience.

The ICRG Intervention

In consultation with the district administration, the ICRG Team identified a farm pond to demonstrate climate proofing in FY 2016-17 in Sanna. The farm pond is in the low land of the farm and was used for irrigating paddy and vegetables. Its location had potential for water being available even in the summer months.

Rainu Faguwa, an ST farmer was provided a farm pond locally known as "dabri" Category B through MGNREGA in the FY 2016-17.

Farm pond

The dimensions of pond are 30mX30mX30m with 10 steps of 0.3m height. The total cost of the farm pond is Rs 324000/-. The pond will provide lifesaving irrigation to 2.4 ha of paddy crops in the kharif season. Under normal rainfall conditions, the pond has a potential to irrigate 0.4ha land in the rabi season and in summer irrigate additional crops like chilli, tomato and maize.

ICRG Team suggested the following modifications to enhance the climate resilience of the farm pond

- Stone pitching at the inlet and outlet for safe inflow and outflow of water.
- Plantation of fruit trees such as lemon and drumstick on the periphery of the dabri.
- Grass pitching on bunds to reduce soil erosion and silting of the dabri.

[10] The Vulnerability Analysis Report was commissioned under the ICRG project. This Report determined the vulnerabilities in the project blocks based on bio-physical and socio-economic parameters. This Report together with the Climate Modelling Study help in identifying the 'hot spots' and are a key input to design recommendations under ICRG.

The Impact

The farm pond provided irrigation at the time of sowing to the lands of three other households located adjacent to Rainu Faguwa's pond. This enabled timely sowing. The pond also provided life-saving irrigation to the lands of these farmers during the dry spell. In the rabi season, Rainu cultivated vegetables like brinjal and tomatoes on 0.4 acres and maize on another 0.5 acres of land. Rainu also undertook pisciculture in his farm pond.

Protective irrigation in dry spell

Who is benefitting?

The farm pond was provided to an individual beneficiary as permitted under MGNREGA for PVTG households. The beneficiary in this case was a small and marginal ST farmer called Rainu owning two acres of agricultural land. Rainu supplements his income by working as a labourer under MGNREGA and has ensured that his son has completed school – Rainu himself has just completed primary school. Rainu's plot produced 10 quintals of paddy prior to the construction of the farm pond; today production has gone up to 15 quintals. In the rabi season, he cultivated brinjal on 0.2 acres and produced around 3 quintals; tomatoes on 0.2 acres and produced 3.5 quintals and maize on 0.5 acres and produced 5 quintals. The sale of these vegetables earned him Rs. 21500/- additional income in one season. Rainu also did pisciculture with local varieties with an investment of Rs 7200/ for 80 Kg of fingerlings and sold the fish Rs 70000/- at the rate of Rs 140 per kg fish in the village market. Rainu has also worked for 65 days under MGNREGA and earned Rs 11180. The additional incomes have improved his economic condition and he is a role model for others in the village.

ASSURING DRINKING WATER FOR LIVESTOCK; SURAJPUR

Background

Premnagar Block in Surajpur district has a high aggregate vulnerability both in terms of bio physical and socio-economic indicators. The block has large number of rural households with monthly incomes of less than Rs 5000. In the last 30 years, the block has faced mild droughts 15 times, moderate and severe drought in one year. Annapurna gram panchayat in the block faces the problem of dry water harvesting structures that adversely impact availability of water for livestock. The situation has worsened in the last five years - 35 households in the village travel around 2-3 km's with their 100 cattle in search of drinking water for them.

The villagers had formed four groups with one member from each household and this group was given responsibility for walking the cattle to the drinking water source by rotation. Thus, everyday four individuals lose the opportunity for earning wages for labour under MGNREGA i.e. about Rs. 516 per month for 3 days per individual totaling Rs. 18060/- every month for 35 households.

The ICRG Intervention

ICRG proposed 6 climate resistant works comprising 17 MGNREGA works. The present case study is on the impact of one such climate resilient work i.e. one gabion as a core structure and two Loose Boulder Check Dams (LBCD) as complementary structures. In consultation with the community, the ICRG Team identified sites that were appropriate for harvesting runoff water and controlling high erosion rates around the grazing area. Subsequently, with the help of satellite images accessed from the Bhuvan Portal and Google Earth Pro, proposed the construction of one gabion and two LBCDs because the site was severely affected by soil erosion.

Climate Resilient Work – Gabion and Loose Boulder Check Dam

The specific interventions proposed by the ICRG Team to enhance the climate resilience of the structures were as follows:

- The climate resilient work is constructed in a series as a ridge area treatment and will integrate with an earthen dam constructed at the downstream.
- The structures are designed in such a way that they can sustain for a longer period. For example, the headwall of the gabion is tied with the embankment through headwall extension and the LBCDs are constructed with flatter downstream slopes to sustain against the overflow of water.

Constructed in FY 2017-18, the gabion structure has dimensions of 10mX2m and cost Rs 149902/-. The two LBCDs have dimensions of 9mX1mX2m and Rs 39421/-. The three works generated 452-person days for 105 persons. The climate resilient work will reduce the rate of siltation in an existing earthen dam constructed by MGNREGA in 2011 and increase

its pondage capacity and life in long run. The availability of local loose boulder for the construction of the dam makes the intervention economic and feasible.

The Impact

The gabion and two LBCDs have increased the duration of stream flow and increased the capacity of an existing earthen dam constructed 400m downstream by MGNREGA in 2011.

Earthen dam in the downstream

The climate resilient works will reduce the soil erosion and siltation in the cropland area of 5 ST farmers. In the absence of the structure, the paddy crops got damaged by heavy siltation because of high velocity of water flow. 35 ST households are using the catchment area of the climate resilient works for grazing their livestock. The asset is functioning as a local water harvesting structure that stores water for livestock consumption in the summer months. The asset is also contributing to increasing sub-surface flows that benefit the paddy crops of 10 ST farmers in the downstream area.

Who is benefitting?

The Annapurna gram panchayat has a high dependence on MGNREGA as an income source as is evident from the fact that 88% of the cards are active.

Livestock drinking water

- The immediate impact of the structure is the availability of water for the livestock of 35 households throughout the year.
- The structure is also contributing to checking high soil erosion in the grazing area. In the long run, the water storage capacity of the existing water harvesting structures like community pond will increase because of sub-surface flow.
- The structure also contributes to checking soil loss and silt deposition in the paddy fields of 5 ST farmers located near the grazing land.
- The structure will also recharge water in two hamlets with about 30-40 households each because of its construction in the upper ridge.

In consultation with beneficiaries, in 2018-19, the ICRG Team facilitated various other interventions to strengthen livelihoods for increased resilience to droughts. A targeted livelihood convergence plan was prepared to link beneficiaries to various agriculture schemes and financial services of the government like seed distribution, credit card, soil health card, horticulture plantation and irrigation pump installation etc. Around 44 farmers received SRI training from RAEO and Krishi Vigyan Kendra's.

ODISHA

LINKING CLIMATE RESILIENT WORKS TO LIVELIHOODS – CREATING LARGER IMPACTS; KEONJHAR

Background

Rural Odisha is highly dependent on agriculture and therefore, in the event of a climatic catastrophe the impacts are far reaching. While MGNREGA provides some relief with the creation of assets and wage labour, it fails to strengthen adaptive capacities of the rural populations that rely on it for benefits. The ICRG programme is trying to enhance the adaptive capacity of populations and enhance the durability of assets created under MGNREGA.

The site selected is a small village called Barbil in Saharpada block of Keonjhar district. This site is a 16ha barren and waste land prone to severe soil erosion, low water retention, poor quality and high silt deposition that together adversely affected agriculture productivity. The site also lacks irrigation facilities and the fields near the lowland of the catchment areas of the Kachinjoda and Baitarani rivers was getting damaged during high intensity rain.

The ICRG Intervention

The ICRG interventions were undertaken in 2017-18 with the focus on integration of climate resilient works with other government programmes for increased resilience of communities. The specific interventions are as follows:

Initiation of field bunding and land levelling on barren land in Barbil village

- Construction of field bund (5600 RM) of different sizes and land levelling for treating barren patches.
- Gully control measures through construction of loose boulder check dam (LBCD) and vegetative measures such as grass turfing and stone outlets to increase the life of bunds. LBCDs of three different sizes as per gulley width and depth were proposed as gulley control measures on 2.7 ha.
- Construction of two farm ponds recommended to harvest surplus surface runoff during monsoons and creation of irrigation infrastructure.

Details of the site: The red boundary is the selected site; the yellow patches indicate field bunding & LBCD and blue are proposed sites for farm pond

- Convergence with ITDA for seed distribution and fertilizers to increase livelihood opportunities.
- Initiation of rain water management with IWMP approaches in 16ha of land to increase water level in the existing village pond.
- Cashew plantation in the treated land up to an area of 8 ha.

While designing the bunds, the projected climate data[11] has been taken into consideration. The maximum one-day rainfall along with coefficient of variation has been considered while calculating the runoff to design the size of the bund. In case high rainfall intensity, the climate resilient design of the bunds will ensure that about 52.5% of runoff water will be utilized for soil moisture conservation, ground water recharge, subsurface flow with the rest being disposed safely downstream through stone/vegetative hedge outlets in a zig zag pattern. In drought conditions, the structure will have the capacity to harvest almost 100% water with improved soil moisture condition in the plot as well as downstream plots especially during kharif season.

The Impact

At present, of the four recommendations made by ICRG, the filed bunding and land levelling has been completed. Convergence with the Integrated Tribal Development Agency (ITDA) has been facilitated and seeds of long beans, lady fingers, radish and fertilizer for cultivation by farmers at the site of the climate resilient works. Some of the immediate impacts seen are as follows:

Barren land converted to fertile land following field bunding.
Plantation of lady finger from ITDA

Plantation of radish through ITDA convergence

- Field bunding and land levelling has been completed on 8 ha.
- Convergence with ITDA has led to plantation long beans, radish and lady finger on 3.5 ha. This will directly impact 28 households and indirectly impact 32 households from SC community
- The field bunding resulted in converting the barren land into a fertile land by increasing the soil fertility and reducing soil erosion. Additional planting of maize done on 2 ha with seeds received from the Agriculture Department.
- The integration of climate resilient works with other programmes through convergence has enabled additional livelihood opportunities. Beneficiaries not only earned wages while doing the

[11] The ICRG project commissioned the Indian Institute of Science, Bengaluru in 2016-17 to undertake the Climate Variability Study. The study includes projections of kharif rainfall – June-July-August-September – for the period upto 2050 as well as temperature variations. The projected climate data is the basis of design of MGNREGS assets under the ICRG programme.

climate resilient work, their income will increase following the harvesting of crops being grown with seeds received from ITDA.

- Existing stagnant water bodies were treated to retain soil moisture.

Plantation of maize through programme of Agriculture Department following land development

Existing stagnant water bodies treated to retain soil moisture

With the completion of all the works proposed by ICRG, the resilient of the village will increase. Additional initiatives will be taken up like capacity building of direct beneficiaries on livelihoods, skill development and credit linkage. The projected benefits are as follows:

- The completed climate resilient works will directly benefit 91hosueholds.
- There is scope for bringing 12 ha of land area under crop cultivation or plantation.
- There is scope for conserving 67% monsoon runoff i.e. 58504.4 cum or 58.5 million litres of water through soil and water conservation that will reduce soil erosion and increase ground water recharge.
- There is for harvesting 50% of surplus runoff water i.e. 3500 cum (3.5 million litres) through a farm pond that can bring another 2.8 ha under assured irrigation.

Who is benefitting?

Mr. Bhubaneswar Nayke is one of the direct beneficiaries, of the interventions done in Barbil village. He has a 5-member family and belongs to the SC category and owns around 3 acres of land. Mr. Nayke explained that following the land development intervention he was able to convert his waste and fallow land into cultivable land. The treated land was able to retain moisture, and this helped cultivation. He has received seeds and fertilizer from ITDA and planted lady finger and long beans in and around the field bund of 0.20 ha that provided him additional livelihood option. Not only did he earn through the wages received from MGNREGS but also earned through the new convergence activity. He even explained how the land development treatment helped in reducing runoff and holding water for use in the kharif season.

Mr. Bhubaneswar Nayke, a local farmer in Barbil

INTEGRATED APPROACH IN MGNREGA FOR ENHANCED BENEFITS FOR POOR; MAYURBHANJ

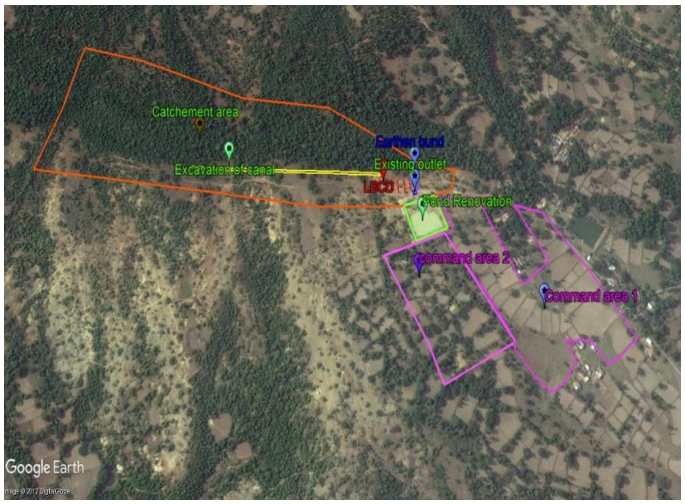
Background

Rural Odisha is highly dependent on agriculture and therefore, in the event of a climatic catastrophe the impacts are far reaching. While MGNREGA provides some relief with the creation of assets and wage labour, it fails to strengthen adaptive capacities of the rural populations that rely on it for benefits. The ICRG programme is trying to enhance the adaptive capacity of populations and enhance the durability of assets created under MGNREGA.

The selected site is in Nuasahi village in the foot hills of the Simlipal Tiger Reserve. Most of the population of Nuasahi village belong to Schedule Tribe category and employment under MGNREGA has been the main source of income for them after agriculture and livestock. 50-60% people of the Nuasahi village practice rain fed agriculture. The ICRG Team found that the perennial water source at the site selected for the intervention had enough water to irrigate about 20 acres of land in both kharif and rabi season but the source was not utilized properly. The ICRG recommendations are therefore around this issue.

The ICRG Intervention

The ICRG interventions focused on means of increasing the irrigated area to recharge ground water and increase crop production. The designs for the various works was done based on one-day maximum rainfall condition and total monsoon surface water yield to ensure water availability. It is found that the surface water yield of the catchment area for the monsoon period is 4 times greater than the total pond capacity, hence it is technically feasible to increase the depth of the tank. Both the core activities are supported by diversion weir, outlet, LBCDs and earthen embankment to make this core infrastructure climate resilient. The outlet is designed as per the predicted peak runoff. Hence, the chances of damage are reduced and the capacity of the water harvesting structure increased. LBCDs in series checks siltation in the tank and reduces the velocity of the runoff. Grass turfing or plantation on the earthen embankments of the ponds will check soil erosion in times of heavy rain. The specific recommendations made are as follows:



Map of the site: the pink boundary indicates the command area; the orange boundary the catchment area and the green boundary the pond renovation

- Deepening of the existing pond catchment area of 15 ha to increase its capacity.
- Construction of loose boulder check dam (LBCD) to decrease siltation.
- Construction of primary bunding to decrease the rain water flow.
- Construction of outlet to dispose the excess rain water from the pond.


Initiation of earthen embankment and deepening of pond

The Impact

At present, of the four infrastructure interventions recommended by ICRG, the primary bunding has been completed. The ICRG Team facilitated other livelihood activities through convergence with Line Departments, the platform of the Odisha Livelihood Mission (OLM) including capacity building of direct beneficiaries, skill development and credit linkage to establish a sustainable production cluster. The immediate impacts are as follows:

Completion of primary field bunding helped retaining water during the rains

Arhar plants on the bund

- The village grows paddy as its main crop in the kharif. Training on best agriculture practices were facilitated. Orientation of villagers to undertake vegetable cultivation in the rabi season following the completion of all the recommended infrastructure is ongoing. Some villagers have taken the initiative and made small nursery beds of various vegetables.
- The completion of the primary bund is directly benefitting 15 ST households of which three are women headed. The structure was able to hold water during the current monsoon season and helped the village undertake plantation on the bunds with arhar (1.5 kg), long beans (200 gm), tomato (100 gm), radish (10 gm), and ladies' finger (100 gm). The bund also helped check soil erosion.
- Paddy cultivation was done for 16ha of land. Vegetables were cultivated in the command area - brinjal on 0.20ha, cauliflower on 0.20ha, tomato on 0.40ha and chili on 0.20ha.

Radish plants on the bund

Nursery beds

Paddy cultivation on 16 Ha using water conserved by primary field bund

Who is benefitting?

Mr. Anand Tiria is one of the direct beneficiaries of the interventions done in Nuasahi village in FY 2017-18. He is an ST owning about 2 acres of land. He explained that with the deepening of the tank and the construction of the earthen bund, he was able to retain water in his land that helped cultivation. Anand further said that in earlier years, the pond would run dry and water shortage especially in the kharif was the norm. The available surplus water from the tank was retained, runoff reduced, and soil fertility increased since the start of implementation of the ICRG recommendations. He earned Rs. 12,000/- from the MGNREGS in the 2018-19 and invested some of this money for paddy, tomato, brinjal, arhar and radish cultivation from which he is expecting additional income.

Mr. Anand Tiria, a local farmer in Nuasahi village.

CONVERGENCE TO ENHANCE CLIMATE RESILIENCE OF MGNREGS WORKS; MAYURBHANJ AND KEONJHAR

Background

Rural Odisha is highly dependent on agriculture and therefore, in the event of a climatic catastrophe the impacts are far reaching. While MGNREGA provides some relief with the creation of assets and wage labour, it fails to strengthen adaptive capacities of the rural populations that rely on it for benefits. The ICRG programme is trying to enhance the adaptive capacity of populations and enhance the durability of assets created under MGNREGA.

The Neduapal village of Karanjia Block of Mayurbhanj District has 22 ST households and a population of 95 persons. The main occupation of these people is daily wage labour, collecting sal leaves from the forest and stitching them into plates. The villagers migrate for four months in a year in search of work. The site identified for the intervention under ICRG has undulating topography with a farm pond that has low water level. The ICRG Team recognized the potential for increasing the storage of the pond for use during the drought situation in the command area.

The Dudhiasole village of Samakhunta block of Mayurbhanj district faces severe soil erosion due to high surface runoff during heavy rainfall. The site chosen for the ICRG intervention has a short perennial stream that was eroding the banks in the monsoon season. The water that was washed out during the monsoons could be stored by constructing a barrier and this water could be used for lifesaving irrigation in the kharif season. The local farmers showed interest in rabi crops but were discouraged in the face of water shortages.

The Badapichhula village of Ghatagaon block of Keonjhar district has an undulating topography. At the ICRG intervention site, the land slopes in three different directions with one side under a dense 7ha forest cover. The soil moisture here was low and water conservation measures were needed. Land development activities were recommended to covert these plots into cultivable land for upland paddy and other kharif crops. There is scope for construction of farm ponds on the plots lying to the east of the slope to harvest excess runoff from treated plots.

The ICRG Intervention

The recommendations made by the ICRG Team for the different sites are summarized below.

Neduapal Village Mayurbhanj	Dudhiasole Village Mayurbhanj	Badapichhula Village Keonjhar
Climate resilient interventions under MGNREGS in FY 2017-18		
▪ Re-excavation of pond ▪ Construction of outlet ▪ Construction of canal ▪ Construction of silt traps ▪ Construction of LBCDs ▪ Land development ▪ Cashew plantation	▪ Check dam to store water ▪ Guard wall to prevent erosion of adjacent plots ▪ Lift irrigation to reach water to the adjacent plots	▪ Construction of field bund (7275RM) (three types of bunds of different sizes) with land levelling wherever required ▪ Construction of farm pond ▪ Construction of a field/diversion canal (250m)

Neduapal Village Mayurbhanj	Dudhiasole Village Mayurbhanj	Badapichhula Village Keonjhar
▪ Fish cultivation		
Convergence and livelihood interventions		
▪ Convergence with Integrated Tribal Development Agency, (ITDA) for seed distribution ▪ Introduction of improved methods of paddy cultivation in the kharif (SRI /LT). Training to farmers on PoPs of SRI/LT through OLM/Agriculture Department ▪ Introduction of HYV paddy varieties (4 Ha.) through OLM/Agriculture Department/PMKSY ▪ Distribution of mini kits of vegetable seeds for inter cropping with mango (2 Ha) in the rabi season through convergence with the Horticulture Department ▪ Agriculture Credit Linkage with Banks (Kharif 2018-19) by PACS ▪ Demonstration of manak variety of arhar (2 Ha @6kg/acre) through the Agriculture Department ▪ Linking farmers to ITDA/Fishery Department for supply of fingerlings/yearlings for fish farming in the pond	▪ Convergence with Odisha Agro Industries Corporation Limited (OAIC) ▪ Demonstration of arhar/pulses on the land development patch by the Agriculture Department ▪ Promotion of vegetable production in the rabi season through convergence with the PMKSY/OLM for distribution of subsidised mini kits (1 ha) ▪ Promotion of back yard kitchen gardening through convergence with ITDA/Horticulture Department/OLM ▪ Agriculture Credit Linkage with Banks (rabi and kharif 2018-19) by PACS ▪ Training farmers on improved PoP for paddy cultivation and organic farming through convergence with ITDA/Horticulture Department/OLM	▪ Convergence with ITDA distribution of seeds and pesticides ▪ Demonstration of arhar/pulses on land development patch through convergence with the Agriculture Department ▪ Promotion of vegetable cultivation in the rabi through convergence wit PMKSY/OLM for distribution of subsidized mini kits (1 ha)

The Impact

The ICRG programme has actively facilitated convergence with the Integrated Tribal Development Agency (ITDA) and Odisha Agro Industries corporation limited (OAIC) to diversify livelihoods of beneficiaries of the climate resilient works and enhance their overall resilience to climate stresses.

The platform of the Odisha Livelihood Mission[12] (OLM) is being utilized for capacity building of direct beneficiaries to diversify livelihoods, skill development and credit linkage. At present the construction of the climate resilient work at Dudhiasole village in Mayurbhanj district i.e. the check dam has been completed. The construction of the other climate resilient works is ongoing.

Convergence with ITDA in Ghatgaon Block, Keonjhar

The ICRG Team undertook extensive community sensitization in May 2018 on improved farming of vegetables because there is a big local demand for reasonably priced vegetables. The ICRG Team facilitated planning vegetable cultivation in kharif followed by discussions with the Programme Manager (Livelihoods) of ITDA who informed that they would provide quality seed with 100% subsidy to Schedule Tribe beneficiaries for making the MGNREGS work productive and enhancing income of beneficiary farmers. Following procedures, the ICRG Team met the Block Development Officer and appraised him about the ICRG initiative of community mobilization, selection of farmers, identification of land, selection of crops for vegetable farming during kharif. The ITDA released the seeds (cow pea, tomato, radish and plant protection chemicals) to the farmers. The total cost of these inputs from ITDA was Rs. 1,95,300/- and benefitted 56 farmers and 26.8 acres of land. After mobilization of farmers and subsidized seed from ITDA, the farmers were trained on improved 'package of practices' (PoP) for land preparation, space management, nutrition and pest management and organic manure preparation.

The farmers of **Badapicchula village** were mainly paddy cultivators. The farmers were linked to ITDA and got seed and fertilizers for vegetable cultivation on 4 ha. The ITDA has invested Rs. 1,95,300/ to date on seeds for tomato, radish, cow pea and PP chemicals. ITDA also created awareness on farm mechanization and the use of improved farm implements. The Badamthakurani SHG group in the village was convinced about income generation through custom hiring and subsidized hiring of a power tiller. The SHG used a power tiller on subsidized hiring through the ITDA, Keonjhar. Farmers from the OBC category received maize seeds from the Agriculture Department and cultivated the crop on 2.5 ha. The convergence facilitated by the ICRG programme benefitted 38 households.

Cow peas under cultivation. Seeds received from ITDA and planted on 0.5ha

[12] The ICRG programme has signed a non-financial MoU with the Odisha Livelihood Mission to strengthen capacities of beneficiaries of its climate resilient works.

The Ma Sujana Shakti SHG in **Neduapal village** were trained on mixed cultivation to improve soil quality and increase soil moisture. Through the convergence with ITDA, Karanjia, the SHG members received seeds for pumpkin, long beans and arhar. This convergence has benefitted 11 SC households directly benefited to cultivate vegetables on 4.24ha. ICRG has also facilitated the SHG to hire a power tiller, 40 sprinkler pipes and a 5HP Diesel Pump set through the ITDA Karanjia. While the actual cost of hiring this equipment is Rs.3,00,000/-, the SHG members got a subsidy of Rs.2,60,000/-. The continuous sensitization by ICRG while the SHG members worked as labour under MGNREGA coupled with the support from district and block OLM-ITDA Officials, has resulted in them integrating farm-based livelihood activities as proposed in the detailed project report of the works as prepared under the ICRG programme. The full implementation of this proposal will enhance resilience of the assets and households and enhance household incomes.

SHG in Neduapal village cultivating long beans and arhar in the command area of the climate resilient work through convergence with ITDA

SHG in Neduapal village received a power tiller, diesel pump and sprinkler from ITDA Karanjia with ICRG support

The proposed ICRG intervention of constructing a check dam in **Dudhiasole village** is complete and has benefited 44 persons. Each beneficiary received Rs. 15,000 for labour. The check dam water was used for paddy cultivation on 24 ha and vegetables will be cultivated in the rabi season. The proposal to OAIC, Samakhunta for providing lift irrigation costing Rs. 17 lakhs have been approved and this is directly benefitting 24.2 ha of land. Awareness was created among local farmers to invest in lift irrigation through the state governments JALANIDHI scheme. The scheme requires a group of at least three farmers to invest Rs.9000/- after which, the OAIC will install a transformer and 24KV electric supply. One such group was formed and each farmer from the group received a 3HP pump set and 500 ft PVC pipe that will benefit 12.1 ha of land.

Electric transformer and 7 HP pump in power house installed bv OAIC in Dudhiasole villaae

Farmers of Badapichula village received seeds and plant protection chemicals from ITDA

Power tiller received through convergence with ITDA in Badapichula village used for paddy cultivation

Completed check dam as recommended by ICRG programme in Dudhiasole village – OAIC will facilitate lift irrigation at this site

Who is benefitting?

Mrs. Sanjukta Nayal is one of the direct beneficiaries of the ICRG programme intervention in Badapichula village, Ghatagaon block, Keonjhar district for the FY 2017-18. She is a member of te Badamthakurani SHG group and owns 2 ha of land. She received seeds from the ITDA Department through convergence and invested in a power tiler with other SHG members through ITDA. She explained that she had used the power tiller to prepare patches for paddy cultivation on 0.5 ha of land. She cultivated vegetables with the given seed on another 1 ha of land. This convergence has enabled additional livelihood opportunities for Mrs. Sanjukta and her family.

WATER CONSERVATION IN DROUGHT PRONE WESTERN ODISHA; NUAPADA

Background

The village Dabri in Khariar block is heavily affected by frequent droughts. Scanty rainfall and dry spells are a regular phenomenon in this region. There is no water in the shallow wells constructed in the past. Therefore, there is need for assured irrigation at the time of paddy cultivation. The ICRG intervention taken up in 2017-18 will directly help 27 farmers get one-time assured irrigation for their paddy fields and also allow cultivation of green gram as a second crop. The site is undulating and therefore the water table is not close to the surface. The pond can ensure storage of water and the design has been done on the estimate of 1197mm rainfall per annum. Plantation on the surroundings in the command area of the pond will contribute to increasing soil moisture content.

Pre-intervention status around the pond area

Pond area post renovation

The ICRG Intervention

The ICRG Team recommended the following based on the bio-physical and socio-economic conditions in the area.

- The excavation of seasonal stream beds to build the water harvesting. This structure will capture and store runoff to enhance ground water recharge. This in turn will contribute to increasing water levels in the nearby shallow wells for irrigation. The structure will also collect and impound subsurface flows. Other design recommendations include construction of a stone bund, loose boulder, outlet and guard wall.
- A 100-meter long CC canal will be constructed at the lower end of the water harvesting structure for better irrigation of the agriculture land.

Construction of bathing steps using 14th Finance Commission funds

- A 50-meter stone bunding has been provided at the upstream to reduce flow of water and to decrease siltation.
- Seven LBCDs of different lengths are planned to check the runoff intensity and soil erosion at the site of the climate resilient work.
- Concrete cement bathing steps were constructed in the water harvesting structure through convergence with the 14th Finance Commission for the cost of Rs. 1.5 lakhs. This has been incorporated in the design keeping in mind the needs of women and elderly.
- The design also includes the construction of a series of shallow wells downstream of structure that will increase ground water levels and facilitate supplementary irrigation of kharif and rabi crops including vegetables.
- Repairing of gully plugs and manual desilting for cultivation of crops like green gram as decided by the Water Users Association.

Mango plantation (medium density) on 2 ha in the command area belonging to Mr. Biharilal Majhi and Mr. Champeswar Hans

- Medium density mango plantation taken up by two beneficiaries namely Mr. Biharilal Majhi and Mr. Champeswar Hans on 2 acres of land in the command area at a cost of Rs. 8 lakhs. The farmers have plated 80 mango saplings with financial support from MGNREGS and technical support from the Horticulture Department.
- Construction of one farm pond on the land of Mr. Champeswar Hans at a cost of Rs. 1.5 lakhs with the support from the Horticulture Department.
- The ICRG CSO partner working in this block, Loka Drusti has supported four farmers to construct two ring wells at a cost of Rs 30,000 each.

Farm pond constructed in command area on land of Champeswar Hans with support from Horticulture Department

Ring well

The ICRG Team undertook awareness generation and focus group discussions with farmers, SHGs, communities, job seekers committee, etc. A micro plan was developed through participatory processes and approved in the Pallisabha and Gram Sabha and included in the MGNREGA Labour Budget for FY 2017-18. Thereafter, the ICRG Team prepared the detailed design and detailed project report and shared with the block and district administration for implementation. The Team also facilitated the 'project initiation meeting' in the village to discuss the detailed operation plan, design and possibilities for convergence with other programmes. The MGNREGA Junior Engineer/GPTA were given the detailed layout of the water harvesting structure for execution – the ICRG Team provided hand holding support. The excavated materials were deposited on the dyke. The slopes of the dyke were maintained both upstream and downstream to flow smooth inflow and outflow of water and preventing siltation. The side walls of the dyke have been stabilized trough grass turfing. A silt trap comprising a line of loose boulder structures will be constructed upstream across the streambed. The village has formed a Water Users Association to maintain the structure post construction.

Awareness generation of SHG members at Dabri

Focus group discussion in Dabri Panchayat

The Impact

- The water harvesting structure was constructed at an estimated cost of Rs.10 lakhs. MGNREGA generated 5460 person-days work for 83 households.
- 27 farmers will be directly benefitted from this structure that will irrigate 52.5 acres' land during the dry spell. The benefits will become perceptible in the current kharif season.
- Convergence with the Horticulture Department for medium density mango plantation on 2 acres at a cost of Rs. 8 lakhs was facilitated. One farm pond costing Rs. 1.5 lakhs and two ring wells costing Rs. 60,000/- also facilitated. The farmer will earn from the mango plantation after 3 years.
- Paddy cultivation done by 2 farmers on 2 acres of land in the command area.
- A Water Users Group with 27 farmers as been formed in the command area for maintenance of the structures.

Mango plantation with wood fencing in the command area

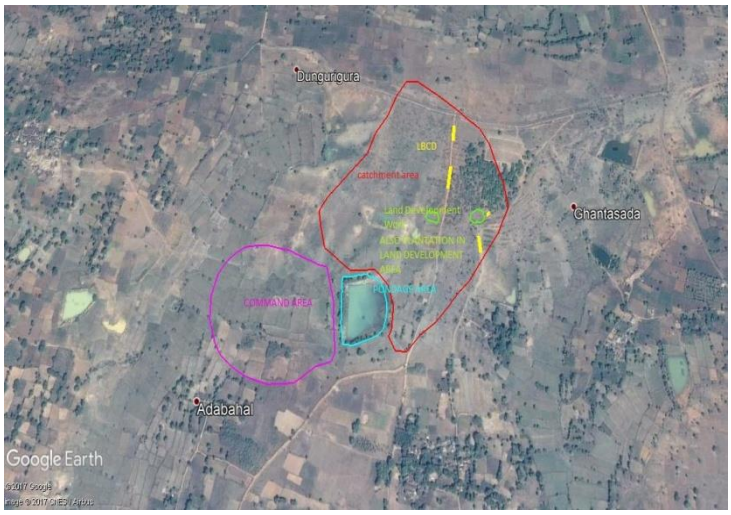
Paddy cultivation in command area

CLIMATE RESILIENT WORKS ADDRESSING DISTRESS MIGRATION; BALANGIR

Background

Western Odisha sees organized migration of population to work in the brick kilns. Migrants return to their villages in May and June at a time when there is hardly any work available either under MGNREGA or other schemes. MGNREGA work is generally freely available in September and October. During September, the people of western Odisha celebrate a festival called 'Nuakhai' or the festival of the first harvest. The absence of enough money linked to distress caused by rain deficit and non-availability of MGNREGA work lead many to the money lender who provides a token amount of loan and enrolls them for the next migration season that begins in October. The advance amount ranges between Rs.25,000-40,000 depending on the number of bricks a family unit can produce. After the festival is over, a second round of advance is given by the money lender to facilitate the final agreement to work in the brick kilns as migrant workers. In the absence of effective sources of livelihood, this hefty advance money is a big temptation and a mechanism to pay off old debts – an endless cycle for survival.

Ghantasahada village of Adabahal gram panchayat under Titilagarh block of Balangir district sees a lot of migration linked to the frequent droughts. The region is also well known for its very high summer temperatures that may sometimes touch 50 degrees centigrade. Erratic rainfall and lack of irrigation badly affects the kharif crop (paddy) here. Although MGNREGA has built several assets here, none have been able to provide enough livelihood opportunities for the local communities and especially the migrant households. The ICRG programme using the MGNREGS platform-initiated dialogue among different stakeholders to take up climate resilient works and link them to livelihoods – this change in focus was felt for the first time. Among the works taken up under ICRG, the Gocharmunda climate resilient work is prominent in the village with a population of 742 persons and 193 households.



Site of the climate resilient work in Ghantasahada village

The ICRG Intervention

Water harvesting structures were taken up as the primary work keeping in mind the drought condition of the area. These structures would serve to conserve maximum rainwater (surface runoff). The site selected has an undulating topography and is a barren rocky land with morrum/silty soil. This prompted recommendations like plantation to increase vegetative cover and regulate the local climate in long run. Other activities such as field bunds and loose boulder check dams were also taken up to check runoff intensity, enhance vegetative growth and thus increase soil formation, soil

moisture and nutrition. The ICRG Team made these recommendations following extensive community consultations, the physical characteristics of the site and discussions with the block administration. The details of the specific recommendations are shown in the table below.

Sl	Activities	Quantity	Amount (Rs.)	Support by MNREGA/ others	Leverage with line departments	Number of beneficiaries
1	Climate resilient water harvesting structure with waste weir	6995 cum+1 west weir	975385	MGNREGA		20
2	Farm Field Bund	2800 RM	327368	MGNREGA		8
3	Mango Plantation	7.5 acre	330421	MGNREGA	Technical support by Soil Conservation Department	10
4	Loose boulder check dam	15	46888	MGNREGA		

Among the interventions planned in 2017-18, only the core work has been completed and other works are on-going. As climate change and its linkage to MGNREGS is something very new, mass awareness campaigns were organized through village meetings, focus group meetings, farmers meeting and labour groups meeting. Special meetings were organized to sensitize the distress migrant families on possible livelihood opportunities in the area through climate resilient works, insurance coverage from other schemes, etc.

Construction of water harvesting structure on-going

A project initiation meeting was organized at the start of the work to sensitize the community on climate issues and the possible adaptation through the asset that was being constructed. The MGNREGA staff used the design prepared by the ICRG Team and received hand holding support. In 2018, a total of 110 labourers from 35 households have worked on the climate resilient works. A total 2747-person days has been generated and expenditure of Rs. 6, 50,269/- was incurred to date.

The Impact

The pond constructed as per the ICRG recommendations was filled with water following the first rains of 2018. Today it has 5-6 feet water. There are 25 farmers (SC-1, ST-18, OBC-6) with a total land holding of 35 acres in the command area benefitting from this. The farmers plan to cultivate millets and other crops in the next rabi season. With support from the Krusak Sathi of the Agriculture Department, the farmers of the village were oriented about benefits of adopting organic farming. As a result, in this kharif crop 20 farmers in the command area of the pond used compost and reduced their use of chemical fertilizers by 30%. 22 farmers have also taken crop insurance under PMFBY.

The tank filled with water

Agriculture in the command area

In the previous year only 52 families were engaged in MGNREGS and this year, the construction in Gocharmunda has generated employment for 110 labourers. The village has 16 families who usually migrate to Raipur every year in search of work. This year, 6 families namely - Padma Majhi, Srikara Bagarty, Ugresanjani, Bhubana Chhura, Tikelal Banchhor and Bhubana Majhi opted to stay back and worked in MGNREGS and they plan on taking up some livelihood activities.

Who is benefitting?

Padma Majhi (37) W/o-Late Dambaru Majhi, lives in the village with her only son Gupta. She has 1.5 acres of land and cultivated kharif paddy this year. Her income is supplemented with the widow pension of Rs 300/- in every month. She is also a member of the Maa Bhairavi SHG. She used to migrate to Raipur for work for the 5 years. However, this year, she chose to stay back and cultivate her land because of assured water for irrigation. She also worked for 50 days in the construction of the climate resilient work. The state government has scaled up the ICRG strategy in another 11 blocks and one additional district in western Odisha.

Padma Majhi with her son