CASE STUDY

For the community, by the community: Building resilience through infrastructure in rural India

THE RESILIENCE SHIFT

Department for International Development

ACCLIMATISE
building climate resilience

ABOUT THE RESILIENCE SHIFT

The Resilience Shift exists to inspire and empower a global community to make the world safer through resilient infrastructure. More people than ever depend on the critical infrastructure systems that provide essential energy, water, transport and communications services, and underpin food, healthcare and education. When this infrastructure fails the consequences can be catastrophic.

Supported by Lloyd's Register Foundation and Arup, the Resilience Shift provides knowledge and tools for those responsible for planning, financing, designing, delivering, operating and maintaining critical infrastructure systems. Our aim is to ensure infrastructure systems are able to withstand, adapt to, and recover quickly from anticipated or unexpected shocks and stresses - now and in the future.

DEFINING RESILIENCE

Resilience is the ability to withstand, adapt to changing conditions, and recover positively from shocks and stresses. Resilient infrastructure will therefore be able to continue to provide essential services, due to its ability to withstand, adapt and recover positively from whatever shocks and stresses it may face now and in the future.

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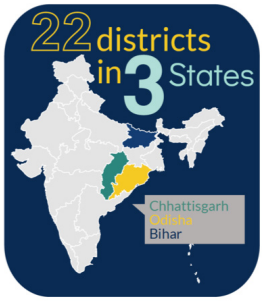
Introduction and context

This is a story of infrastructure creation that does not begin with the asset. It begins instead with the people; specifically, the needs of some of the poorest and the most vulnerable in rural India. By linking to an established social security programme, the Infrastructure for Climate Resilient Growth in India (ICRG) project provides technical assistance to support the development of over 900 resilient infrastructure works in just 4 years. Funded by DFID, ICRG has cleverly combined technology with traditional techniques to ensure that the assets build community resilience to climate change and can be built and maintained by the communities themselves.

In 2015, the UK's Department for International Development (DFID) provided funding to help launch a technical assistance project called Infrastructure for Climate Resilient Growth (ICRG), in India. The project's aim was to strengthen the resilience of rural communities by building resilient rural infrastructure. But the ICRG is far from a standard infrastructure development project, the infrastructure that is developed requires no construction companies, architects, or large machinery. In fact, the infrastructure that is developed is an important bi-product of a larger initiative that builds the financial and resilience of rural communities.

Key Messages:

- A technical assistance project in India has initiated over 900 climate resilient infrastructure projects in just 4 years. The DFID-supported, Infrastructure for Climate Resilient Growth in India (ICRG) programme, is active across 22 districts in three Indian states, Bihar, Chhattisgarh, and Odisha.
- ICRG connects resilient infrastructure with social protection to build community resilience. It links with India's largest social security programme, the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA). The MGNREGA, is a wage-for-labour programme, has deployed $25 billion as wage payments to rural households in over 13,000 villages.
- Under the ICRG programme, climate resilient works are built by local communities. The programme has provided training to over 10,000 people to ensure the infrastructure delivers resilience benefits.
- ICRG has used technology and climate data to inform asset selection delivered through mobile phone applications.
- Over 8 out of 10 climate resilient works built under the ICRG project have been geo-tagged, creating a digital database and asset map that helps state level officials track existing assets and plan new ones.



Today the ICRG project is being piloted in 22 districts across three states in India. The success of the project is in part due to the fact that it was set up to strengthen a component of a much larger programme; one whose primary aim was not infrastructure development at all. In fact, when the Government of India conceived the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), their primary intention was to tackle poverty. The Act allocates wages to unskilled adults, for 100 days of manual labour.

Under the Act, the nature of the labour, until recently, was secondary to the livelihood benefits realised to the poor. The work is designed to be unskilled; no machinery or excessive concrete can be used and yet the outcome has been the creation of community infrastructure assets delivering vital services including roads, toilets, canals, ponds, and wells. Over 60% of the assets are in fact natural resource assets. Today, MGNREGA is considered to be India's largest social security programme, both in terms of the budget and its geographical impact.

In the early years of MGNREGA, the infrastructure that was being constructed was found to be insufficiently durable. To stave off growing criticism that the Act was essentially "digging holes and filling them in again", a series of impact studies were carried out.

One such study by the Indian Institute of Science evaluated the environmental services that MGNREGA provided. The study argued that the natural resource structures offered environmental benefits by aiding water conservation, drought proofing, plantation, and afforestation. There was also an emerging dialogue on the resilience benefits that the scheme yielded, largely by way of strengthening "the livelihood resource base of the rural poor."

The findings of the impact studies suggested that while, MGNREGA had made significant progress across rural India as a wage-for-labour scheme, there was room for improvement when it came to the identification, design and maintenance of assets themselves. This is where the ICRG project focussed its attention.

Part of the problem was that "MGNREGA has generally focused on the creation of assets and not its use." Explained Namita Mishra, ICRG Project lead in Chhattisgarh. "Under ICRG, our objective is to understand how to convert MGNREGA business as usual works to climate resilient works. For this, we are focusing on five aspects: i) Durability, ii) Inclusion, iii) Livelihood convergence, iv) Flexibility, and v) Income generation."

The ICRG realised that a targeted programme could amplify the impact of MGNREGA, by bridging the gap between community social protection and infrastructure creation. Since 2015, ICRG has been working with thousands of stakeholders across multiple scales to strengthen the climate resilience benefits that MGNREGA provides, both in terms of the selection and durability of the assets created and the resilience of communities dependent on them. The idea is to find a balance between community and infrastructure resilience by aligning the functions and priorities of governments, practitioners, and communities in a more synergistic manner.

The need for infrastructure in India's rural communities

Building resilience of critical infrastructure is becoming increasingly vital, especially in developing countries, in the face of existing socio-economic vulnerabilities, increasing demand for resources, and climate change impacts. Rural regions in developing countries are exceptionally vulnerable to climate change as they are also subject to different and complex non-climate challenges such as inadequate investment in agriculture, commercialisation, land use, socio-economic marginalisation, environmental degradation and institutional barriers (IPCC 2014).

This is a major concern for India as about 67 percent of its population lives in rural areas and is mostly dependent on agriculture and natural resources for livelihoods. While rural poverty has been steadily declining, around 7 percent of India's rural population is still living in 'extreme poverty', and comprises mostly of agricultural landless labourers, women-headed households and marginalised groups such as tribal communities. Climate change is further exacerbating existing vulnerabilities.

India has a set of rural development and social safety net schemes that have been instrumental in critical infrastructure development, poverty alleviation, and vulnerability reduction of poor households. However, the additional risks caused by climate change do not find an explicit mention in any of these schemes. As critical infrastructure is essential for growth and development, schemes such as these are important entry points for integrating climate change resilience across infrastructure development and poverty alleviation in rural India.

Diagnose and conceive

Financing resilient rural infrastructure

MGNREGA is primarily funded through the government's wage disbursement scheme, principally from the national budget with a smaller percentage routed through state budgets. Since its inception, about $25 billion has been deployed directly as wage payment to rural households. The ICRG project, on the other hand, is managed as a technical assistance project and is funded entirely by DFID to facilitate the integration of climate resilience principals in the development of public works.

What makes ICRG innovative is how it builds on a well-funded government scheme and aligns it with other relevant state schemes that have their own budgets, to create a bundle of assets called a climate resilient work (CRW). The development of each climate resilient work asset involves three components:

1. An infrastructure asset (such as an embankment),
2. Ancillary structures (such as trees or plantation on the embankment), and
3. The development of a livelihood plan for each CRW and its beneficiaries.

The livelihood plan, developed in coordination with other sectoral departments, consists of either an additional crop, provision of livestock, fish, or silkworm farming to the community.

> *"We link the beneficiaries of farm ponds with the agriculture department for seed treatment, crop insurance, soil health cards, etc. as all these go hand in hand in increasing asset productivity and community resilience.*
>
> - Namita Mishra

A beneficiary of ICRG infrastructure projects, Yashoda Lader is now able to irrigate her fields thanks to a newly installed check damn.

Contour bunding or embankment built in Barbaspur village, Chhattisgarh.

This approach delivers multiple benefits: First, ICRG ensures that assets are built to be resilient to long-term climate impacts. Second, the asset selection is also aimed at improving community resilience. For instance, the creation of a water storage infrastructure (such as a recharge well) could help farmers with additional water during deficient monsoon periods. Third, the ancillary structure and livelihood plan ensures that there are additional revenue benefits to the surrounding villages. For instance, the provision of a fishery in a farm pond can generate additional income. For a fixed sum that MGNREGA spends on an asset, the ICRG pilot districts receive up to four to six times more money from other departments to strengthen community livelihoods.

> *"In every meeting of the rural development commissioner in Odisha, principal secretaries of various departments are asked what they can allocate for any asset built. For instance, can fingerlings [juvenile fish] be provided, can seeds or crop assistance be given, can saplings be offered for afforestation? These departments are able to provide money, training, and market linkages. In Chhattisgarh, through a similar exercise, a fisherman's cooperative was set up, so local entrepreneurship has been facilitated in this way.*
>
> - Sriparna Iyer, Vice President Urban Infrastructure, IPE Global

A Guava plantation in Peeparlor village. The trees provide a livelihood for local villagers and improve local ecological diversity.

Leveraging climate finance to support resilience outcomes

One challenge, identified in the ICRG programme, and indeed MGNREGA itself, is that community wages are still not aligned to future climate impacts, both in terms of the timing of the pay-out as well as the amount. Therefore, an idea put forward for the next phase is to leverage domestic and international climate change funds to further build resilience in the process.

There remain some challenges for the ICRG to access climate funding in this way. “It has been a challenge to get the Ministry of Rural Development to understand the need for additional financing from outside. Given that MGNREGA is well funded, their question is why can’t the ministry budget not do it?” explains Simon Addison, Principal researcher, Climate Changeat the International Institute for Environment and Development (IIED). “But climate resilience is tied to asset construction, not wages, and so there is limited flexibility to innovate or build resilience using the scheme’s existing budgets. Moreover, the additional funds will be needed to build capacities within states.”

A proposal is already being developed to finance climate resilience interventions in the selected states under India’s National Adaptation Fund on Climate Change (NAFCC). ICRG, in the next phase, hopes to also develop proposals to access international climate finance (such as the Green Climate Fund) by providing evidence of the additionality (of costs and interventions) in making structures and livelihoods climate resilient.

Governance at the heart of ICRG's success

One of the defining factors in ICRG's success has been the way it identified and targeted a clearly defined entry point to deliver resilient infrastructure. As a Government Act, MGNREGA already has a legal framework and an established institutional process in place. The ICRG programme's innovation was to realise that it could deliver resilient infrastructure by piggy-backing on this well-established social protection scheme. This brought significant benefits with regards to political traction and profile, allowing ICRG to forge links with policy makers at different levels of the MGNREGA programme.

ICRG carefully positioned itself as a project that could build on and enhance the MGNREGA programme. The MGNREGA combines top-down oversight with bottom-up activities. The central government provides overarching directives, the state government is in charge of the implementation, and the assets are finally selected by gram panchayats or village councils. The ICRG project had an extended period of consultation and engagement, working with policymakers across these levels to ensure that key stakeholders participate in, and are trained on, the planning and creation of climate resilient works in the pilot districts. ICRG teams were deployed across different levels to ensure they could engage holistically with MGNREGA operations.

Having ICRG staff at all levels of the process, meant that they could inform and make the case for resilient infrastructure at every level. Making a strong business case for infrastructure resilience was crucial for winning support of senior MGNREGA officials. ICRG was able to do this by aligning itself with relevant government departments that had not previously been involved with MGNREGA directly.

ICRG promoted horizontal integration of the programme allowing for greater convergence, linking one programme with other government programmes or schemes to maximize its benefits. ICRG has done this in the pilot districts by providing state departments a clear entry point to use funds and meet targets on existing development schemes. For instance, parts of ICRG have been aligned to the Bihaan programme, which is a livelihood project in Odisha focusing on livelihood diversification from agriculture to agricultural value chains.

> *"Under ICRG, in Chhattisgarh, we placed a state level team as well as a district level team, which form two kinds of support structures in the state. At the state level team there are 4-5 experts like a livelihood expert, climate change resilient infrastructure expert, and project documentation expert. In the same manner, at the district level we have a district level engineer who has experience on building micro-infrastructure. The major role of the state level team is to work with the state MGNREGA cell which plans all MGNREGA activities in the state and prepares guidelines and give instructions for district level implementation.*
>
> - Namita Mishra

Marrying infrastructure resilience with social protection

Under MGNREGA:
- Households have guaranteed access to wages
- The poorest, women and other vulnerable groups participate in the building of assets
- Assets are broadly responsive to needs of rural households and communities

Under ICRG
- Asset selection is also responsive to a changing climate
- More durable assets are created
- Livelihoods and wages are further strengthened through the climate resilient works (combining a core asset, an ancillary structure and livelihood plan incorporating either livestock, fisheries, additional crops, horticulture, or sericulture)

Building capacity among government officials

One of the objectives for the ICRG project was to build knowledge and awareness amongst key government officials of best practice for infrastructure resilience. To encourage policy makers to mainstream resilience into development planning overall (through MGNREGA as well as other sectoral schemes) training has been a crucial component of the ICRG project.

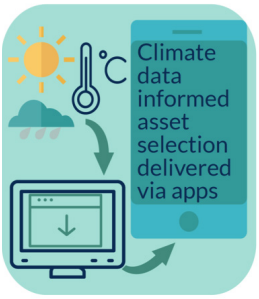
ICRG has held many capacity building and training workshops for officials at the national and local level. The workshops have encouraged policymakers to identify opportunities for resilience principles to be incorporated in plans, polices, and departmental practices. For instance, ICRG has been successful in integrating climate resilience into:

- A section on climate change has been incorporated in the Annual Master Circular (AMC) of 2019. The AMC is drafted by the Ministry of Rural Development and documents all key guidance on MGNREGA implementation.
- In Bihar, the Secretary, Rural Development Department, and the MGNREGA Commissioner conduct a monthly meeting where the progress of ICRG is reviewed.
- In Odisha, ICRG progress is discussed during all bi-monthly review meetings of the Project Directors of the Department of Rural Development (DRDA).
- In Chhattisgarh, ICRG progress has been reviewed under the ‘Empowered Committee for MGNREGA’.

Design and deliver

Using data and new technology in climate resilient planning and design

During the implementation phase of MGNREGA's projects, ICRG's role has been two-fold: First, to enhance the capacity of technical organisations such as engineering institutions and technical resource personnel to support the construction of better quality infrastructure, and second, strengthen systems and processes needed to improve the resilience of rural poor, including through development of innovative digital tools.



ICRG differs from conventional infrastructure projects in the use of climate data and tools to incorporate resilience in the creation of assets under MGNREGA. At the start of the project, a climate modelling study was used to map projections of rainfall and drought intensity between 2030-2050 in the 22 pilot districts. In addition, a vulnerability assessment was undertaken, capturing bio-physical and socio-economic parameters in select areas. These documents were subsequently used to develop a "Adaptation Package" to select the type of assets that could be built for each block or district sub-division.

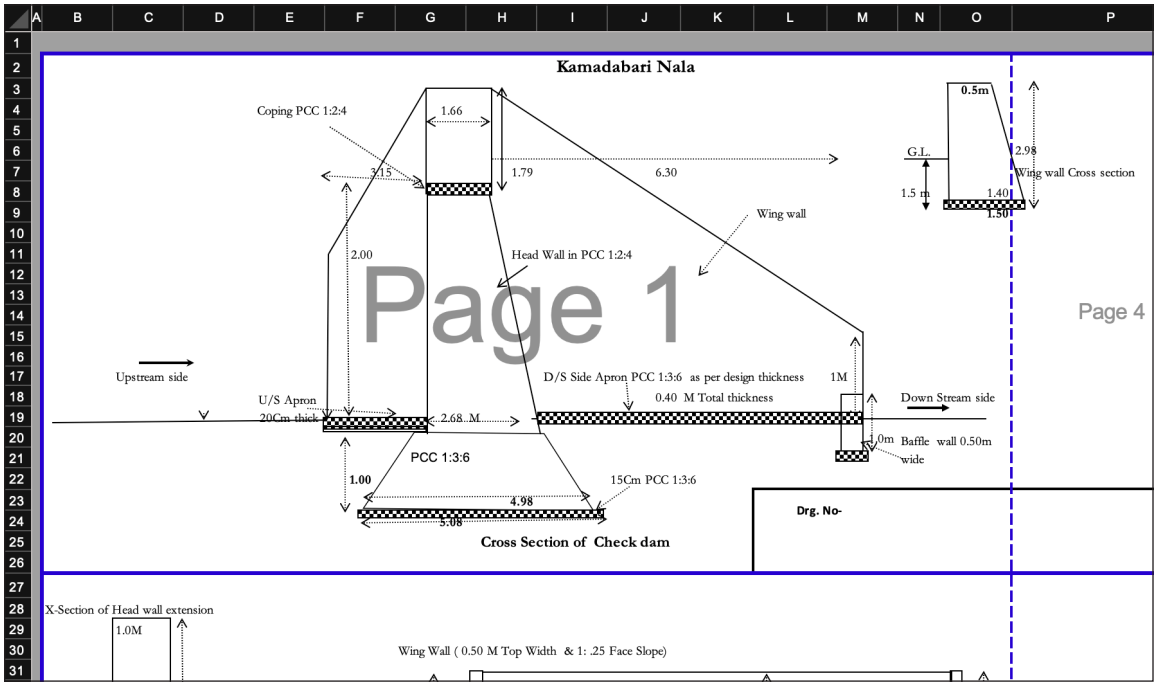
The adaptation package has also been spun off into a mobile app called the "Climate app" However, the app has not gained much traction with local communities as yet. The limitation of the adaptation package and the app is that the climate data has been interpreted largely by the ICRG team in determining the selection of relevant assets for each block. Community leaders, in turn, have been given a pre-decided array of asset types to choose from. One of the suggestions for the next phase of the project is to allow local governments to interpret the data and make their own decisions on asset selection.

One ICRG application that has however found significant usage among MGNREGA projects is an excel based tool that provides standard design specifications for each of the structures. Project workers input some of the asset's measurements, and then the tool provides the design specifications as well as a rough cost of the work using a standard schedule of rates.

> *"This is a long list of some 250 assets which are approved by the government of India. So looking at the vulnerability and the climate modelling we actually came up with the 5 top assets which would increase resilience to droughts, 5 top assets for floods, 5 individual assets and 5 community assets. For the decision maker…you have a tool in your hand which not only links the climate projection, it also tells you what asset to pick.*

- Sriparna Iyer, IPE.

An ICRG community mobiliser demonstrates the "Climate app"



ICRG engineers access an excell-based tool for asset design.

Apart from these ICRG tools, MGNREGA engineers already use a map-based GIS tool by the Indian Space Research Organisation called 'Bhuvan' and an application called the Composite Land Assessment & Restoration Tool or CLART which provides data on land use and the geomorphology of the site to assist in the asset selection.

Noting the use of multiple tools and applications in the field, ICRG is currently working to combine its climate data (from the Climate app) as well as the excel sheet with the CLART tool to provide users with an end-to-end solution in selecting, designing, and costing assets under MGNREGA using resilience principles.

> *"The Climate app, I would call it version-1 of our process. We just wanted to see whether it would work or not. Now we have found that when you go to the field, there is the CLART app which gives the geo-morphology and land use of a particular site. We are now working with the organisation that developed CLART and are integrating our Climate data into it. We're are very excited that once we are able to do this, details like the land use, geomorphology, climate data, the section of work, and the design for it will be available to MGNREGA functionaries. They will also be able to estimate how much the asset is going to cost.*

- Sriparna Iyer, IPE

Finally, as part of MGNREGA, 84.36% of the public works assets have been geo-tagged against total work completed as of August 2018. The process of geo-tagging was undertaken under the scheme to ensure the elimination of 'hoax' assets. However, ICRG, which has also been geo tagging its climate resilient works, sees the potential in using this data in its monitoring process.

Upskilling local technical personnel

As noted earlier, a key step in mainstreaming ICRG in MGNREGA's planning has been working closely with policymakers to include climate change in key documents and planning processes. A parallel, and equally critical exercise has been the training of the MGNREGA project workers such as district and block level engineers as well as the community 'barefoot engineers' to incorporate climate considerations in decision specifications of the assets built.

Training materials have been developed to build expertise of stakeholders at all levels and this has been a gradual, sustained process. In the first year, the ICRG team conducted training of key government staff, community-based organisations, and technical personnel. From the second year, the State Institute of Rural Development had built capacity to conduct the training on their own, based on available training manuals. According to the latest available data, the ICRG has influenced 448 village councils to adopt the approach of using future changes in rainfall, climate extremes, and socio-economic vulnerability of people due to climate change in prioritizing infrastructure.

Operate and maintain

Operations and maintenance and measuring asset productivity

One of the challenges of the MGNREGA programme is that it does not have a specific provision for operations and maintenance of the public works built, since it was conceived to focus primarily on employment generation. Works are maintained indirectly as there is a stipulation to refurbish old works after three years, but as a new structural intervention. The ICRG programme however provides design specifications for more durable assets, designed to last between 10-20 years and these demonstration projects are evaluated by third parties to ensure specifications are being met from a planning and civil engineering perspective.

Aligned to the conversation on managing assets is an evaluation of its benefits. ICRG has developed a framework for outcome level monitoring, aimed at measuring asset productivity and durability as a means to generate evidence on the value of climate resilient infrastructure.

The data gathered from this framework is still being processed, however, the latest Annual Master Circular (AMC) incorporates a monitoring and evaluation framework for the first time. While the ICRG programme is keen to incorporate the monitoring and evaluation framework in its training programmes, this has yet to happen.

Meet the end-user

MGNREGA, is designed to focus on delivering social protection to the most vulnerable communities in rural India, the poorest in

> *"The Ministry of Rural Development is under permanent pressure to release MGNREGA money to states. One the funds are disbursed, then it is classified at 'utilised,' so the process is not focused on what has been actually achieved. The current governance process has its challenges. ICRG has made a positive contribution in better site section, better asset selection and design specs. But to pinpoint specific climate resilience impacts, we developed a Monitoring and Evaluation (M&E) framework focused on variables such as asset durability, water retention, green cover, asset productivity etc. Some of these are being measured through proxy indicators. We expect to complete third round of data collection in the fall of 2019. We're trying to map if there has been improvement under each of these variables. So far we have relied on physical measurements and farmer surveys.*
>
> - Sriparna Iyer, IPE

villages, people from classes and tribes who are often on the margins of the mainstream labour market, as well as women-headed households. ICRG has been designed to offer these communities additional livelihood benefits through the creation of climate resilient works. Many of beneficiaries have also reported additional incomes as a result of the assets built.

While some of the beneficiaries' own land and receive benefits in terms of additional crops or plantations, landless labourers receive benefits from community sharing structures such as goat-sheds built on public land.

In the future: improvements and innovation

In its current form, ICRG is a pilot project with a finite timeline and funding, and a defined geographical scope in three states. A critical component in ensuring the continuity of the exercise is mainstreaming resilient infrastructure principles in the functioning of MGNREGA across the country.

In terms of scaling up, DFID is extending its four-year pilot project by another four years with a potential focus on three new states, Rajasthan, Madhya Pradesh, and Uttar Pradesh, collectively known as the Bundelkhand region.[1] Work may continue in parallel in three of the existing states as well.

There are efforts to bring improvements to the second phase of the ICRG project based on an evaluation of the first pilot exercise. IIED has been brought in to focus on improvements and innovation in three areas: climate data use, better integration between assets, and accessing finance.

One area of focus is to introduce decision-making under uncertainty in the selection of works by building the capacity of local MGNREGA staff to interpret this data and make decisions. This would be a shift from the current asset selection approach where the ICRG team, based on their interpretation of the climate and socio-economic data, offers communities a menu of assets to select from.

Currently assets under MGNREGA are built as standalone structures. IIED is examining how the assets together can offer ecosystem services for integrated water resource management by layering different types of assets together. For instance, if a water storage infrastructure is built downstream, it is strategically combined with afforestation activities upstream.

> *"In terms of the actual nature of asset design, location and implementation, IPE is doing most of the work there. IIED, on its part, looking at how climate change information can be used effectively to inform robust decision-making. We're not focused on averages based on historical and future projections but specifically uncertainty within future projections. This is an institutional issue; the Indian met departments prescribe averages. But we realise the need for long range forecast and uncertainty in planning so we have a clearer understanding of what the extremes may be to better guide the design and capacity of assets.*
>
> - Simon Addison, IIED

[1] *This is a region particularly vulnerable to high temperatures and water deficits.*

Ongoing challenges for ICRG

- MGNREGA, despite being one of the world's largest social protection programmes, also grapples with issues of relatively low wage rates, including the challenges of inclusivity of the lowest classes, and rent seeking. As the ICRG project builds on the MGNREGA scheme, it also faces these issues.
- The success of ICRG is dependent to an extent on interested and motivated policy makers and champions at the national and state levels. As a result, ICRG has fared relatively better in Odisha and Chhattisgarh compared to Bihar. Going forward, any success on the project in other geographies will also be context specific.
- MGNRGA's budgetary cycle is currently not aligned to provide wages during the seasons that communities need it most, thereby resilience can be further built through better planning on the timing of the wages.
- Under ICRG, the interpretation of climate data and selection of assets is being carried out by the technical project team rather than village councils. There is a need to build further capacity on the ground to translate climate data and align immediate local socio-economic considerations with decision-making under uncertainty.

Thus far ICRG has focused on using climate data for asset selection and design. In its next phase another consideration is to work with the ministry of rural development to align the quantity and timing of the wages in line with projected climate impacts.

The ICRG programme is ultimately aligned to prioritise processes encapsulated in the MGNREGA act. The current government has used MGNREGA as a way of fulfilling its national development targets; be it building rural homes, building rural roads, or building toilets. ICRG has specifically depended on the fund allocation by the Ministry of Rural Development for building natural resource infrastructure, specifically for water capture and conservation. With the government's latest target to link MGNREGA with its water conservation mission, ***Jal Shakti Abhiyaan***, the ICRG programme may find greater acceptance in its second phase.

> *"Currently MGNREGA provides a safety net to seasonal shocks, however the constraints of MGNRGA's budgetary cycle is that the wage transfer does not happen at the time that communities need it the most. We're also working on the concept of shock-responsive cash transfer, so introducing two layers of wages. this is at the conceptual stage and may integrate into phase 2. We will have discussions with states over next few months on it.*

- Simon Addison, IIED

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