



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 MGNREGS 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

GENERATING LIVELIHOODS IN BACKWARD AREA; GAYA

Background

Fatehpur block is in Gaya district of south Bihar located between 24028'4.599" - 24044'50.183" North Latitude and 8506'6.565" - 85024'2.755" East Longitude. The Block has 19 Gram Panchayats and covers an area of 32239.87 ha with an average elevation of 187.5 m above sea level. The general slope is 0-3 % from North-West to South-East. Some parts in the south have slope between 3-25% and have small hillocks. About 70% of arable land is covered under cereals like rice, wheat and maize, 20% under pulses and 10% under oil seeds.

The Block has 167 villages with a population of 235612 living in 35298 households. Most of the households in the Block depend on agriculture and allied services for livelihoods.

Agriculture is primarily confined to the traditional kharif cultivation linked to monsoon rainfall. Rabi cultivation happens in localized patches where irrigation water is available. The rate of soil erosion is high on account of low vegetation cover and this is one of the most important problems of the Block. Exploratory drilling in Gaya district is confined to hard rock areas only and shallow bores of 50m depth yielding 10-15m³/hour are no longer adequate to combat the long dry spells. In recent years, the depth of boring has increased with a preference for wells of 100m depth yielding 15-30m³/hour. Hydrological data indicates an increase in the thickness of the sandy layer eastwards towards the River Phalgu as the main reason for increasing depth of borings. The Block has fertile soil with alluvial soil being seen at the confluence of the rivers.

The ICRG project is working in the Bapugram village of South Lodhway gram panchayat where about 72% of the population are members of the 'other vulnerable group' (OVG) community. Bapugram village has 200 households that settled there in the 1970's under the *Bhoodan* movement. Most of the residents belong to the manjhi community. The entire land in the village was donated by one Dr. Raghunath Saran under the *bhoodan* movement for resettlement. The manjhi community traditionally dwells in areas around water bodies and rely on farming and fisheries for livelihood.



Undulating topography of Bapugram village

Following the resettlement in this village, each manjhi family got around 2-4 acres of land that included both homestead and farmlands. Owing to the specific socio-cultural traits in the village, Bapugram ranks low in development indices and while the village has often been the centre of interventions, the economic status of the village has remained almost unchanged. Sunil Manjhi, a youth of the village spoke about the condition of youth and jobs in the village and said “*is gaon se koi naukri me nahi gaya hai, kheti aur mazduri hi hamare jeene ka sadhan hai*”. (No one has got a job in government or private sector from our village. Farming and working as labor are our main occupations). Some of the residents have migrated to Mumbai and Kolkata to work as unskilled labour in factories and learn trades like tailoring. Vishwar Manjhi, (50) says, “*gaon me koi aajeevika ka saadhan nahi tha, isliye mere beto ko bhi maine tailoring sikhaya aur wo abhi Mumbai- Delhi me kaam*

kar rahe hai. Yeh hamari majburi hai." (The village has limited livelihood opportunities and so my sons learnt tailoring and are working in Mumbai-Delhi out of compulsion.)

The village therefore is in great need for some livelihood opportunities that are sustainable. The ICRG Team found that there are immense possibilities for integrating with existing government schemes and programmes.

The ICRG Intervention

The ICRG Team explored in South Lodhway gram panchayat with special emphasis on Bapugram village considering its unique sociological characteristics and selected 3 CRW sites in Bapugram village in 2017-18 - 1 ahar work, 1 check dam and 1 pyne work as the core works from the Annual Work Plan of MGNREGS. The ICRG Team also proposed the construction of check-dam with a catchment area of 52 ha. The design was prepared in consultation with the community members and discussions were also held on the possible benefits of these works. Technical sanction has been received for two works and the work will start soon. Given the expected delays in the actual commencement of the MGNREGA works, the ICRG Team continued field consultations around livelihood options in the area.



Individual pond constructed under MGNREGA in Bapugram

Community consultations with the PRI members, SHG's and farmers groups revealed more information about existing livelihood orientations/wants. Farmers wanted support to take up fisheries to supplement their incomes in the existing ponds in the village. The ICRG Team identified 2 interested farmers and surveyed the water availability and catchment area of the ponds. The Team also facilitated soil excavation work through MGNREGA and embankment construction and ensured continued water availability in the pond through a proper inlet and outlet structure.



Proposed site for check dam

Upendra, a Community Mobilizer of ICRG briefed the farmers about benefits of fisheries and accompanied the interested farmers to the Fishery Department in Gaya district, however, the demand was placed late and the Department refused to supply the spawns. The farmers did not loose hope and with the help of Upendra, contacted a spawn supplier in Gaya. The supplier visited the site three times and shared know-how on various techniques of fish farming like chuna (lime)¹, feed, water flow etc.). Thereafter, in July coinciding with the onset of the monsoons, the farmers purchased fish spawns using their own money. In the first phase, spawns such as silver carp, glass carp, rohu, katla, american carp etc. were cropped in the pond. The farmers spent Rs. 7500 for spawns for each pond. This intervention was closely monitored by the CSO partner of the ICRG programme as well as staff of the Fisheries

¹ Chuna-Lime used in bottom of pond as acts as disinfectant

Department. Subsequently, 2 more farmers in the village also started this livelihood. These ponds are used not only for fishery but also for irrigation.

The Impact

The ICRG support in the village included linking livelihoods to MGNREGA works and advising on design of structures. Two ponds were rejuvenated for irrigation, embankments were constructed, and the ponds are being used for fishery and irrigation for 3 acres nearby. Along with cultivating maize, wheat, chana (gram), masur (lentil), farmers have also started vegetable cultivation for individual consumption and are growing brinjal, potato, tomato and lady's finger. The additional livelihood opportunity from fisheries has increased household income.



Bisheswar Manjhi feeding his fish

Who is benefitting?

Bisheswar Manjhi (50) and Sunil Manjhi (30) are brothers and own 8 acres of land in Bapugram. Both are extremely hard working and used their undulating land for farming using well water. However, Bisheswar admits, *"paani saal dar saal kam ho raha tha, hamari kheti ke liye paani kam ho raha tha."* (Water availability for farming has been declining over the years). Bisheswar had developed a close friendship with the ICRG Community Mobilizer and learnt about livelihood opportunities from him. He redesigned his pond in consultation with the ICRG Team for irrigation use and was fascinated with the concept of fishery. He invested around Rs. 12,000 on fish spawns and feed and travelled to Gaya around 46 km from his village to learn techniques and market. Currently Bisheswar is happy with the twin benefits of irrigation and fishery from his pond. He says *"main ab dusro ko bhi paani de paata hu. Main machlio ka bhi pooro dhayan rakh raha hu. Ye yahi gaon me hi haato hath Rs. 120-140 /kg bik jayegi.* (I am now able to give water to other farmers. I am looking after the fish and am confident that they will be sold at a good price in the village). Bisheswar proudly tosses soya bean seeds in the pond and says - *"ye dekhiye meri nayi aamdani ka zariya."* (See my new livelihood option.). Following Bisheswar's footsteps, his younger brother Sunil and 2 other farmers have also started working on this model and are showing success.



Bisheswar and Sunil Manjhi in front of their home

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 pyne² 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.

ENHANCING RESILIENCE THROUGH CONFLICT RESOLUTION; NALANDA

Background

Nagarnausa block is located between 25.1937243 North Latitude and 85.165453 East Longitude in Nalanda district. The block has 21243 families and the total population of the block is 112033. The total geographical area of the block is 7532.4 ha and the average elevation is 51.23 m above sea level. The area is exposed to soil erosion, occasional floods and mild to moderate drought as the modelling report conducted under the ICRG project suggested.

It is seen that parts of the area remains water logged.

The people of Nagarnausa block are primarily dependent on agriculture which is the largest contributor in local economy. The gross cropped area is 6490.50 ha, net sown area 3622.9 ha, area sown more than one is 137.1 ha and cropping intensity of block is 0.964%.

According to the Climate Modelling Study (2017) commissioned under the ICRG programme, it is expected that the temperature will increase by $>4^{\circ}\text{C}$ by 2035. It is also expected that the average June-July-August-September (JJAS) rainfall will also increase by 20% as will the number of high intensity rainy days by 76% by 2050. These indicate increased flash flooding and resultant loss of agricultural productivity.



Site visit with PRI members

The Climate Resilient Works (CRWs) selected in this area focus on these aspects. Kachiyawan gram panchayat has 4 revenue village with 2013 households, out of which 625 households are in Kachiyawan village. The site is been selected in this village targeting mainly Bind³, Mahato, Mochi, Yadav and Harijan communities of this village. The village has mixed social fabric coupled with specific incidences of internal community conflicts. These clashes were prevalent in the village for much of the 1970's on account of land, ownership of common property rights and caste dynamics. The village has seen the dominance of one community that suppresses the common ownership and collective decision-making process in the village resulting in unequal sharing of benefits. The farmers approached the district administration with the problems and the district administration decided to resolve the issue with support from NABARD⁴ and MGNREGA funds.

In April 2017, the ICRG Team met with the DDC⁵ Nalanda and MGNREGA functionaries and received a request for support in Kachiyawan gram panchayat to make a pond climate resilient. This pond had been partially rejuvenated by NABARD. Site visits showed surplus rainfall (runoff) during kharif was not being stored in the newly constructed pond as a result, there was water logging around the pond that was also damaging the standing crop in the nearby fields. This situation adversely impacted the rabi crops due to loss of soil-moisture and unavailability of water in the water harvesting structure in

³ Binds are considered extremely backward caste (EBC) in Bihar, Mahato and Yadav comes under OBC traditionally dwelling on vegetable cultivation and animal husbandry, Harijan and Mochi are SC community.

⁴ NABARD: National Bank of Agricultural and Rural Development

⁵ DDC: Deputy Divisional Commissioner

the area. These were common problems in the Kachiyawan village for many years and this prompted the district administration to construct a community pond in the area.

The ICRG Intervention

The gram panchayat presented challenges because of its history of conflict and multiplicity of castes. The ICRG Team started with a community meeting together with the PRI leaders and elders of the gram panchayat. While it was difficult, the ICRG Team were finally able to convince the village about the programme approach and the likely impacts of climate change on livelihoods. Thereafter, trainings and orientations were done for PRI members, SHG groups, farmers and proposed beneficiaries. The ICRG approach was to try and resolve conflicts through regular dialogue and finally work began as proposed in the DPR that the project prepared. The main recommendations for enhancing the climate resilience of the site were (i) excavation of pond (completed under NABARD) (ii) 2 units plantation of horticulture and timber trees on the embankment (iii) connection of pyne to the pond and (iv) constructing a staircase for easy access. Except for the pyne work, the other interventions have been completed. This intervention will help in freeing the nearby agriculture fields free from water logging, increasing soil-moisture content, increase the availability water ground water recharge – these together will contribute to minimizing the risk of agriculture production in the kharif and rabi seasons.



Training of PRI members in Nagarnausa

The Impact

This ICRG intervention has both tangible impacts like climate proofing MGNREGA works and intangible impacts like conflict resolution in the village. The CRW site is just outside the village and has become as sort of pilgrimage place for five neighbouring villages. The open area on all four sides is ideal for religious gatherings like the Chatt puja. The staircase enables easy access to the pond for all. The stored water from pond and connected pyne will help irrigate 23 acres for 52 families of Kachiyama. Earlier, the pond was managed by one group (strongman of village) now, the fishery in the pond will be commonly managed.

To strengthen the bund of the pond villagers collectively planted a variety of trees like palm, mango and simal (cotton). These 400 plants will be useful in economic upliftment of marginal farmers of the area who will sell the produce. MGNREGA has provided employment to 2 needy families who are responsible for watering and protection of the plants. The connection of the pyne to the pond is underway.



Pond in Kachiyama village with plantation and staircase

Besides the measured impacts at the CRW site, one significant change felt in the village is the sense of ownership towards common properties. The elders, the elected village representatives and village leaders like Phagu Bind, Ramdas Akela, Ramchandra Prashad, Usha, Rampratap and others now understand the importance of climate resilient works and have worked together to fight all adversities and conflicts and arrive at a consensus.

Who is benefitting?

The intervention will directly benefit 52 families that own 23 acres by providing irrigation following the connection of the pyne to the pond. Additionally, 2 units of plantation will become available for the entire village in the years to come.

Rampratap Sharma (58), is a marginal farmer who is also disabled but he never allowed this to hinder his work. He played a lead role in convincing the community to complete this work. Rampratap is also a teacher in the Government School and teaches 75 children from three nearby villages in the morning and evening since the 1980's. He also does labour work together with his wife to supplement his income. When Rampratap began teaching, he charged a monthly fee of INR 5 per child and today he charges INR 100 per child. Rampratap candidly says *"shiksha ko jitna baata jaaye utna badhta hai. Jab koi garib pariwar ka baacha aaye padne to main usse kaise paisa le sakta hu. Aise hi jeevan chalta hai."* (Education increases in direct proportion to the amount



Rampratap Sharma in his class

spent. I do not charge money from very poor person and life goes on). Rampratap talked about the significant role he played in the execution of the CRW and said, *"main to shikshak hu, par ICRG ke training aur karyo ke baad hame apne gaon, apne jalvayu suraksha ka mahatva samjh me aaya. Bina upyog wali talab se ab sichai aur machipalan hoga. 5 gaon ke logo ka ye tirthstal ban gaya hai. Har jan ko ek paudha lagana chahiye, ye hamne samjha. Bina jal aur paudhe ke hum beekar ho jayenge"* (I am a teacher, but I have learnt about environment protection and climate change from the ICRG trainings. A defunct pond will now be used for fishery and irrigation and it has become a pilgrimage spot for 5 villages. Every person should plant one tree since without trees and water, life will end). Rampratap described his role in conflict resolution and proudly says, *"latth jagadna bhi zaruri hai. Kesh-Mukadama se samaj bikhari jaata hai. Hamne aapas me hi sabse charcha kar raasta nikala. Aadmi rupaya, paisa sab bikhari jaata hai, par gaon ke fayada ka raasta ek hi hai, jisse hamne chuna."* (Disagreements and fight are necessary. Court cases destroy everything money and reputation too. Discussion and communication amongst us are important. We chose the way to make our village prosperous)

Phagu Bind who has land near CRW agrees with the Rampratap and says, *"lagataar mehnat se karya hua. Pedo ko hum apne baccho ke liye bachayenge"*. (Regular persuasion has reached success. We will protect trees for our children).

MICRO FINANCING FOR LIVELIHOOD OPPORTUNITIES; 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, these 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. The block was termed as a dreaded region till the end of the last decade due to few developmental interventions of the government and regular incidences of loot and robbery. Movement after 4pm within the district was dangerous. Further, its location on the banks of the River Gandak that changes its course frequently, many natives were rendered homeless and landless as their lands submerged in the river. The district has mostly SC's¹, ST and OBC communities that depend on agriculture and casual labor for their livelihood together with their traditional occupation such as making brooms, soops² etc.

The average land holding is low ranging from 1-2 bigha and this together with the landlessness and resettlement linked to the flood fury of the River Gandak adversely affected livelihoods.



Submerged fields on account of floods in River Gandak

The ICRG Intervention

The ICRG Team started working in the block in mid-2017 through a dialogue with the community on climate change and its impacts. Subsequently, selection of works was done following orientation of PRI members, SHG members, farmers and beneficiaries. The ICRG Team realized that the community engagement would increase if more information on livelihood opportunities was shared. The CSO partner spoke to each group separately to gain insight on needs and opportunities. Most of the beneficiaries of the CRW in Nawalpur gram panchayat of Yogapaati were keen on starting their own micro enterprises in the village. The limited land available for agriculture was one of the key reasons as was the high dependence on local moneylenders to borrow at very high interest rates – as much as 60% - to meet family expenses. Md. Islam, the local ICRG worker says,



Training SHG groups

“During our PRI and SHG trainings this need for creating livelihood options came up.” He says that in those trainings’ participants narrated their experience of dealing with local moneylenders especially with defaulters. The ICRG Team facilitated convergence with micro finance institutions as well as with the Agriculture Department for additional activities such as vermicomposting, farmers registration and better-quality seeds etc.

The Impact

The ICRG Team had selected a pond for demonstration in Nawalpur gram panchayat that will benefit 8-9 ha of land belonging to 40 families apart from fishery prospect mainly for families of Bind⁶ caste of the village. Livelihood interventions have been started by the beneficiary families who have started preparing, using and selling vermicompost⁷ and 100 kitchen gardens have been planted. The ICRG Team has also facilitated linkages of beneficiary farmers with ATMA⁸ and so far, 20 farmers have been registered. The Team has also facilitated strengthening of livelihoods for the beneficiaries through MFI⁹ linkage. Madan Ram a native of Nawalpur gram panchayat says, *“mahajan ke alag alag niyam hai, koi dedh, koi sava guna byaj leta tha. Sab lut ke barbaad ho jaate the. Bilas Mahato ka to 13 kattha khet bik gaya. 10000 ka loan 5 saal me 1.5 lakh ho gaya tha.”* (The moneylender used to change his rules and interest rates frequently. Some used to charge 1.5 times or more. Villagers taking loan from moneylenders were harassed. Bilas Mahato, a native was divested of his lands for a loan of INR 10,000 that had INR 1.5 lakh in 5 years.)



Women beneficiaries with passbook and statements

In this area the MFI lends to the group and they are more active in the urban areas. The ICRG Team requested the Microfinance officers of Bandhan, L&T Microfinance and others to meet with the beneficiaries of the CRW in Bintoli and Brahmchari tola. A training programme was organized in each ward on financial literacy and livelihood options. 50 women of Nawalpur gram panchayat received loans following due process at an interest rate of 1.2%. These women have used the money to start livelihoods.

Who is benefitting?

Rambha Devi (47), is a torchbearer for change in her village. Being a SHG leader she has the zeal to try new things and learn on her own. With ICRG programme she has taken on a new role as a community level binding force and constructed vermicompost pits and started organic kitchen gardening this year.

⁶ Bind are OBC traditionally dependent on fishery occupation once belonging to Noniya caste.

⁷ Vermicompost is used in Kitchen garden and sold at Rs. 700/quintal to other farmers.

⁸ ATMA: Agricultural Technical Management Agency is responsible for capacity building and dissemination of Agricultural technologies and initiatives at district level.

⁹ MFI: Microfinance Institutions lends loans to mainly SHG groups at minimal rate.

She remembers cash crunches to start some livelihood activities of her own and says, *“pehle zarurat par sahukar se paise lete the, par sood chukate chukaate sab barbaad ho jaata tha. Ab hum khush hai 2 paisa bach jata hai. Maine 30,000 ka loan liya aur gaabhin gay kharida aur 5 bakriyan. Doodh ghar ke upyog ke baad gaon me hi 30 Rupaya/lite bik jaati hai. Bakriyo ne bhi bacche de diye hai. Ye bhi mere bhawisya ki punji hai”*. (Earlier I used to take loans from the moneylender but faced difficulties in repayment at high interest rate. I have now taken a bank loan at a minimal rate and easy instalments. I have purchased a pregnant cow and 5 goats. The cow milk is sold in the village at good rate. Goats are my future savings). She uses cow dung for vermicomposting and her kitchen garden.



Rambha Devi with her cow

Reshmi Devi (46), whose husband lives in Punjab working as a labourer in sugarcane fields took a loan of INR 25,000 from L&T Microfinance to start her own ration shop in the village. She says: *“mere dukkan accha chal raha hai, beta jiski naukri nahi lagi wo sambhalta hai. Kabhi din ke 500 kabhi 1500 tak kama lete hai. Apne SHG group se hame bari-bari se loan milta tha par aur paisa bhi kam tha”* (My shop is running well. My son who is unemployed helps me. I earn INR 500-1500 per day from the shop. From our SHG group loaning we used to get loan only if our turn comes and the amount was less.)



Shanti Devi's husband in her shop

Shanti Devi, Bacchi Devi are others who have started livelihood interventions like shop and cattle. Bacchi Devi says, *“mujhe ICRG meetings se iske bare me pata chala. Maine 40,000 ka loan le kar bete ke shadi ki. Sab maine chukk diye aur bakri bhi kharidi. Ab beti ki shadi ke liye bhi loan lugi 500-600 Rupaye mahina chukane me koi dikakt nahi hoti.”* (I had taken a loan of INR 40,000 for my son's marriage and have repaid it. I have also purchased a goat. Now I will take another loan for my daughter's marriage – paying installments of INR 500-600 per month is not a problem.)

INCLUSIVE PLANNING UNDER ICRG; 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. Rahui block has 65 villages with a total population of 30599 (Census 2011); geographical area of 12169 ha and the average elevation is 59m above sea level. The area is exposed to soil erosion, occasional floods and mild to moderate occasional droughts. Parts of the block remain water logged in the block. The common landscape features present in the



Pyne in Rahimpur village

area are ox-bow lakes, back swamps or flood plains and chaur land that form the wet area occurring mostly in southern part of the block. Agriculture is the largest sector of the economy in the block with the gross cropped area being 7745 ha, net sown area 7453.9 ha, area cropped more than once 291.1 ha and cropping of block 0.962%.

The traditional 'ahar-pyne'¹⁰ 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. Siltation and encroachments over these structures has worsened in recent times and the break in the natural slope in many places results in water logging due to flash floods. Therefore, renovation of these structures is high on the list of demands of the gram panchayats.

MGNREGA guidelines define the process of preparing the Annual Work Plan that contains plans and decisions regarding nature and choice of works to be undertaken as per suggested work list, the order in which each work is to be carried out (prioritization), site selection and tentative calculation of labour- material requirement. This AWP is prepared in open assemblies in gram panchayats wherein all the residents participate – these forums are known as Gram Sabhas. An important focus of the ICRG intervention is to facilitate inclusion of the right kinds of works in the AWP by building capacity of different stakeholders like PRI members, SHG members, farmers etc.

The ICRG Intervention

The ICRG Team started with orienting field staff one month before the scheduled Ward Sabha on work prioritization and use of the Vulnerability Assessment toolkit at gram panchayat level. The Programme

¹⁰ 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.

Officer MGNREGA requested ICRG to conduct model gram sabhas in a few gram panchayats that would be attended by all functionaries who would then replicate the process elsewhere. The ICRG Team helped the Block Administration to organize a Gram Sabha on 02nd October 2018 in the gram panchayat that was attended by MGNREGA functionaries and PRI members of different gram panchayats participated. Subsequently the Block Administration issued a notice on the calendar of meetings in the different panchayats. Some pre-requires like notice board, card board and chart paper were arranged by block and PRI members in their respective wards and blocks.



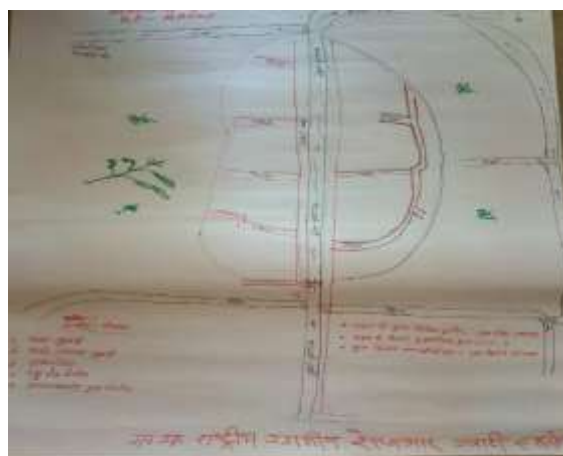
Gram sabha in Rahui panchayat with Line Departments

A detailed planning of all works in the ward and gram panchayat was done along with social security measures like old age pension and farmer's registration with Agriculture Department etc. facilitated by the ICRG Team at different levels. ICRG team facilitated the MGNREGA functionaries and PRI members to prepare village map and trained them to identify the possible works for inclusion in the Labour Budget of this year. The Team also demonstrated the use of the Vulnerability Assessment toolkit and use of other of IEC materials prepared under the project for prioritized works at Ward Sabha and subsequently at Gram Sabha. This was followed by a site visit to a selected CRW of last year to explain the design changes required to enhance climate resilience of the structure.

The Impact

The ICRG Team helped the Block Administration to plan, organize and conduct the Gram and Ward Sabhas in 7 gram panchayats and 2 model Ward Sabhas in Rahui and Dosut gram panchayats. In these Ward Sabha's, the village mapping and work prioritization exercise helped PRI members and MGNREGA functionaries to identify possible works in their village co-relating with findings of the Vulnerability Assessment report and NRM works. Even though the impact is yet to be seen, the efforts of ICRG were appreciated by block functionaries, PRI members and community members.

These plans have now been submitted to the Ward Sabha and will be included in the Labour Budget in the coming months. A quick analysis shows that about 70-75% NRM works have been suggested together with mapping and prioritization. ICRG also facilitated 1095 to register with the Agriculture Departments for benefits from their programmes. These farmers are mainly beneficiaries from around the ICRG CRW sites.



Village map of proposed NRM works in Rahimpur

Who is benefitting?

Suman (43), is a ward member belonging to the vulnerable community of Rahimpur village. Located about 5km from the block office, Rahimpur has 150 households who are mostly SC and OBC. In recent times the village has seen the construction of pucca houses built mostly by second generation residents who have migrated to Patna or other cities. Suman is educated, and she used to always speak up on the issues in her ward in front of MGNREGA functionaries. Her husband Rajesh says, *“hamare gaon me sarkari karya nahi hai. ICRG programme se hamne karyo ko karne ka tarika jaana jisse zyada se zyada fayada ho. Humne site bhi chuna. Is baar hamne pehli baar gaon ka naksha banakar karyo ki pehchan ki aur sabke samasayo ko suna. Pehli baar yeh prakriya hui hai aur hamne karyo ko chuna.”*



Model Ward Sabha in Rahimpur

(We do not have government programmes in our village. Through ICRG we learnt about selection of works and identifying its benefits. We mapped the possible works for the village through participation of entire community. This process is very helpful and has been done first time in our ward).

Suman took us to see the panchanan pyne work taken in ward sabha this year and says, *“ye kaam bahut zaruri tha. Humne is baar Ward Sabha me isko prastavit kiya hai. Isse har varsh barh ka paani gaon me ghusne se rukega. Poore gaon ko fayayda hoga.”* (This work was very important and has been proposed by the community in this Ward Sabha. This will help keep out flood water from the village thus benefitting all). Another villager remarked *“Itni jaankari kaha mil pati hai, in yojano se ajeevika se jodne me madad milegi.”* (Where does one get so much information? These schemes will help in improving our livelihoods)

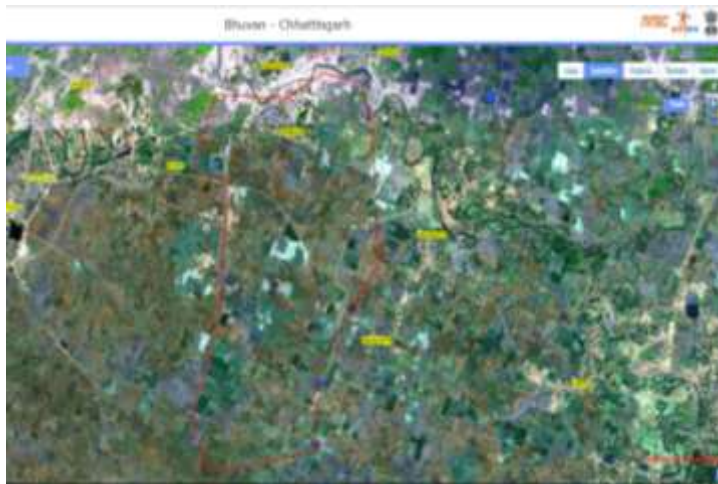
CHHATTISGARH

RECHARGING BOREWELLS FOR GROUND WATER RECHARGE; KABIRDHAM

Background

Kawardha block is in Kabirdham district that is also a district headquarter. The Block has 102 gram panchayats with 182 villages and covers an area of 51436.85 ha of which net sown area is 43530.24 ha, irrigated area of 15482.49 ha and unirrigated area of 36180.54 ha. The Block has no area under forest.

According to Vulnerability Assessment Report¹¹ (2017), the block has low aggregate vulnerability in comparison to other blocks. In terms of bio physical indicators, the areas of low vulnerability are its forest cover. In terms of socio-economic indicators, the block has several landless households and manual labourers.



Satellite image of Gangapur gram panchayat

According to the Climate Variability and Hotspot Blocks Report¹² (2017), the average projected temperature of the block will increase by 0.09°C by 2035. The average June-July-August-September (JJAS) rainfall will increase by 8% by 2050. Likewise, the number of rainy days will increase by 13% with minor increase in the frequency of high rainfall events by 2050. The rainfall variability will increase by 41.6 %. The block faced mild droughts in 13 years and moderate droughts in two years out of the 30 years historical period. The absence of forest cover has increased the rate of soil erosion in the cropland area and excessive exploitation of ground water through deep borewell has become a major challenge for the community and district administration. Additionally, the block has many landless households and limited attention to planning of different NRM activities and the combination of these factors has increased the vulnerabilities associated with high floods and droughts.

The ICRG Intervention

In consultation with the MGNREGA functionaries, the ICRG Team selected Gangapur gram panchayat in the Kawardha Block to demonstrate climate resilient works. Gangapur gram panchayat has 236 households of which 27 are SC, 37 are ST, 11 are women headed, 9 are differently abled, 15 are small farmers and 178 are Others. In comparison, the gram panchayat has 145 borewells. With the establishment of sugar industries in the region, farmers have moved away from cultivating traditional paddy to sugarcane that requires high volumes of water but fetches a high income. While the income

¹¹ 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.

¹² 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.

of farmers has improved, the ground water situation has worsened to the extent that drinking water is no longer available from the tube wells. With the onset of winter onwards all the handpumps for drinking purposes dry up. The lure of the higher income from sugarcane cultivation is such that illegal borings are rampant despite government warnings.

The ICRG Team undertook extensive analysis of secondary information like GPDP, Census and SECC reports 2011, land use pattern, soil erosion maps to ascertain the cause of soil erosion from the Bhuvan portal. Thereafter, in consultation with the community, the ICRG Team identified sites for locating structures that will harvest runoff water and control high erosion. Subsequently, with the help of satellite images accessed from the Bhuvan Portal and Google Earth Pro, the ICRG Team proposed the construction of 21 borewell recharge pits in a cluster model.

In the FY 2017-18 four CRWs comprising 29 MGNREGA works with a total outlay of INR 1091276 were selected to climate proof them in a cluster model based on the following criteria.

- Suitability of the bio-physical characteristics (land type/soil depth/current cultivation practices/extent of soil erosion);
- Probable extent of earth work that can be done manually;
- Observation on suitability for construction of recharge pits to control soil erosion;
- Provision of activated charcoal as a layer for absorption of dissolved chemicals in the water for safety of ground water from the pesticides, fertilizers used in the catchments.
- Proposed to have recharge pit in most of the bore wells for enhancing the recharge of ground water

The present case study is based on two borewell recharge pits which are a part of the combination of 19 recharge pits. The dimensions of one recharge pit is 3m diameterX3m depth with an estimate cost of INR 31300. The construction of the two recharge pits has generated 96 - person days and 18 persons were given work. To make the recharge pit climate resilient the following interventions were done:

- A filter material used as per technical specifications like 100cm thick (40-80 mm size metal or boulders), 80cm thick (40mm small boulders), 20cm thick activated charcoal, 50mm thick (20



Satellite image of climate resilient works sites in Gangapur gram panchayat



Construction of recharge pit in progress

mm size aggregate), 30mm thick coarse aggregate. Out of the 19-recharge pit sanctioned, two recharge pits were constructed in the FY 2017-18).

- The slope is less than 5% and the added advantage of local availability of construction material for the recharge pit.
- The availability and extent of catchment area in the field in proximity to the recharge pits of the borewell.
- The borewell recharge pits will increase the water percolation rate and increase ground water recharge.
- This CRW tries to integrate the traditional knowledge of ground water recharge with borewells with improved technical quality. Using proper filter materials will increase the efficiency of the structures. These technical components will be used as an approach by the participating farmers for planning and constructing similar structure in future

Training of local Resource Team and beneficiary households

ICRG Team facilitated training programmes for the Local Resource Team (LRT) that includes Gram Panchayat level functionaries and beneficiary households to strengthen their livelihoods and enhance capacities to deal with 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 45 farmers received SRI training from RAEO and Krishi Vigyan Kendras. The officials distributed 5 kg seeds for SRI of paddy cultivation and agriculture mini kit for vegetable cultivation.

The Impact

- The construction of the borewell recharge pits will capture the runoff water from the field and increase the water percolation rate and ground water recharge in the next few years. The recharge pit will also sustain the life of the borewell by artificial recharge of rain water through these pits.
- The beneficiaries were linked with the Agriculture Department to access drought resistant paddy and reduce vulnerability to drought.
- The increase in the ground water will benefit farmers. They will have firsthand experience in recharging ground water and learn to optimally use the water for irrigation.

Who is benefitting?

19 small and marginal farmers from Other Backward Caste (OBC) community will directly benefit from the construction of the recharge pit. Since only two recharge pits have been constructed the indirect benefits of the cluster will be visible in the next few years. Ram Kumar and Manohar are the two beneficiaries on whose lands the borewell recharge pit has been constructed.

Ram Kumar (45), is a small and marginal farmer from the OBC Community. He cultivates sugarcane and works as a labourer in MGNREGA to meet the needs of his family of 5 members. Ram Kumar shifted from paddy cultivation to sugarcane from 2005 due to the increased returns from the cash crop. He has two acres of land on which he does sugarcane cultivation and produces around 150 quintals per acre. The production of sugarcane has come down drastically over the last decade due to the non-availability of continuous water supply. However, in 2017-18 following persuasion and follow up, he has done SRI method of paddy cultivation on 0.5 acres of land in the FY 2018-19 and expects to produce 8-9 quintals of paddy. Ram Kumar has also planted chick peas on the bunds of the paddy lands and expects to produce six quintals which will fetch him around INR 15000.

Seeing the successes of his fellow villager, another farmer Manohar (65) plans to follow. Manohar has two members in his family and owns three acres of land which produces around 450 quintals of sugarcane – in his case too, production has been affected by the lack of continuous water supply for the crop. Manohar plans to replicate SRI cultivation of paddy on his own farm in the FY 2019-20.



Ram Kumar – a direct beneficiary of the intervention

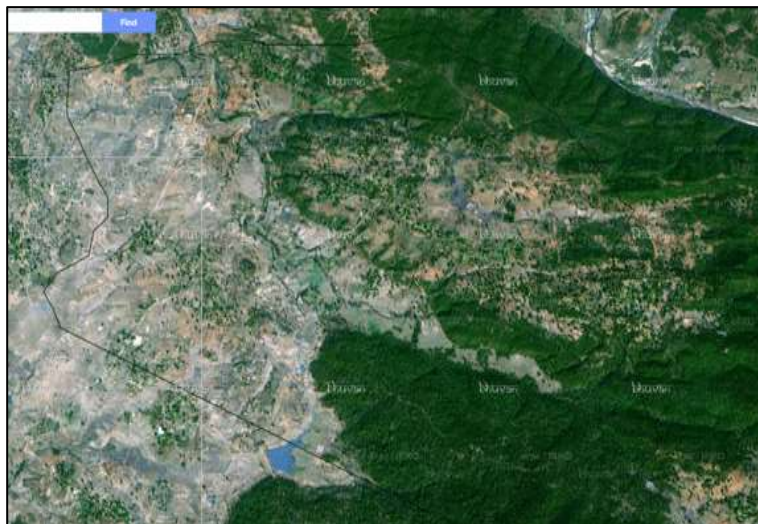


SRI and chick pea cultivation done by Ram Kumar

ENSURING CONTINUOUS DRINKING WATER SUPPLY; SURAJPUR

Background

Premnagar is one of the six blocks of Surajpur district located 51 km towards north east of the district headquarter. Premnagar block has a 'high' aggregate vulnerability level in comparison to other ICRG blocks. 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 households with incomes below Rs. 5000. (Ricardo, et al., 2017). According to the Census Report (2011), Premnagar Block has 37 gram panchayat and 46 villages covering an area of 27990.49 ha. of which forest area is 6930.65 ha, net sown area is 12830.98 ha, irrigated area is 864.5 ha. and unirrigated land area is 13550.68 ha. According to the Climate Variability and Hotspot Blocks Study Report (2017), the average projected temperature of the block will increase by 0.4°C by 2035. The average June-July-August-September (JJAS) rainfall will decrease by 11% by 2050. Likewise, the number of rainy days will increase by 23% with high frequency of rainfall events by 2050. The rainfall variability will increase by 46.4%. The block faced mild droughts in 15 years, moderate droughts in one year and severe drought in one year out of the 30 years historical period. The increasing deforestation has had several impacts like soil erosion, causing degradation of forest land in the upland area, decrease in water table for irrigation and the absence of planning for different NRM activities has led to generation of low average person days per household before FY 2017-18



Satellite image of Annapurna gram panchayat



Satellite image showing location of climate resilient works in Annapurna gram panchayat

The ICRG Intervention

In consultation with MGNREGA functionaries, the ICRG Team chose the Annapurna gram panchayat to demonstrate climate resilient works. Annapurna gram panchayat has 331 households of which 238

are ST and 93 others. In addition, there are about 120 FRA beneficiaries, 25 women headed households and 3 households with differently abled. In summer, most of the water harvesting structures in Annapurna dry up making it difficult for the villagers to fetch water for drinking and domestic use. In the last five years the situation has worsened. As a result of this, 35 households in from Sankar pada travel around 2-3 km spending around two hours two times a day to collect water for household use.



Layout of the 30-40 Model

The ICRG Team undertook detailed analysis of available secondary information like Gram Panchayat Village Development Plan (GPVDP), Census and Socio-Economic Caste Census (SECC) report 2011, land use pattern, soil erosion maps to ascertain the cause of soil erosion from the Bhuvan portal. Thereafter in consultation with the community, identified sites that would harvest runoff water as well as control high erosion rates of the degraded forest land in the upland areas. Subsequently, using satellite images accessed from the Bhuvan Portal and Google Earth, the ICRG Team proposed the construction of three works: (i) 30-40 model (ii) individual farm pond and (iii) a dhodi (traditional water harvesting structure) in a cluster model.



Satellite image of the 30-40 Model accessed on 7 June 2018

In FY 2017-18, six CRWs comprising 12 MGRNEGA works had been planned and DPRs prepared with a total outlay of INR 2128300 with the following features:

- Suitability of the bio-physical characteristics (bed slope/stream width/stream depth/catchment area/command area/rainfall data/runoff coefficient);
- Probable extent of earth work that can be done manually;
- Direct benefit of irrigation to small and marginal farmers belonging to SC and ST category; and
- Scope for convergence with the Forest and Agriculture Departments for plantation and linking to improved cultivation practices.

Based on the watershed approach of ridge to valley treatment, the present case study is based on the combination of three works namely 30-40 model, farm pond and *Dhodi* that together are one climate resilient work. It was assumed that the site selected for 30-40 model having dimensions of 8 ha with plantation at an estimated cost of INR 5.642 lakhs for drought proofing is appropriate. The land is undulated, degraded and affected by soil erosion. The land parcel of 8 ha had a soil depth of 20-30 cm. Half of the 30-40 land is partially owned by four ST farmers and the remaining is government land under the Forest Department which has been acquired.

Under the 30-40 model, 702 pits with dimensions of 7ftX7ftX3ft pits were prepared to harvest runoff water and reduce soil erosion. In each 30-40 plot, six agroforestry plants – three fruit plants like mango, lemon and jackfruit and three wooden plants like *sheesham*, *neem* and *karanj* were planted. The treatment area is partially used by farmers for grazing. Cattle protection trenches along the periphery has been taken up as protection measure against grazing. Secondly a farm pond of size 20mX20mX3m already existed towards the lower end of the treatment area. An additional farm pond, of size 20mX20mX3m was constructed with at an estimated cost of INR 3.274 lakhs to address the irrigation requirements of the agro-forestry plants. The lower side of the treatment area has cropland that is primarily used for paddy cultivation. The 30-40 model and farm pond will enable the sub-surface flow of water and increase the moisture content of the soils in the lower reaches and prevent siltation in the lower reaches. Thirdly, a *Dhodi* is located at the lower end of the treatment area with dimensions of 3m diameter 3m depth at an estimated cost of Rs 90600. The 30-40 model will help the traditional water harvesting structure to recharge through sub-surface flow. The traditional water harvesting structure is now used by 30-35 ST households for drinking purposes.

The CRW was constructed in the FY 2017-18. The three works generated 4078 - person days and provided work to 1051 persons. The interventions for this composite climate resilient works are as follows.

- Each pit constructed in the 30-40 model harvests the runoff water from the micro catchment area delineated by 30-40 model.
- Cattle protection trenches along the periphery have been constructed to protect the agroforestry plants from grazing.
- An inlet was constructed in the farm pond with the dimensions of 10mX1mX1m. Stone pitching at the inlet has been suggested for safe inflow of runoff.
- A silt chamber of 3mX2mX1.5m is proposed to capture the silt moving with the runoff water.
- Grass pitching will reduce the soil erosion and siltation of the *Dabri*.
- Farm pond constructed at the lowland area will be used for irrigation of agroforestry plants by all the farmers in summer season.
- Command area of 10 ha will also benefit from sub-surface water flow from the upper catchment area to lower catchment area.
- The 30-40 model with plantation has a life span of 25 years. In its lifetime, the structure will



The District Collector inspecting the 30-40 Model



Dhodi – traditional water harvesting structure

reduce soil erosion and increase the sub-surface flow of water. The runoff water harvested will increase the soil moisture content at the lower reaches.

Training of Line Department and Forest Officials

In 2018-19, in consultation with beneficiaries, the ICRG Team facilitated various other interventions to strengthen livelihoods of the villagers 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 the Rural Agriculture Extension Office (RAEO) and Krishi Vigyan Kendras. Apart from this, the district team provided INRM training to Rural Extension Officer (REO), Agricultural Department and Forest Officials. The total number of participants were 560, out of which 110 were female officials. These officials were provided training on planning of INRM works and watershed development works and its relevance in the context of Climate Change. The officials distributed 5 kg seeds for SRI of paddy cultivation and agriculture mini kit for vegetable cultivation.

The Impact

- The completion of the construction of the CRW of 30-40 model, farm pond and Dhodi has ensured the availability of drinking water for 30-35 households. It also provides water for other domestic uses. This has significantly benefitted people of Sankar pada and the time spent in collecting water as well as the distance travelled has been resolved.
- About 10 ha of paddy land owned by 15 farmers in the lowland will be benefit by sub-surface flow of water due to the pit constructed in the 30-40 model.
- 8 ha degraded land will be converted to farm land in the next few years. The families will benefit from the sale of fruits and fuel woods for self-consumption from the agroforestry plants.
- 11 households will manage, monitor and maintain the agroforestry plantation in the 30-40 model.
- Plantation of 1680 saplings consisting of three fruit trees mango, lemon and jackfruit and three wooden trees *sheesham*, *neem* and *karanj* for self-consumption.
- Reviving traditional knowledge in the form of the construction of Dhodi.

Who is benefitting?

- There are around 30-35 households who have directly benefited from the construction of traditional the water harvesting structure Dhodi. Earlier these households used to drink unclean water and spend more time in fetching clean water leading to wage loss of at least one family member every day.
- 11 ST households are direct beneficiaries of the 30-40 model. One of the households (that of Kapil Pancham Dumbhari) has done paddy cultivation on 2 acres of land and expects 16 quintals of paddy from it which was earlier not possible as the water could not be recharged.
- Another beneficiary Shankar Singh on whose land Dhodi has been constructed has used the dhodi water to irrigate his paddy field at the time of sowing and during the intermittent dry spells. He is expecting a very good harvest.
- There are 3 farmers who have around five acres of land below the site of the climate resilient works and they are expecting 8-9 quintals of paddy compared to their earlier production of 3-4 quintals.

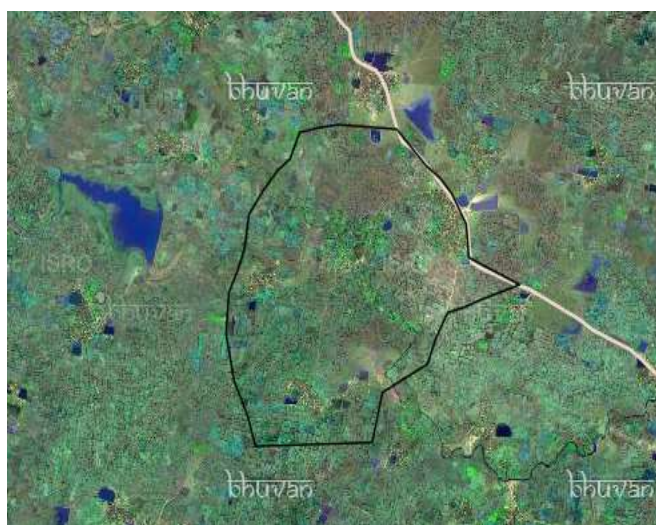
IMPROVING PLANNING OF NRM STRUCTURES; MUNGELI

Background

Patharia is one of the three blocks of Mungeli district located 31 km east of the district headquarter. The block was selected under ICRG programme due to the presence of high aggregate vulnerability index in terms of both biophysical and socio-economic indicators. The block has many landless households who do manual labour work and have incomes <Rs. 5000. The block has 93 gram panchayat and 151 villages covering an area of 48696 ha. of which forest cover 113 ha, net sown area 36344 ha, irrigated area 10345 ha, unirrigated area 25877 ha. The low percentage of area under forests and lack of irrigation facilities are major challenges for the community and district administration. According to the Climate Variability and Hotspot Blocks Study Report (2017), the average projected temperature of the block will decrease by 0.1°C by 2035. The average June-July-August-September (JJAS) rainfall will decrease by 23%, but the number of rainy days will increase by 3% with minor increase in high rainfall events by 2050. Similarly, the rainfall variability will increase by 44.7%.

The ICRG Intervention

The Marrakona village was selected for ICRG demonstration because of the high presence of vulnerable households (Census 2011) and severe problem of soil erosion (Soil Erosion map, Bhuvan web site) in the village. Marrakona is a mixed caste village with 420 households of which 137 are SC & ST households, 5 women headed households, 4 households that have persons with disabilities and 10 Housing scheme beneficiary households. Participatory planning process and GIS assisted tools were applied for identification of community priorities and scope of work. PRA tools like Resource mapping, social mapping and seasonality of employment demand were used to develop the collective understanding of issues and options for NRM work. Community consultations were held for awareness on climate issues. The community prioritized the construction of water harvesting structures like community ponds and farm ponds were prioritized to address the problem of water availability for irrigation and domestic use. It was noticed that high surface runoff was leading to severe sheet erosion in the cropland areas as well as on the scrubs and waste land area; second, due to low irrigation facilities, cultivation is primarily rainfed. Weather variability like intermittent dry spells were leading to partial to complete loss of crops thus affecting the livelihoods of the community. Third, the absence of forest area in the gram panchayat is a major issue to deal with climate shocks like floods and droughts; and finally, due to lack of awareness on NRM activities, few such activities were being identified and planned.



Satellite image of Marrakona gram panchayat

Analysis of biophysical maps and satellite imageries (Google Earth Pro) followed by field survey were used to select the cluster and work site for construction of a pond. For 2017-18 plan, three CRWs comprising 7 MGRNEGA works have been planned based on the following criteria.

- Suitability of the bio-physical characteristics (bed slope/stream width/stream depth/catchment area/command area/rainfall data/runoff coefficient);
- Probable extent of earth work that can be done manually;
- Direct benefit of irrigation to small and marginal farmers belonging to SC and ST category; and



Satellite image of GPS points of NRM works

- Scope for convergence with Forest Department and Agriculture Department for plantation and linking for improved cultivation practices respectively.

The case study describes the climate resilient work of earthen dam, that is integrated with one community pond and one farm pond. The ICRG team found that the Bhairwa Nala, a seasonal stream with a width of 12-22m and bed slope of 3% that subsequently drains into the *Tesua* river was appropriate for the construction of an earthen dam and community farm pond. The construction of the earthen dam, community pond and the individual farm pond was sanctioned in FY 2017-18 and completed in 2018-19.

The cost of the earthen dam having dimensions 27*10.5*1.8 and community farm pond having dimensions 60*40*3 together cost INR 14.47 lakhs while the cost of the individual farm pond having dimension 30*30*3 cost INR 385887. The storage capacity of the community pond after assuming 30% seepage and evaporation loss is 13646.5 m³ while the pondage capacity is 13646.5 m³. Similarly, the storage capacity of the individual farm pond after assuming 30% seepage and evaporation loss is 3275.16 m³ while the pondage capacity is 3275.16 m³. The following elements were incorporated in the design of the structures to make them climate resilient.

- Stone pitching 22.5cm thick on upstream face of embankment to protect the structure from erosion;
- Lining of exit weir surface area with stone pitching to prevent erosion;
- Provision of rock toe to reduce the phreatic line level and ensure safety of earthen dam;
- Full reservoir level is designed taking considerations of maximum flood level;
- Grass pitching is proposed at the downstream face of the embankment to control erosion;
- Clay soil puddling in dabri and farm pond to minimize the percolation loss;
- The water harvested and stored by the dams will recharge the sub surface water level in the long run; and
- Dam has life of 15 years and it will protect soil loss and deposit the silt on the upper side. This silt will be periodically removed by the villagers for maintaining the effectiveness of the dams

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 in convergence with the Horticulture Department. The plantation will contribute to the durability of the structure and meet the nutrition needs of beneficiaries in the future. The ICRG Team also facilitated training of 22



Community farm pond and Earthen dam in Marrakona gram panchayat

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 and 1 kg maize and 500 gm chicken pea seeds were distributed to the beneficiary households. Through convergence with the Horticulture Department, 400 fruit trees like guava, custard apple, mango, *Karanj* saplings were planted on the bund of the community pond and earthen dam. In this FY 2018-19, the ICRG Team has planned to encourage beneficiary households to undertake mixed cropping of vegetable cultivation in between the rows of fruit plants. A compost unit area has been planned near the community pond for solid waste management and production of manure. This will diversify the livelihoods practices of the households to deal with the gestation period of fruit plants and enable each household to earn some additional income.

The Impact

The completion of the construction of the earthen dam has ensured availability of irrigation for 24 households from SC, ST and OBC households at the time of sowing and provided lifesaving irrigation during the intermittent dry spells. The possibilities of providing supplementary irrigation to rabi crops



Water retention in dug well prior to ICRG intervention



Water retention in dug well post ICRG intervention

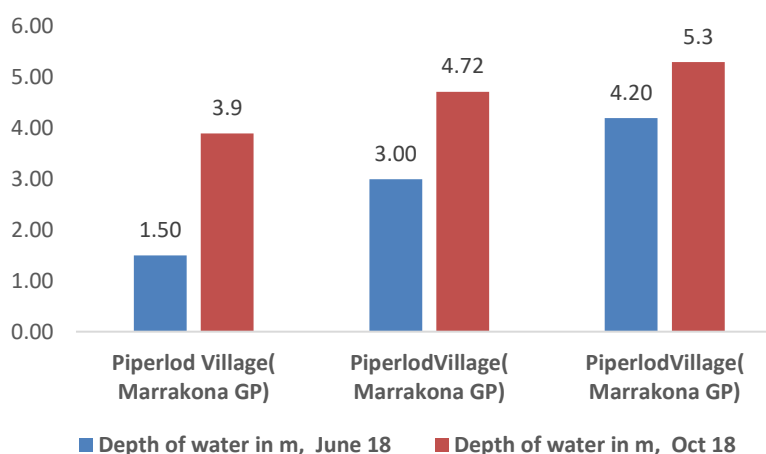
has been enhanced. Around 20 ha of land received irrigation in the kharif season, ground water was recharged, drinking water provided for around 60 households with 120 cattle – these households had to travel some distance after December to fetch water. The construction of the CRW generated 12651

person- days and provided work to 2792 persons.

Fruit trees have been planted adjacent to the community pond on 4 acres of barren community land; 2000 saplings of custard apple have been planted and this will provide livelihood opportunities to SHGs. Responsibility for maintenance of the plantation has been given to 2 ST households and one OBC household from among SHG members and these 3

households will get regular MGNREGA wages for two years for maintenance work. The impact is evident as the dried dug well now has water and there is assured irrigation for paddy cultivation in the dry spell.

Water level of Dug well



Who is benefitting?

There are around 24 households that having land near the command area of the CRW who beneficiaries are directly and have seen a 30-40% increase in their crop production. Pahar (49) belongs to the ST community and owns 2 acres of land. He supplements his farm income with wages earned under MGNREGA to sustain his family of seven. Prior to the construction of the community pond and earthen dam he could not utilize rain water and it used to drain into the *Tesua* river via the Bhairwa stream. Following the ICRG intervention, the crop production from his 2 acres has doubled – from 15-18 quintals of paddy to 30 quintals owing to water availability at the time of sowing and life-saving irrigation during the intermittent dry spells of the monsoons. Pahar plans to cultivate pulses and vegetables in the rabi season.



Semlal (46) belongs to the SC community and owns 2 acres of land. Until 2017-18 he could cultivate 15-18 quintals of paddy on his land but following the ICRG intervention, the production has increased to 25-30 quintals. He has also undergone training from the experts of KBK on the SRI method of paddy cultivation, mulching methods of vegetable cultivation, livestock management in rainy seasons. He has worked for 147 days in the FY 2017-18 and earned INR 18628 and in FY 2018-19 he has already worked for 126 days till date and earned INR 14636.



CONVERGENCE OF FLAGSHIP PROGRAMMES; KORIYA

Background

Sonhat Block is one of the five blocks of Koriya district located 27 km towards the north of the district headquarter. The average elevation of the block is 2477 feet above sea level. Sonhat Block has 32 gram panchayats and 106 villages covering a total area of 23255.46 ha. of which forest area is 3076.01 ha., net sown area is 11545.04 ha., irrigated area is 601.71 ha., and un-irrigated area is 10801.33 ha. According to the Vulnerability Assessment Report (2017), the block has a high aggregate vulnerability index across both bio physical and socio-economic indicators in comparison to other ICRG blocks. In terms of bio-physical indicators, the block has high exposure to both drought and flood and areas of high vulnerability are, ground water availability, net irrigated area and forest cover. They are exposed to both high drought and flood and, in terms of socio-economic indicators, the block has many households with incomes below Rs. 5000 per month.

According to Climate Variability and Hotspot Blocks Study Report (2017), the average projected temperature of the block will increase by 0.5^o C by 2035. The average June-July-August-September (JJAS) rainfall will increase by 9.5% by 2050. Likewise, the number of rainy days will increase by 21% with high frequency of rainfall events by 2050. The rainfall variability will decrease by 18.3%. The block faced mild droughts in 13 years and moderate droughts in 4 years out of the 30 years historical period.

In consultation with the district administration, the ICRG Team selected Pondi gram panchayat in the FY 2016-17 to demonstrate the programme interventions. Pondi has 387 households of which 69 are SC, 191 ST and the remaining are classified as other. Out of the total vulnerable households, 61 are women headed, 85 are FRA and 16 are differently abled. Around 95% of the population of Pondi are small and marginal farmers who depend upon subsistence farming, Non-Timber Forest Produce (NTFP) collection and pisciculture as the main livelihoods. Unpredictable agriculture output due to erratic rainfall, meagre NTFP production due to forest degradation and unavailability of timely fingerlings for fish rearing are some of the major issues of the panchayat.

The ICRG Intervention

The ICRG intervention has been demonstrated in two blocks Sonhat and Bharatpur. In the FY 2016-17, one climate resilient work comprising four fish rearing ponds in a series was constructed in the Pondi gram panchayat of Sonhat Block. The pond site was identified and selected in consultation with the Deputy Director, Fishery Department and intensive community consultations. The technical assistance for planning, implementation and monitoring of the work was done by the Fishery Department.

Four fish rearing ponds with dimension of 50m X 20mX1.2m (LXWXD) each are located at the upper end of the catchment area of the Gunghuta Dam located near the panchayat and is close to the submergence area. Due to presence of clay soil, percolation loss is reduced, and water stays for longer



Community fish rearing pond

duration as required for rearing of fingerlings. Moreover, fingerlings will be locally and timely available for the dam and reduce the cost of transportation. The specific technical inputs provided are as follows.

- To protect the bunds of the pond from soil erosion, stone pitching on outer side of bund was proposed.
- On the submergence side, pitching and plantation was suggested at 1 m distance from the bund to reduce soil erosion and water pressure and increase the durability of the asset.
- Inlet and outlet for the pond was suggested to regulate optimum water flow.



Releasing fingerlings in the pond

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 190 farmers received SRI training, different methods of mulch for vegetable cultivation, livestock management in rainy season from RAEO and Krishi Vigyan Kendra's – of the total farmers trained, 92 were women. The farmers also received seeds for paddy cultivation

The Impact

There are 31 ST households who are direct beneficiaries of the fish rearing pond. These households have formed a cooperative called Om Shiv Machuwa Sahakri Samiti Maryadit - Amhar Group that is registered under the Society Act of 1962. The four ponds cover an area of 0.4 ha and has the capacity to produce 16 lakh fingerlings annually. This group is also responsible for maintaining the dam and practice pisciculture. The submergence area of the dam (145 ha) and the four ponds together has the potential to produce about 480 metric tonnes of fish annually. Seeing this impact, in FY 2017-18, 5 CRWs comprising 8 MGNREGA works were constructed to meet future climate shocks like high flood and droughts. Of the 8 NRM works, a cluster of 3 farm ponds has been taken up for fish rearing and this will benefit 3 ST households. In the last 2 years, the Fishery Department has sponsored seven exposure visits for these fishermen to West Bengal, Odisha and other districts of Chhattisgarh.



Monitoring the size of fingerlings

Who is benefitting?

31 households from the Cherva ST community are the direct beneficiaries of four fish rearing ponds. Each member of the group is expected to earn an average of INR 1.85 lakh through sale of fish.

Additionally, the ponds will also supply fingerlings at low cost to others interested in this activity and it is estimated that another 160 households will also benefit through using other village ponds for pisciculture.

Bahadur Kawal Bansi (28) is the Secretary of the Om Shiv Machuwa Sahakri Samit. Previously he depended on farming, collection of NTFP and MGNREGA wage labour in the district and outside the district to support his family. He has 2 acres of land that produces about 12 quintals of paddy. In 2017-18, he earned INR 30444 as wages for 177 days work under MGNREGA. After getting involved in fish cultivation, this year he has earned INR15000 even as this activity was started as a pilot. Bahadur is of the opinion that after a few months, his income from fish rearing will increase substantially and he hopes to earn as much as INR 1 lakh annually.

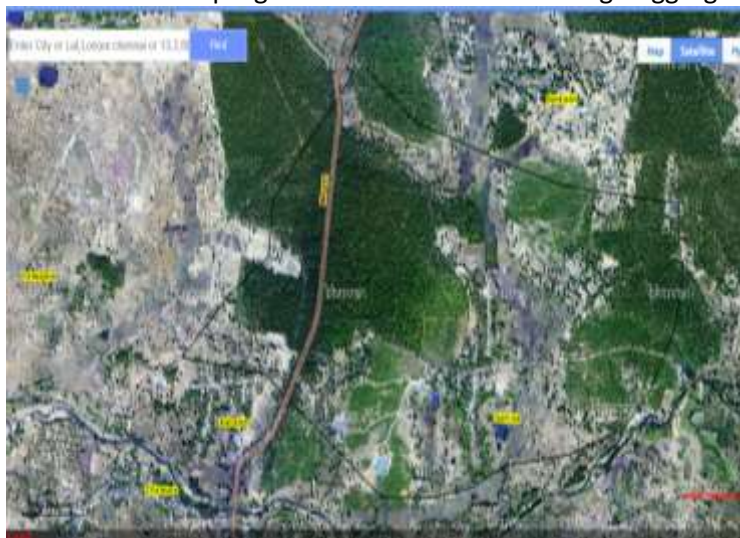
Suresh (48) owns 2 acres of land that produces around 10-12 quintals of paddy. Suresh also works as a MGNREGA wage labourer to supplement his income. In FY 2017-18 he has worked for 93 days in MGNREGA and earned INR 158245. Suresh earned INR 10000 from fish cultivation. He is optimistic that his earnings will increase to around INR 1.5 lakh in the coming years.

Balkaran (25) owns one acre of land that produces only 7 quintals of paddy. He also collects NTFP and works occasionally under MGNREGA. In FY 2017-18 he has worked for 184 days and earned INR 31864 from MGNREGA work. He earned around INR 13000 from selling fish. Balkaran hopes that his income from selling fish will increase in future when the fish become bigger in size and fetching a higher income. Balkaran is considering taking up fish selling as his occupation.

DIVERSIFYING LIVELIHOODS IN RAINFED AREAS; KORBA

Background

Pali is one of the three blocks of Korba district and is located 39 km towards the west of the district headquarters. Pali block was selected under the ICRG programme on account of its high aggregate vulnerability in terms of both biophysical and socio-economic indicators. The block has many landless households who do manual labour and have incomes of <Rs. 5000. The block also has many women headed households. The average elevation of the block is 944 feet above sea level; 91 gram panchayats and 141 villages covering an area of 98930.02 ha. of which forest area is 43378.06 ha., net sown area is 30587.29 ha., irrigated area is 1177.59 ha. and unirrigated area is 28686.89 ha. The



Satellite image of Damiya gram panchayat

irrigated area accounts for only 1.1% of the total area of the block even forest area is 44% of the geographic area. Rainfed agriculture is the norm across most parts of the district and this results in low productivity because of the absence water at the time of sowing of paddy and during the dry spells of the monsoons. According to Climate Variability Report (2017), the average projected temperature of the block will rise by 1.14⁰ C by 2035. Similarly, the average June-July-August-September (JJAS) rainfall will decrease by 15% but the number of rainy days increase by 12% with high rainfall events by 2050. Similarly, the rainfall variability will increase by 42.2 %.

In consultation with the district officials, the ICRG Team selected Damiya gram panchayat as the demonstration site. This gram panchayat has many households that belong to the vulnerable groups and rely on agriculture and NTFP collection for livelihoods. According to the SECC report, 2011, Damiya gram panchayat has 500 households of which ST households number 272 (54%), SC households 40 (8%), FRA beneficiary households 86, women headed households 28, households with differently abled 3 and small and marginal households 4.

The ICRG Intervention

At the outset, the ICRG Team undertook an analysis of several secondary documents like GDP, Census (2011) and SECC (2011), land use pattern, geomorphology, lineament, and extent of erosion from different thematic maps available on the Bhuvan portal to identify the natural resource problems of the panchayat. Thereafter the Team engaged in consultations with the community and gram panchayat functionaries to identifying the NRM works in the panchayat in a cluster approach. Soil erosion, low irrigation facilities and low average person days generated per households in the previous financial years under MGNREGA were identified as key issues. High surface runoff leads to severe sheet erosion in the cropland areas as well as on the scrubs and waste land area. Second due to low

irrigation facilities, cultivation is primarily rainfed and variability of rain and intermittent dry spells lead to partial to complete loss of crops affects the livelihoods of the community. Finally, due to lack of the planning and awareness of different NRM activities, the benefits of MGRNEGA are limited

The Team identified 5 Climate Resilient Works comprising 12 MGNREGA works in the FY 2017-2018. The present case study is that of an individual farm pond under Category B assets of MGNREGA located at N22°21.244'; E082° 19.586' constructed at a cost of INR 275862. The slope of the farm land is <3% having runoff coefficients of 0.5 with catchment area of the farm pond being 4 ha. The storage capacity of the farm pond after assuming 30% seepage and evaporation loss is 7800 m³. The dimensions of the farm pond are 25mX25mX3m dictated by the availability of land and the estimated capacity of harvested water is around 1500 m³ with the potential to provide life-saving irrigation to 1.5 ha of paddy crop in case of intermittent dry spells while in the case of normal weather conditions, the farm pond has the potential to irrigate 0.3 – 0.4 ha land during rabi and summer seasons for wheat and gram cultivation. The specific technical inputs provided are as follows.

- Inlet was constructed with dimensions of 10mX1mX1m;
- Stone pitching at the inlet was done for safe inflow of runoff;
- A silt chamber of 3mX2mX1m dimension was constructed;
- Plantation of fruit trees such as lemon and drumstick were suggested on the bunds and periphery of the farm pond and open well respectively to help stabilize the soil and provide additional income to the household;
- Grass pitching done to reduce soil erosion and siltation of the *dabri*.
- The farm pond has a lifespan of >15 years and during this period it will protect soil loss and deposit the silt on upper side. Farmers will need to remove this silt periodically to maintain the effectiveness of the *dabri*.



Satellite image of GPS points of the NRM



Planting fruit trees on pond bund

The Impact

Immediately after the construction of the farm pond, the direct beneficiary who owns 2 acres of land near the pond received water. Additionally, two indirect beneficiaries also used water from this pond to irrigate their lands. One of them is Budhwara who has used this pond water to irrigate his 1.2 acres in the dry spell and is expecting to produce 16 quintals of paddy. Another indirect beneficiary, Dukhiram took water to irrigate his 0.5 acre of land and is expecting around 9 quintals of paddy from it. The construction of farm pond has generated 1208 person-days' work for 352 persons. The construction of the farm pond was started in April 2018 and required 37 muster rolls and provided INR 210192 as unskilled wages.



Command area of the farm pond

Who is benefitting?

Jawaharlal (40) belongs to the ST community and has a family of 8 members including 3 sons and their wives'. Jawharlral has not gone to school and can only sign his name while his sons have studied till 8th standard. Farming, wage labour under MGNREGA and NTFP collection are the main livelihoods of the family. Prior to the construction of the farm pond, he was able to produce around 18 quintals of paddy but now in 2018-19 he is expecting around 28 quintals of paddy. The farm pond has helped at the time of sowing and intermittent dry spells and Jawaharlal has plans to cultivate wheat in the rabi season on 30 decimals of land. In FY 2018-19, Jawaharlal has received several trainings like SRI method of paddy cultivation, different methods of mulch for vegetable cultivation from KVK and Agriculture Department through convergence facilitated by the ICRG Programme. He received 500 gm of *seasum* seeds from the Agriculture Department for bund plantation; 10 mango saplings, 8 black berry saplings, 8 jackfruit saplings from the Horticulture Department. Jawarharlral also received around 300 gm of fingerlings from the Fishery Department to do pisciculture and these have grown to a size of 350 gram and he is expecting to earn about INR 5000 from their sale after 6 months. Once the fruit trees bear fruits in 3 years his income can go up by about INR 10000 annually. The family also earns about INR 5000 through the sale of NTFP collected from the forest. The family worked for 54 days in FY 2017-18 in MGNREGA and earned INR 9288 and, in FY 2018-19 worked for 88 days till date and earned INR 15312. The family is very happy with the multiple benefits of the farm pond.



Jawaharlal, beneficiary of the farm pond

ODISHA

DESIGNING CLIMATE RESILIENT WORKS – THEIR NEED UNDER MGNREGA; KALAHANDI

Background

The ongoing MGNREGS works lack adequate technical planning are therefore unsustainable. There is huge scope to improve the adaptive capacity of the poorest and vulnerable communities in the rural parts of Odisha by integrating climate resilient into MGNREGS.

Kalahandi has extreme climate - it is dry except during the monsoons – day and night temperatures record huge variations. The average annual rainfall of the district is 1378.20 mm and the year on year variation is not large. 90% of the rainfall is received from June to September with August having the greatest number of rainy days. Drought is normal feature of this district. May is the hottest month when the maximum temperature is about 45^o C.

The district has red, black clay, sandy loam and yellow soils. Nearly half of the total geographical area of Kalahandi district 4,962 sq. km is covered with forest. The total population of Kalahandi district is 15,76,869 (Census 2011).



Drying up of water in the nala area in Ghantabahali village

Chahagaon gram panchayat in Bhawanipatna Block is 30 km from the district headquarters of Kalahandi. The Ghantabahali village of Chahagaon gram panchayat has 200 households. Around 80% of the residents of this village depend on agriculture for their livelihoods, and a large percentage of the fields are drying due to rising temperatures and wastage of rain water during peak rainfall that could otherwise be stored and used for agriculture in both upper and lower land. (Source: Central Ground Water Board, SER, Bhubaneswar, Ministry of Water Resources, GoI, March 2013).

The ICRG Intervention

The ICRG Team and Block and Gram Panchayat officials visited the Ghantabahali village to collect livelihood data, forest and other biophysical data to understand the needs for suitable works in the selected vulnerable site. The village had a source of water – the Podamundi Saranala – that flowed for about 7 months of the year but, in the absence of water storage, the village is facing drought for part of the year. Only 5 families of the village were able to use the water by diesel pump for irrigation during



Engineering drawing of the work

the dry spells of the monsoons. The Team therefore suggested that a check dam be constructed and nala trimming/de-siltation be done in the upstream. The check dam will benefit >60% of the families residing at the site and around 30 acres of land will get irrigated. Other land development was also taken up like field bunding and land levelling in the both upper and lower lands to stop run off. Convergence with the Watershed Department was also suggested.

The Impact

Following implementation, the impacts are as described below.

- 30 acres (12 ha) land of 20 households (SC-6 and OBC-14) of the command area are getting direct benefits.
- The Check dam helped to store water and increase the water table of one farm pond and 3 dug wells. The farmers of the command area have planned to grow millets and other vegetable crops in the next rabi season.
- Convergence with the Watershed Department benefitted 12 households who planted 400 mango trees.
- 10 households have already completed land development work and started the mixed crop cultivation i.e. arhar and cotton crops in addition to paddy and 10 other families will be starting their land development activities soon.



Field bunding washed off and land levelling downstream affected by heavy rainfall

The specific technical inputs from ICRG are as follows:

- Land levelling and field bunding on both sides of the nala - 8 ha. (left side- 7.4 acre, right side 11.85 acres). Specification of field bund BW= 100 cm, H=45 cm, TW= 30 cm to TW=50cm, BW=170 cm and H=60cm (depending upon the slope of the plot and size of the plot)
- Renovation of nala for desilting and cleaning (300 m x 10 m x 1 m= 3000 cum.)
- Construction of dam over nala (nala width=10m, total length of CD=20 m, height of CD=1.5 m, foundation depth=1.5 m)

This season the rainfall was unpredictable, it rained for 3 days continuously with the highest rain fall being 253mm in one day. This caused a flood and delay in implementation of other works. However, since the ICRG design was done based on projected climate data, the following results were seen.

- Though the rainfall caused a flash flood in the village reaching the height beyond the check dam, the structure did not get damaged and was still able to hold water.
- The field bunding were washed out but these bunds managed to save about 60% of the area from silting.
- The water harvesting capacity of the nala increased and most of the water was able to percolate the soil to increase water table level. This will provide irrigation to fields on both sides of the nala during dry spells and drought.

- Despite the sudden wash off, the soil moisture and fertility increased. Around 20 households will be cultivating groundnut and black gram in the rabi season.



Despite flash floods, desilting was reduced and cultivation possible



Check dam remained undamaged even after overspill of water

Since the MGNREGS, was able to adapt to the unpredictable weather conditions, farmers were able to continue with agriculture which is the major source of income – the structure therefore proved its durability and resilience.

Who is benefitting?

Mr. Trijotava is one of the direct beneficiaries of the interventions done in FY 2017-18. He has a 7-member family, belongs to the SC category and owns around 6 acres of land. The farmer explained that due to the initiation of check dam intervention along with field bunding and nala trimming he was able to hold water in his land which helped him do paddy cultivation. He said earlier the water in the pond would dry off and there was always a shortage of water especially during kharif season. Since a surplus amount of water was collected by



Mr. Trijotava, a beneficiary



Mr. Trijotava's lands growing cotton using the waters from the nala in the downstream end

reducing surface run off, the soil fertility significantly increased. The beneficiary earned INR 10,000 from the MGNREGS in FY 2016-17 and invested in paddy, tomato, brinjal, arhar and cotton cultivation and is expecting extra income. He will also cultivate groundnut and green gram in the kharif. The climate resilient designs demonstrated in the Kalahandi district has helped Mr. Trijotava and other local farmers who have a chance at a more secure livelihood.

LABOUR BUDGETING FOR MGNREGS TO INCLUDE CLIMATE; MAYURBHANJ

Background

The preparation of the Labour Budget is a key input for the MGNREGA programme. The process has scope to include climate aspects in the choice of works especially for climate vulnerable states like Odisha. The knowledge of the villagers is key to ensuring that the appropriate works are selected and therefore, MGNREGS has an elaborate process for Labour Budget preparation mandated by law.

This case study describes the ICRG intervention in facilitating Labour Budget preparation in Dudhiasole village of Kendua gram panchayat in Mayurbhanj district.

The ICRG Intervention

The ICRG programme has developed a communication tool called **Climate Kunji** to be used to sensitize communities on climate impacts and thereby influence the choice of works for inclusion in the Labour Budget. The Climate Kunji includes a card game called 'Patta Patta' and a short video. The experience of using this tool in the Dudhiasole village is as described below.

At the core of the exercise is community interaction and participatory decision making. At the village meeting, a quick introduction was given to the key stakeholders. They were sensitized about the impact of climate change and how it has affected them locally. The ICRG Team explained the need for including more NRM (Natural Resource Management) related works and how to use the Climate Kunji game for prioritization.



Community meeting in Dudhiasole village



Left to Right: Calamity Card; Village Card; Kunji Card

- **Step 1: Playing the game with the key stakeholders:** The Climate Kunji card deck has 24 calamity cards (climatic event or other issues i.e. drought, flash flood, crop failure, soil erosion etc.), 16 Kunji cards (list of NRM

based works to address the climatic issues) and 72 village cards. The game was played with groups of 5-8 players and everyone was given a kunji card at the beginning with the remaining cards shuffled and kept in the centre. One player picked a card to start the game and the moves followed in a clockwise direction. If the player picked a village card, he/she kept the card in the centre creating a new pile and the next player played his/her turn. When a player

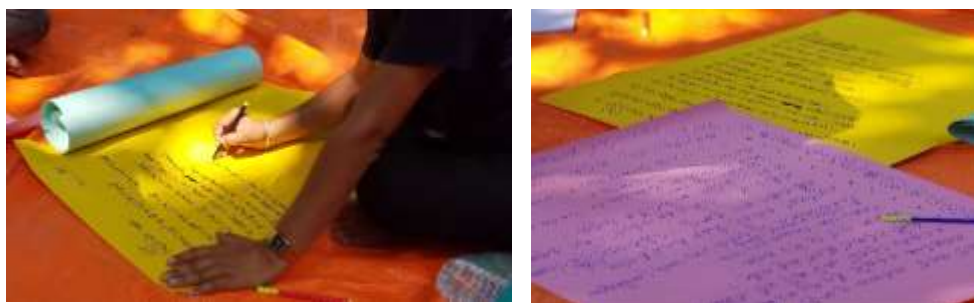
picked a calamity card, he/she must state a local climate issue before keeping it in the new pile. If the next player has a kunji card, then he/she can place it over the calamity card thus identifying a possible INRM work as a solution – this player then gets the whole pile of cards and the kunji card which cannot be played again. The next player picks a new card and a new



Climate Kunji game in progress

round of the game begins. If the previous player does not have a solution to the identified climate issue then, he/she skips a turn. If none of the players have a solution, then that pile is discarded, and a new pile was created by picking up a new card to play a new round of game. The player with the greatest number of cards wins the game.

- **Step 3: Listing of work:** The issues stated by the villagers were noted by the ICRG Team including the list of permissible works suggested by the villager against the identified issue.



Listing of key local issues and suggested works

Prioritization of works

MGNREGA has a list of 260 permissible works and it is important to identify suitable work from the list of suggested works (**Table 1**) to address the issues.

Table 1: Identified list of key local issues and suggestive works

Key Issues and Concerns Identified	Suggested Solutions
Villagers are facing severe problems relating to drinking water	Overhead tank can be constructed for drinking water
Patches of the agricultural fields are non-productive due to lack of water	Lift Irrigation points constructed
The bank of the check dam is facing soil erosion	Guard wall can be constructed
The ground water level is continuously decreasing	Dug well can be constructed on individual or community land

Residents in the lower stream area near the nala are regularly more vulnerable to flash floods in rainy seasons	Disaster relief centre can be constructed
Lack of internal roads in the villages	Pucca road can be made
Lack of facilities for livestock treatment	Veterinary hospital can be constructed in the village
Perennial water sources cause run off and get wasted during peak rainy season	A second check dam can be constructed for irrigation
Roads are always flooded in Tala Sahi	Proper drainage system can be developed for the internal road
Women/girls find it inconvenient to bathe near the village tank	A changing room can be constructed for women near the village tank
No connecting road to Upper Sahi from the main road of the village	Road can be constructed for Upper Sahi
Barren lands are left unused in the village	Planting of mango, cashew on the barren land
Few families in the villages do not have any land	Land Patta can be allotted in consultation with the revenue department
Open defecation is a key issue in our village	Individual Household Latrines can be constructed.

Table 2: Scoring technique and criteria

Efficacy	The extent to which the works are relevant to annual variations in rainfall.	Score: 10 = Beneficial irrespective of climate exposure, 5 = Beneficial for extreme exposure; 1 = Beneficial for moderate exposure
Urgency	How urgent it is to undertake the works, i.e. to address rainfall variations?	Score: 10 = urgent; 5 = moderately urgent; 1 = less urgent
Durability	The length of time that the MGNREGS work is likely to last and deliver benefits.	Score: 10 = >15 years; 5 = 10-15 years; 1 = <10 years
Acceptance	Support of village communities to do the work.	Score: 10 = highly popular; 5 = less popular; 1 = opposed by some people
Time	Time required for implementation of the MGNREGS work	Score: 10 = A few days; 5 = Some days; 1 = Many days
Co-benefits	The extent to which the MGNREGS work will provide benefits (e.g. livelihoods).	Score: 10 = Many; 5 = Some; 1 = Few; 0 = None

The final identification of works is done by applying the scoring technique give in **Table 2**.

For example;

- Lift Irrigation points can be made for irrigation purpose: Efficacy = 8, Urgency = 8, Durability = 9, Acceptance = 10, Time = 4, and co-benefit = 7. The total score is 46
- Veterinary hospital can be constructed at village level: Efficacy = 6, Urgency = 5, Durability = 7, Acceptance = 8, Time = 1, and co-benefit = 5. The total score is 32

Thus, works that received a higher score were prioritized.

The Final Selection

Based on the above, the list of works selected in the Labour Budget for FY 2018-19 are as follows.

- Overhead tank for drinking water
- Lift Irrigation points
- Construction of guard wall along the check dam
- Construction of dug well
- Construction of a second check dam for irrigation
- Development of proper drainage systems for the internal road
- Plantation of mango, cashew on barren land

This innovative strategy under ICRG team will help people to prioritize works to address climate issues they face and enable selection of more NRM works in MGNREGA Labour Budgets.

CREATING DURABLE ASSETS FOR SUSTAINABLE LIVELIHOODS FOR VULNERABLE GROUPS; MAYURBHANJ

Background

The Samakhunta block in Mayurbhanj district has a population of 75,363 (Census 2011) of which SC's comprise 5% and ST's 67% of the population share. The total share of vulnerable households of the population is 66.4% and includes women headed households, households with differently abled, other PVTG groups, small and marginal farmers and migrants. ICRG selected a site in Godipokhari village of Kuchilaghaty gram panchayat. This village experiences frequent flash floods linked to heavy rainfall that causes soil erosion and damages agriculture.

The ICRG Team chose a 5-acre barren plot that suffered from high wastage of water that could otherwise be stored for use in the rabi season. The erratic rainfall received by the Block contributes to crop loss, distress sale of paddy and default loan payments all contributing to the overall poor economic condition of the population.

The ICRG Intervention

The intervention at this site was taken up in FY 2017-18 following community consultations with ward members, sarpanch, members of the SHGs, landless farmers, women-headed households, and vulnerable groups. The discussions were around the socio-economic conditions of the village, the local impacts of climate change and the work that can be taken up under MGNREGS. Convergence possibilities with the Agriculture Department and Horticulture Department were also discussed. The interventions taken up include (i) land development (ii) construction of 2 dug wells (iii) construction of 3 vermicompost pits. These three interventions would most certainly have a positive impact on agriculture practices in both kharif and rabi and therefore livelihoods of the villagers.



Village meeting for prioritization of works



Construction of dug well

The Impact

The ICRG intervention has recorded the following impacts to date.

- The construction of two dug wells has been completed and these are providing water to 18 ha of lands. The beneficiaries of these wells cultivated paddy in the kharif and rabi together with vegetables. This intervention has benefitted 25 poor and vulnerable villagers.

- The total number of households benefitted to date in Godipokhari village is 142 all from the ST group. These households have also benefitted from convergence with other government programmes facilitated under the ICRG programme.
- Farmers have been provided with 11 sprayers (ASPEE) at a subsidized rate of INR 1100. Around 22 farmers have been provided with SUPER Fertilizer at a subsidized price of INR 250 for 50 kgs and 18 farmers have been provided with “RANI” paddy seeds for the kharif season.
- Convergence with the Horticulture Department led to 8 farmers receiving mango saplings that have been planted on 1 acre.

The works are ongoing, and the number of beneficiaries will increase in future.

Who is benefitting?

Mr. Bijaya Murmu is a direct beneficiary of the intervention. He belongs to the ST category and owns around 2 acres of land to support his family of six. Following the construction of the dug wells and the vermicompost pits, he has received adequate water for irrigation. Bijaya earned INR 20,000 from MGNREGS as wages in 2017-18. He plans to grow green gram and vegetables like tomatoes in the kharif.

*Bijaya Murmu is one of the beneficiaries
in Godipokhari village*



PLANNING LIVELIHOODS FOR GREATER IMPACT; KEONJHAR

Background

Banspal block located in Keonjhar district has highly undulating topography and is largely inhabited by tribal population. The block has low net sown area of 16% with forest cover of more than 51%. Irrigation facilities are poor because of the undulating terrain. The block faces both the flash floods and droughts. Shifting cultivation is another key issue in the block on account of low percentage of cultivatable area – all combining to result in poor productivity.

The site selected is a small village called Bhaliadhal in Banspal block of Keonjhar district. The village is on the upper catchment of two famous water falls in the district – the Badaghagra and Sanaghagra. The geo-coordinates of the water source is 21°35'17"N & 85°34'45"E and the master storage supply tank (village habitant) is 21°35'28"N & 85°33'48"E.

The ICRG Intervention

The interventions here began in FY 2016-17 and although not complete, the case study describes the impacts of integrating climate resilient works with livelihoods through convergence. The ICRG Team recommended the following based on the bio-physical and socio-economic conditions in the area.

- Diversion Based Irrigation system (DBIs) to restore water in a live spring at a suitable elevation either through the construction of a retaining wall or a box. The water is then diverted through a pipeline from that point to the village or cultivable land. In the discussions with the community while deciding on the intervention, it was initially decided that the DBI would be constructed to provide water only for drinking and domestic use however, at the time of construction, it was decided that provisions for irrigation should also be included.
- Convergence with NABARD, KVK and others for NRM works.
- The promotion of clean cooking energy in convergence with Nexleaf and NABARD.
- Farm pond proposed to diversify livelihood opportunities. Other livelihoods like duckery, plantations were also facilitated through convergence.

The Impact

All works proposed are yet to be completed. However, the impacts seen to date are as follows.

- There are 35 households in the Bhaliadal village who have benefitted. The intervention has also seen construction of 228 cum area for field bunding that has benefitted 35 vulnerable persons.
- Convergence with NABARD, KVK and others for NRM works has led to the following benefits:
 - 11 acres have been brought under chick pea cultivation.
 - 35 households have initiated duckery as an additional livelihood.
 - 11 households have initiated fisheries as an additional livelihood.
- 10 households were provided improved cookstoves as a pilot – this has now been scaled up to 30 households in the village.



Multiple livelihoods have been taken up in the village

Who is benefitting?

Gurubari Naik (27) does not get the time to help with agriculture on the family lands since she was engaged in collecting firewood in the forests. Stuck in the vicious cycle of poverty, she struggled to meet the family needs and educate her children because of low income. Agriculture is the main source of income and productivity has been declining due to climate impacts. Like Gurubari, others in the village too were highly dependent on the forests for livelihoods and thus exploiting the forests to the maximum.



Gurubari Naik using the improved cookstove

With the introduction to the improved cookstove in convergence with Nexleaf and NABARD, Gurubari's family has been able to reduce firewood consumption. This intervention has also improved the problems of indoor air pollution being faced by the family. The use of the cookstove has freed up time that used to be spent in gathering firewood and more time is available for agriculture. Gurubari needed 12 kg of firewood daily for cooking but now needs only 3-4 kg. She expects that with her contribution to agriculture, the family will increase their productivity and earnings in the kharif.

IMPACT OF INTEGRATING CRWs WITH CONVERGENCE; NUAPADA

Background

Nuapada district receives about 1250mm annually and most farm holdings are small or marginal and rely entirely on rains for agriculture. The deficit rains in 2015-16 led to the district facing extensive crop loss and severe water shortage. The ground water level in the district is rapidly receding due to high runoff of whatever rain is received. The district is also facing problems of massive land degradation because of loss of forest lands. The water shortages have resulted in low paddy productivity and the failure of the kharif crop in 2015-16 and 2016-17 has pushed the farmers to a very critical stage and most had to skip the rabi crop because of non-availability of water in the reservoirs.

The ICRG Intervention

The interventions taken up in Chandopala village of Komna block in FY 2017-18 are discussed. While all the works are yet to be completed, this discussion highlights the benefits seen so far. The specific recommendations made by the ICRG Team are as follows.

- Renovation of water harvesting structure
- Construction of loose boulder check dam
- Construction of an outlet
- Construction of a guard wall
- Convergence of land development with the community development block
- Convergence with the Odisha Livelihood Mission for specific focus on SHGs
- Promotion of vegetable cultivation in the rabi season that will benefit 4 acres of land

The Impact

The impact of the intervention as on date include the following.

- The renovation of the water harvesting structure is ongoing. 668 person-days of work has been generated under MGNREGA and INR 154154 made towards wages.
- 53 households have benefitted from the renovation of the water harvesting structure as has 5 acres of land.
- Convergence has been facilitated for mango plantation on 1 acre of land.
- The Odisha Livelihoods Mission has mobilized INR 30000 for SHG members from 22 households.
- Members from 10 households decided not to go to Hyderabad in search of work in anticipation of receiving enough water for agriculture.

The process followed included extensive community consultations and generating awareness on climate change. Focus group discussions were held with farmers, the SHGs, job seekers community, etc. These consultations led to the preparation of a detailed micro plan for the village.



Renovation of water harvesting structure

This plan was approved by the Palli Sabha and Gram Sabha and shared with the officials of the gram panchayat and block. The site selection was done jointly with the Block staff and technical staff of MGNREGA and detailed drawing and design prepared. This DPR was subsequently approved and is under implementation. The ICRG programme plans to continue to facilitate convergence with other programmes.



Awareness programmes at village and block level

Who is benefitting?

Mr. Abhisingh Majhi is one of the direct beneficiaries of the interventions. He belongs to the ST category and owns about 3 acres that supports his family of five. Abhisingh explained that his lands were barren on account of water scarcity. Following the renovation of the water harvesting structure he was able to get water for irrigation and cultivate paddy on 2 acres and cotton on 1 acre. He said that in earlier times, the water in the pond would dry up and the kharif crop suffer because of water shortage. He has also benefited from convergence under the community block development scheme and received INR 30,000. The construction of the water harvesting structure has facilitate water storage and the reduced run off has increased soil fertility. Abhisingh plans to cultivate onion, cabbage and cauliflower and expects to increase his income.



Abhisingh Majhi is one of the beneficiaries in Chandopala village