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Building resilience to climate change

MGNREGS, drought and flooding in Odisha

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Acknowledgements

The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) is one of India's flagship social protection programmes. This paper is part of a series of briefings that analyse how MGNREGS builds the resilience of rural households to different climate shocks. The goal of the series is to identify options for Indian policymakers to integrate climate risk management into MGNREGS. These findings can also provide global policymakers with evidence on how to mainstream climate risk management into social protection programmes, or combine and layer social protection instruments with climate risk management instruments to address poverty in the context of climate change.

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Summary

Despite progress in reducing poverty across the globe, the rising challenge of climate change could reverse development gains, reinforce structural barriers to development and push people back into poverty. To create more lasting development solutions for the rural poor, policymakers need to address the multifaceted risks posed by social and economic exclusion and climate change.

Social protection and climate change instruments aim to support inclusive and climate-resilient development, respectively. The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) is one of India's flagship social protection programmes and its beneficiaries are among the most climate-vulnerable people in India. But as well as helping poor households cope with poverty and marginalisation, such schemes can help poor and vulnerable households build resilience to the impacts of climate change (Agrawal *et al.* 2017).

This paper is one in a series of briefings that analyse how MGNREGS builds rural households' resilience to different climate shocks. In this paper, we examine how MGNREGS is helping households in Mayurbhanj District, Odisha build resilience through convergence with other government departments to help households develop new horticulture livelihoods that strengthen rural livelihoods and improve productivity in the face of drought and flooding.

The goal of the series is to identify options for Indian policymakers to integrate climate risk management into MGNREGS. More broadly, our findings also provide evidence for global policymakers on how to mainstream climate risk management into social protection programmes, or converge and layer social protection and climate risk management instruments to address poverty in the context of climate change.

Analytical framework

Our analysis is based on a theory of change that identifies how MGNREGS interventions can lead to changes in five livelihood capitals, building household resilience to climate change so they can address complex risks and take advantage of new opportunities.

What are livelihood capitals?

Poverty is not just a lack of income. People rely on a combination of **livelihood capitals** to build sustainable livelihoods:

- **Natural capital**: value in natural resources to produce goods and services

- **Physical capital**: value from infrastructure that contributes to the production process

- **Human capital**: value from skills training, good health, knowledge and motivation

- **Social capital**: value from social networks and institutions that help people improve their social status, maintain and develop human capital, and

- **Financial capital**: value from income, assets and consumption patterns.

What are resilience outcomes?

Resilience outcomes are the changes in a households' ability to respond to climate hazards as a result of changes in their livelihood capitals. Our analysis is based on three types of resilience:

- **Absorptive** resilience: a system's ability to maintain its original structure by absorbing infrequent and low-magnitude risks

- **Adaptive** resilience: a system's ability to improve its original structure to manage future risks and bounce back better when shocks occur, and

- **Transformative** resilience: a system's ability to fundamentally change its structure to move beyond vulnerability thresholds.

Main findings

Pathways to household resilience

MGNREGS can improve the capacity of households in Mayurbhanj to absorb, adapt or transform in the face of increasing climate risk. Our analysis and policy recommendations are based on a triangulation of evidence from: a review of global and national literature on social protection and climate resilience; secondary data on MGNREGS and climate trends; and primary data from focus group discussions, key person interviews and a survey of 150 households in four communities.

Four MGNREGS interventions can improve the capacity of households to change their livelihood capitals to absorb, adapt or transform to address climate-induced hazards and opportunities:

• **Guaranteed wages** improve household consumption, and are most strongly linked with absorptive – and to a lesser extent, adaptive or transformational – resilience.

• **Institutional strengthening** – through the creation of rural cooperatives – is overwhelmingly linked to adaptive resilience through its contribution to changes in human, social, physical and financial capital.

• **Infrastructure investment** in horticulture plantations and processing equipment builds physical and social capital and is most strongly linked to adaptive resilience.

• **Skills development** to develop new businesses (with value-added processing and marketing support) was particularly important in building livelihood capitals that lead to adaptive resilience.

MGNREGS instruments play a significant role in building resilience to drought and flooding in Odisha. Although individually important in supporting different resilience outcomes, a **combination of MGNREGS instruments** is essential for households to build adaptive or transformative resilience

Livelihood capital contribution to resilience outcomes

Changes in a **combination of livelihood capitals** are important for delivering adaptive and transformative resilience in Mayurbhanj. MGNREGS helps boost natural capital by creating private mango, cashew, guava and rubber plantations. District Supply and Marketing Society (DSMS) builds social capital by helping MGNREGS beneficiaries establish cooperative institutions that support their new horticulture livelihoods. DSMS also provides physical capital in the form of storage and processing machinery that can help cooperatives add value to their products, and provides skills training which builds human capital. Cumulatively, these interventions help MGNREGS beneficiaries improve their financial capital by increasing their sales of agricultural products. Improvements in a combination of livelihood capitals have helped many beneficiaries build adaptive or transformative resilience.

Resilience outcomes

Absorptive resilience: More than 20 per cent of our survey respondents have improved their capacity to absorb the impact of drought and flooding as a result of MGNREGS, with guaranteed wages most likely to deliver absorptive resilience. This highlights the important safety net function MGNREGS wages play in helping households maintain their wellbeing despite the impacts of flooding and drought. But a significant number of households are either not participating in convergence initiatives or have seen no increase in wellbeing that would help them build adaptive resilience or transformative resilience.

Adaptive resilience: Just over 25 per cent of survey respondents have built adaptive resilience through MGNREGS. Respondents strongly linked convergence interventions – institutional strengthening, infrastructure investment and skills training – that led to new horticulture livelihoods with increased wellbeing and reduced sensitivity to climate hazards.

Transformative resilience: Fifteen per cent of survey respondents have built transformative resilience as a result of MGNREGS. We observed two distinct patterns among these households. Nearly half benefited from convergence between MGNREGS and Odisha Livelihood Mission (OLM) to create new horticulture livelihoods and businesses that are less sensitive to drought. The other 50 per cent were from flood-prone communities that benefited from neither convergence nor flood protection infrastructure, a surprising finding that suggests the need for further analysis.

Decline in resilience: Nearly 15 per cent of households reported a decline in wellbeing due to climate hazards, despite participating in MGNREGS. This decline in resilience indicates that MGNREGS is not addressing the underlying sensitivity of some households to climate hazards.

Local economy and ecosystem services

The impact of MGNREGS extends beyond the household into the local economy by improving wages and skills in the rural labour market and increasing the number of rural enterprises. Eighty-five per cent of household survey respondents report that MGNREGS convergence has increased the number of rural enterprises. MGNREGS has also led to improvements in ecosystems services, with 90 per cent reporting improvements in agricultural production, 85 per cent increased crop diversity and 40 per cent increased irrigation and availability of agricultural land. Improved ecosystems services have helped many households in Mayurbhanj maintain, improve or transform their livelihoods in the face of droughts and flooding.

POLICY RECOMMENDATIONS

1. **Delivering a combination of MGNREGS interventions** will build and sustain the resilience of households over time.

2. **Integrating climate risk management into MGNREGS** through climate-resilient wages, infrastructure, institutions and skills will climate-proof MGNREGS and ensure the scheme can help households build absorptive, adaptive and transformative resilience.

3. **Converging MGNREGS with other initiatives and programmes that support climate risk management** can help programme implementers spread the financial and delivery costs of resilience activities and build more resilient households and communities.

4. **Ensuring that MGNREGS interventions at household-level promote spillover benefits to the local economy and improve ecosystems services** will help create more resilient communities.

Introduction
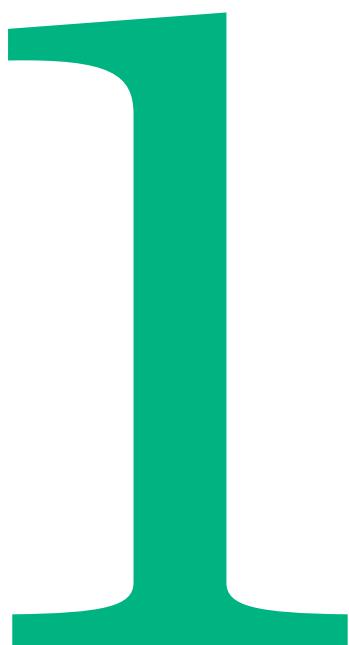
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The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) is one of India's flagship social protection programmes. Under the scheme, all rural households are entitled to 100 days' guaranteed wage employment as unskilled labourers building different types of rural infrastructure. More than a decade has passed since MGNREGS was launched. Since its inception, the scheme's objectives have expanded to include improving the durability and sustainability of rural infrastructure, strengthening rural institutions and skilling the rural labour force.

During this same period, climate change has risen up the global development agenda as the evidence base has made it increasingly clear that the rural poor in developing countries will be most adversely affected by climate change (IPCC 2014; Sen 1999). Although there have been significant achievements in reducing poverty across the globe, the increased frequency and intensity of extreme weather events and long-term changes in weather patterns associated with climate change will exacerbate the shocks already faced by poor households in developing countries and reinforce the underlying drivers of poverty (IPCC 2014; Reddy *et al.* 2014; Hallegatte *et al.* 2016). When exposed to increasingly frequent and high-magnitude risks, social, economic and ecological systems will therefore need to absorb, adapt and transform to successfully deal with change.

Social protection programmes like MGNREGS are already helping households and communities cope with poverty and marginalisation. But they can also play a central role in helping households and the local economy absorb the effects of climate risk, adapt to climate impacts and transform their ability to address escalating and future climate stresses (Agrawal *et al.* 2017). With high rates of poverty and livelihoods that are based predominantly on changing natural systems, MGNREGS beneficiaries are among the most climate-vulnerable people in India. But to date, there has been no systematic attempt to understand the scheme's contribution to building the capacity of rural Indian households to address climate change risks and impacts.

This paper is part of a series of four state briefings that, along with a meta-analysis of social protection and climate resilience in India, aim to fill this evidence gap. The goals of the series are to analyse how MGNREGS builds the resilience of vulnerable women and men to different climate shocks and identify options for Indian policymakers to integrate climate risk management into MGNREGS. More broadly, these briefings also aim to document options for a global policymaking audience on how to mainstream climate risk management into the provision of social protection, or combine and layer social protection instruments with climate risk management instruments to address poverty in the context of increasing climate risk.

The papers draw on field research into MGNREGS and specific climate-related shocks in different states: cyclones in Andhra Pradesh, drought in Jharkhand, flooding and drought in Odisha and winter drought in Sikkim. This paper documents how MGNREGS is helping households in Mayurbhanj District, Odisha build resilience to drought and flooding.

Using an analytical framework, we collected data to understand which resilience pathways were responsible for delivering specific resilience outcomes in a particular context in each state. In this paper, all the evidence we present is relevant to drought and flooding in Mayurbhanj District only. We used a mixed methodology approach, triangulating primary evidence from: primary data collection in the form of focus group discussions, key person interviews with MGNREGS officials and beneficiaries and a household survey of 150 beneficiary families; secondary data analysis of MGNREGS and climate data; and a review of global and national literature on MGNREGS, social protection and climate resilience. For a more detailed overview of our methodology, see Kaur *et al.* (2017a).

Analytical framework

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This paper focuses on how four MGNREGS interventions – guaranteed wages, rural infrastructure, institutional strengthening and skills development – enable households to change their livelihood capitals to absorb, adapt and transform to address climate-induced hazards and opportunities.

2.1 Theory of change model

To understand MGNREGS' contribution to resilience, we used a theory of change that identifies the key pathways associated with absorptive, adaptive and transformative resilience. Figure 1 presents an overview of our theory of change for how MGNREGS builds resilience to climate change. Our theory of change is based on the 'context, mechanism and outcome' framework, derived from realist evaluation methods (Pawson and Tilley 2004), which is discussed below.

2.1.1 Context

'Context' refers to the contextual factors that shape responses to MGNREGS interventions. In this framework, the key contextual factors are a household's exposure and sensitivity to slow and rapid-onset hazards: droughts in Sikkim, Jharkhand and Odisha;

floods in Odisha and cyclones in Andhra Pradesh. In this study, we focus on the exposure and sensitivity of households in Mayurbhanj District, Odisha to flooding and drought.

2.1.2 Mechanism

'Mechanism' refers to the **four MGNREGS programme instruments** discussed below that enable households to change their **five livelihood capitals** to absorb, adapt and transform to address climate-induced hazards and opportunities. These are delivered through MGNREGS alone or in convergence with other government schemes and programmes.

100 days' guaranteed wages: MGNREGS guarantees the provision of up to 100 days' work in rural areas to every household whose adult members volunteer to do unskilled work. In drought-hit states, households can demand 150 days of work. Job card holders can demand wage labour when other sources of income are undermined by climate hazards, making it an implicitly climate-responsive instrument. Households often use income from MGNREGS wages to supplement other sources of income and smooth consumption gaps.

Figure 1: Analytical framework on how MGNREGS contributes to resilience
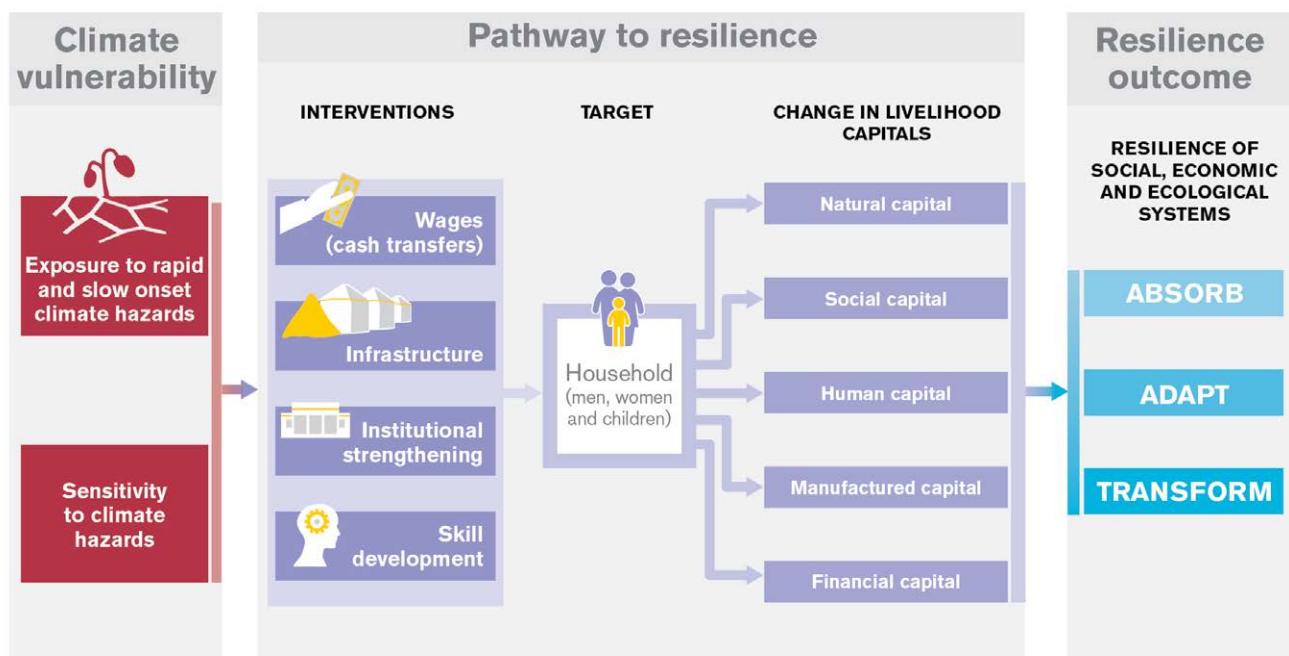
Creation of individual or public assets: MGNREGS builds public and private rural infrastructure to support long-term livelihood strategies and strengthen the local economy (GoI 2017). This includes infrastructure for:

- Natural resource management: building new flood control structures, planting trees to rehabilitate canal or stream banks and degraded common lands and check-dams to reduce floods and improve water retention

- Agriculture-based livelihoods: irrigation channels, livestock shelters and water and grain storage structures, and

- Non-agriculture-based livelihood activities: sanitation facilities, roads, footpaths and buildings for community use.

Institutional strengthening: MGNREGS strengthens rural institutions to empower rural households and improve programme delivery by:

- Enabling rural households to participate in local governance bodies – such as the village-level *gram sabah* – particularly to make decisions around the allocation of MGNREGS labour and selection of MGNREGS infrastructure

- Improving rural access to formal banking by linking MGNREGS job card holders to banks and digitising all payments

- Strengthening community institutions such as producer groups, and

- Creating market linkages by converging with other programmes, such as the National Rural Livelihoods Mission.

Skills upgrading: MGNREGS aims to contribute to the transformation of the rural labour market by providing training for unskilled wage labourers, self-employment and upgrading livelihoods. This is a new component under MGNREGS and is being implemented under the Project for Livelihoods in Full Employment (Project LIFE).

In our study, we assessed whether the four MGNREGS instruments enabled households to positively change their **livelihood capitals** to absorb, adapt or transform to address the impacts of climate change. We focus on how changes in five livelihood capitals – natural, physical, human, social and financial (see Box 1 below) – serve to link a household's wellbeing with their climate response strategies (Porritt 2007).

BOX 1. WHAT ARE LIVELIHOOD CAPITALS?

Poverty is not just a lack of income. People rely on a **combination** of **capital assets** to build sustainable livelihoods, particularly:

- **Natural capital**: value that resides in natural resources to produce goods and services

- **Physical capital**: value derived from durable and non-durable infrastructure, which contributes to the production process

- **Human capital**: value derived from skills training, consisting of people's health, skills, knowledge and motivation

- **Social capital**: value derived from social networks and institutions that improve people's social status and help them maintain and develop human capital in partnership with others, and

- **Financial capital**: value derived from income sources, assets and consumption patterns, which enables households to own or trade other capitals.

2.1.3 Resilience outcomes

Resilience outcome refers to changes in households' ability to respond to climate hazards as a result of changes in the five capitals. Three aspects of resilience outcomes are central to our analysis:

- **Absorptive resilience**: the ability of social, economic and ecological systems to maintain their original structure by absorbing infrequent and low-magnitude risks

- **Adaptive resilience**: the ability of social, economic and ecological systems to improve their original structure to manage future risks and bounce back better when shocks occur, and

- **Transformative resilience**: the ability of social, economic and ecological systems to fundamentally change their structure to move beyond vulnerability thresholds.

MGNREGS in Odisha

3

3.1 Background on MGNREGS in Mayurbhanj

Fieldwork for our study on MGNREGS and resilience in Odisha took place in Mayurbhanj District. Mayurbhanj is a predominantly rural district in the northeast of Odisha, where 92 per cent of the population lives in rural areas and at least two-thirds of the labour force works in the agricultural sector (19.5 per cent work mainly as cultivators and 46.5 per cent as agricultural labourers). Nearly 60 per cent of the population come from scheduled tribes and seven per cent from scheduled castes (GoI 2011). Mayurbhanj is listed as one of India's 100 most 'backward' districts (Bakshi *et al.* 2015).

Mayurbhanj has been implementing MGNREGS since the scheme was launched in 200 districts in 2006. Over the past five years, the number of households and individuals employed under MGNREGS has steadily increased to 372,000 people in 2016/17 (Table 1). During this same period, the number of assets has increased fivefold, driven by an increase in public works related to natural resource management, individual assets for vulnerable groups and investment in rural infrastructure.

3.2 MGNREGS convergence initiatives in Mayurbhanj

One of MGNREGS' most significant accomplishments in Mayurbhanj over the past five years has been its success in fostering convergence between MGNREGS and other government departments and schemes in the district. Convergence has centred on initiatives that help households develop new horticulture livelihoods to strengthen rural livelihoods and improve rural productivity. A number of agencies have been involved in various roles to deliver convergence in Mayurbhanj:

- **Panchayati Raj and Drinking Water Department**:[1] Responsible for delivering MGNREGS in Odisha, provides guaranteed wages and materials to create horticulture assets – including mango, cashew, guava and rubber plantations – for MGNREGS job card holders.

Table 1: MGNREGS implementation in Mayurbhanj 2012–2017

	2012/13	2013/14	2014/15	2015/16	2016/17
Total expenditure (rupees, billions)	1.08	2.21	1.82	3.43	3.49
Total expenditure (US$ millions*)	19.4	36.1	30	53.5	52.2
Total households worked (millions)	1.54	2.02	1.76	2.26	2.30
Total individuals worked (millions)	2.58	2.99	2.65	3.69	3.72
Average wage rate per day/person (rupees)	126	143	164	195	174
Average wage rate per day/person (US$*)	2.27	2.34	2.7	3.04	2.6
Average days employed per household	37.73	57.85	44.14	59.93	47.39
Total number of households completed 100 days of wage employment	N/A	39,260	18,230	46,968	6,051
Women person days (%)	38.07	37.51	37.84	41.22	42.67
Scheduled caste person days (%)	14.11	12.96	12.86	12.49	12.00
Scheduled tribe person days (%)	57.74	58.72	58.09	57.67	56.80
Number of assets created	4,789	5,580	2,179	18,952	26,873

* Converted using rate of 1 August of the earlier year in each column

Source: MGNREGA. See http://mnregaweb4.nic.in/netnrega/all_lvl_details_dashboard_new.aspx

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[1] See www.odishapanchayat.gov.in/English/index.html for more information on this government department.

- **Odisha Livelihood Mission** (OLM)[2] **District Supply and Marketing Society** (DSMS):

  - Supports the creation and management of cooperative businesses and institutions to support new horticulture livelihoods – for example, producer groups to manage the production and supply of horticulture produce; producer societies to process commodities such as rubber; and producer companies to create market linkages with buyers outside the district

  - Provides infrastructure to help members of these institutions add value to their products: greenhouses, storage and processing buildings for the Mayurbhanj Fruit and Vegetable Producer Company; drip irrigation technology for cashew plantations; and rubber processing buildings and machinery for rubber producer societies.

  - Offers opportunities for skills training in planting, pitting, maintenance, business management and sabai weaving: including field visits to processing and packaging facilities, and

  - Operates shops in Baripada and Bhubaneswar to sell and distribute sabai handicrafts on behalf of sabai cooperatives.

- **Department of Horticulture**: Provides technical training on horticulture techniques to MGNREGS beneficiaries and physical infrastructure such as grading chambers, packaging centres, storage facilities, tree nurseries and processing centres free of charge to producer companies.

- **Department of Agriculture**: Subsidises the construction of bore wells for irrigating vegetable and horticulture plantations. Materials account for about 85 per cent of the cost of bore wells. MGNREGS covers a maximum of 40 per cent of these costs. The Department of Agriculture provides another 45 per cent.

- **Integrated Tribal Development Authority** (ITDA): Supports scheduled tribe communities and MGNREGS job card holders to develop rubber plantations and processing facilities.

Mayurbhanj's convergence initiatives are an important example of how MGNREGS can support skill development for MGNREGS job card holders and improve rural livelihoods through institutional strengthening and coordination. See Section 5 for an analysis of how convergence contributes to improved development outcomes and climate resilience.

3.3 Site selection

Our research on MGNREGS and resilience to drought and flooding in Mayurbhanj draws on key person interviews, focus group discussions and a household surveys conducted in four blocks in the district. We chose the sites for our research to cover exposure to different climate hazards (drought and flooding) and different levels of participation in convergence initiatives (beneficiaries of rubber, cashew and guava plantations; beneficiaries of sabai handicraft training; or no participation in convergence). We selected the following sites for our analysis:

1. Badasahi block

Active MGNREGS job card holders: 16,663
Active workers: 28,239 (15 per cent scheduled caste; 42 per cent scheduled tribe)
Research sites: Jadunathpur and Puma Charanpur *gram panchayats*, where households are exposed to drought and have benefited from MGNREGS and ITDA rubber plantations.

2. Betnoti block

Active MGNREGS job card holders: 10,933
Active workers: 17,775 (16 per cent scheduled caste; 26 per cent scheduled tribe)
Research site: Patliputra *gram panchayat*, where households are affected by flooding and have not receive OLM support to develop horticulture plantations.

3. Morada block

Active MGNREGS job card holders: 13,349
Active workers: 20,056 (11 per cent scheduled caste; 37 per cent scheduled tribe)
Research site: Gadigang *gram panchayat*, where households are affected by drought.
Respondents: Households that had received guava, cashew and mango plantations as well as OLM training, marketing and distribution support.

4. Suliapada block

Active MGNREGS job card holders: 13,724
Active workers: 22,282 (8 per cent scheduled caste; 39 per cent scheduled tribe)
Research site: Kujidihi *gram panchayat*, where households are affected by drought and involved in producing sabai handicrafts. Sabai handicraft producers receive training, marketing and distribution support from OLM.

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[2] OLM is the nodal agency for delivering the National Rural Livelihood Mission – a government initiative that to help the rural poor increase household income through sustainable livelihood enhancements and improved access to financial services – in Odisha. See www.aajeevika.gov.in for more information.

Climate vulnerability in Odisha

4

4.1 Exposure to climate-induced hazards

Odisha is exposed to several climate hazards, including flooding, cyclones and drought. With 480km of coastline, an extensive network of rivers with high rates of siltation, and 80 per cent of annual rainfall concentrated in a narrow three-month period, Odisha is particularly prone to flooding. Flooding affects both coastal districts and those inland adjacent to rivers. The state has experienced several severe floods over the past 30 years, notably in 1980, 1982, 2001, 2003, 2006, 2007, 2008 and 2011. Flooding between 2006 and 2008 affected 6.7 million, 7.8 million and 6 million people respectively, damaging over 500,000 houses and leading to the loss of at least 300 lives (GoO 2010; GoO 2016b).

The frequency, intensity and extent of drought in Odisha is also gradually increasing (GoO 2016b). Western Odisha is prone to moderate drought every two years and a major drought every five or six years (GoO 2010). The impact of drought is predominantly felt by rural communities working in agriculture who have less access to arable land, irrigation and drinking water as a result of drought.

Mayurbhanj District is exposed to both drought and flooding. On average, the district is affected by a drought every three years; low-lying communities adjacent to rivers in one municipality and 11 blocks are affected by flooding every second year. Since 2004, drought has become increasingly frequent in Mayurbhanj. The district experienced drought in 2009, 2010, 2012 and 2016, leading to crop loss and a scarcity of drinking water (GoO 2016a).

4.2 Sensitivity to climate hazards

Odisha's physical exposure to climate hazards such as drought and flooding is compounded by high sensitivity to these hazards. Climate sensitivity can be shaped by underlying conditions such as: household income, assets or capabilities; the strength of governance and institutions; economic conditions; or issues of social inclusion based on, for example, gender, caste, religion or ethnicity. All these factors can enable or constrain responses to climate hazards.

To understand how sensitive households are to climate exposure, we conducted a household survey among MGNREGS job card holders in our four study sites in Mayurbhanj in March 2017. We supplemented this survey with key person interviews and focus group discussions with MGNREGS officials and beneficiaries. The sites we selected for interviews and surveys

covered communities in three blocks that are exposed to drought (Badasahi, Morada and Suliapada) and one exposed to flooding (Betnoti) (see Section 3.3 for more information on these sites). Our household survey collected data on:

- Household income
- Consumption
- Asset ownership
- Capabilities, including the ability to make informed decisions (based on education and technical knowledge) and to participate effectively in local decision making.

BOX 2. HOUSEHOLD WELLBEING IN MAYURBHANJ

- 93 per cent have a per capita daily income below the official poverty line
- 90 per cent are active MGNREGS job card holders
- 14 per cent have family members who migrate seasonally for work
- 5 per cent did not consume enough food for a period of time during the previous year
- 16 per cent are landless
- 73 per cent have formal schooling
- 60 per cent report high or medium participation in local governance bodies such as the village-level *gram sabah* meetings and so influence decisions around MGNREGS resource allocation and delivery, and
- 53 per cent have technical knowledge – for example, they know how to select and maintain MGNREGS infrastructure, operate a bank account and agricultural production techniques.

Source: Household survey, Mayurbhanj (March 2017)

Based on the survey responses, we constructed a composite household wellbeing index that classified sampled households into low, medium and high wellbeing categories (see Kaur *et al.* 2017a for more details on this process). We found that only 4 per cent of sampled households cent have low levels of household wellbeing, 52 per cent are in the medium wellbeing category and 44 per cent have high levels of wellbeing. Since participation in MGNREGS is self-targeting for those who need income support at some period of the year, all households within this sample are likely to have lower incomes, assets, education, skills and capabilities than the general population. So, with most households below the poverty line, our aim

Figure 2: Household wellbeing in Mayurbhanj

Source: Household survey, Mayurbhanj (March 2017)
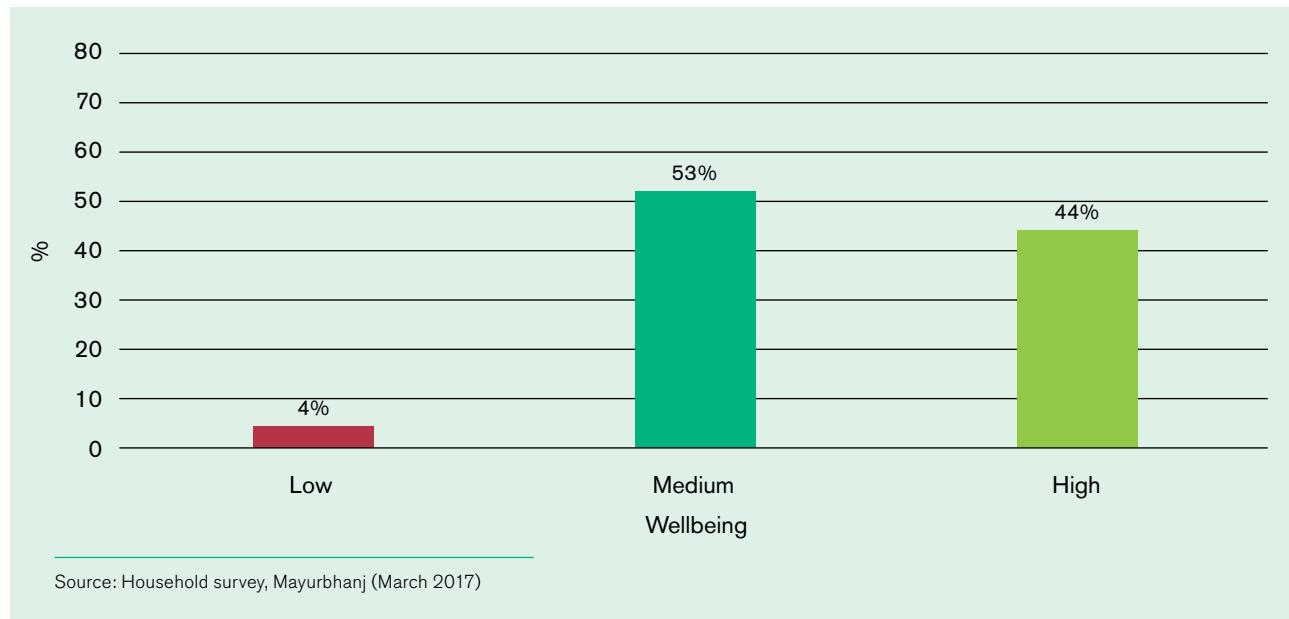
was to differentiate our findings (where possible) on MGNREGS contribution to resilience by household wellbeing categories.

4.3 Climate change impacts

Our household survey also aimed to understand how climate change has impacted various elements of household wellbeing (including income, assets, education, skills, capabilities and decision-making power), public infrastructure and ecosystem services. Seventy percent of respondents reported a decline

in wellbeing as a result of either drought or flooding (Figure 3). These impacts are consistent across all households in our survey. There was no variation in response by households in different wellbeing categories, or between male and female survey respondents. Given that over 90 per cent of sampled households are below the poverty line, and that Mayurbhanj's economy is based on rural employment in the agriculture sector, the high impacts reported by household survey respondents can be attributed to the fact that their livelihoods remain highly sensitive to climate-related impacts.

Figure 3: Impact of drought and flooding on household wellbeing in Mayurbhanj

Source: Household survey, Mayurbhanj (March 2017)
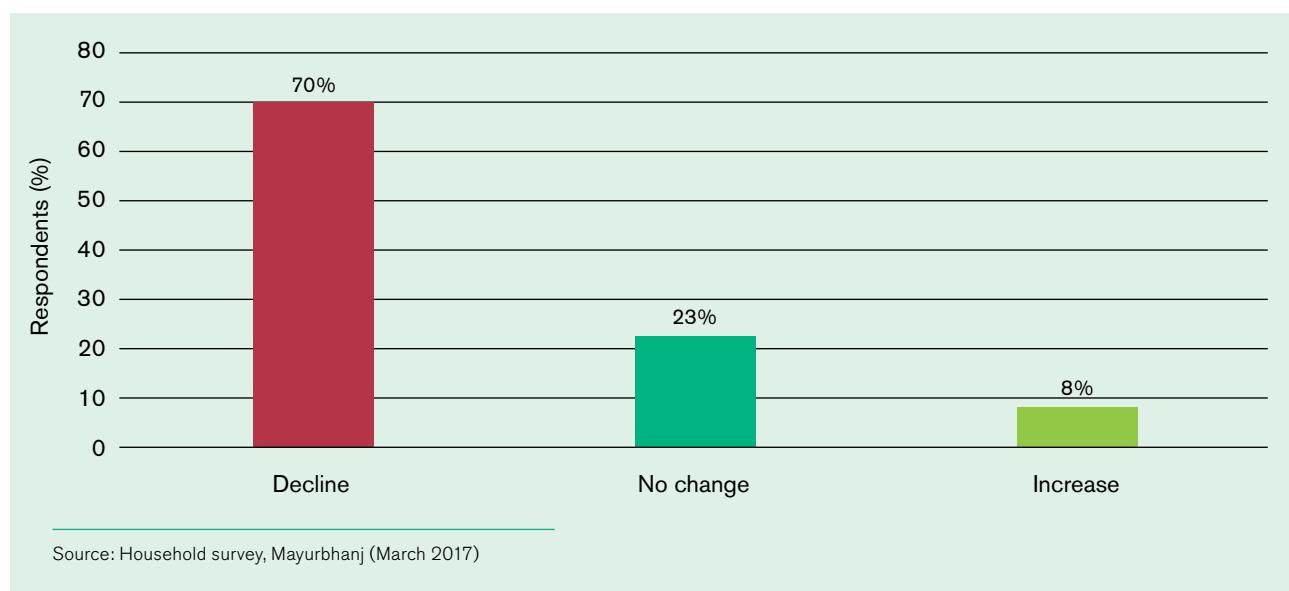
As well as impacting their own household wellbeing, a significant number of respondents reported damage to community infrastructure as a result of drought and flooding, with 45 per cent reporting damage to schools and more than 30 per cent reporting damage to health centres, community buildings and roads (Figure 4). Surprisingly, drought-affected communities were 10–20 per cent more likely to report damage to community infrastructure than flood-affected communities, where we expected physical damage to be higher based on interviews with MGNREGS officials in Betnoti, who reported high damage in the block when floods occur.

Drought and flooding have also led to a decline in ecosystem services in Mayurbhanj. Nearly half of our survey respondents in all four blocks reported a decline in agricultural land, water availability, forestry products and fishery output as a result of climate hazards (Figure 5). One of the explanations for this decline may be the high sensitivity of respondents to the drought that hit Mayurbhanj in 2016. Despite the fact that two-thirds of the labour force work in the agricultural sector, only 23 per cent of the district's net sown area is irrigated, so most households rely on monsoon rains to ensure a living (GoO 2016a). It is likely that the 2016 drought led to a decline in water and other critical ecosystems services for climate-sensitive households in our survey who do not have access to irrigation facilities.

Figure 4: Impact of drought or flooding on community infrastructure in Mayurbhanj

Source: Household survey, Mayurbhanj (March 2017)
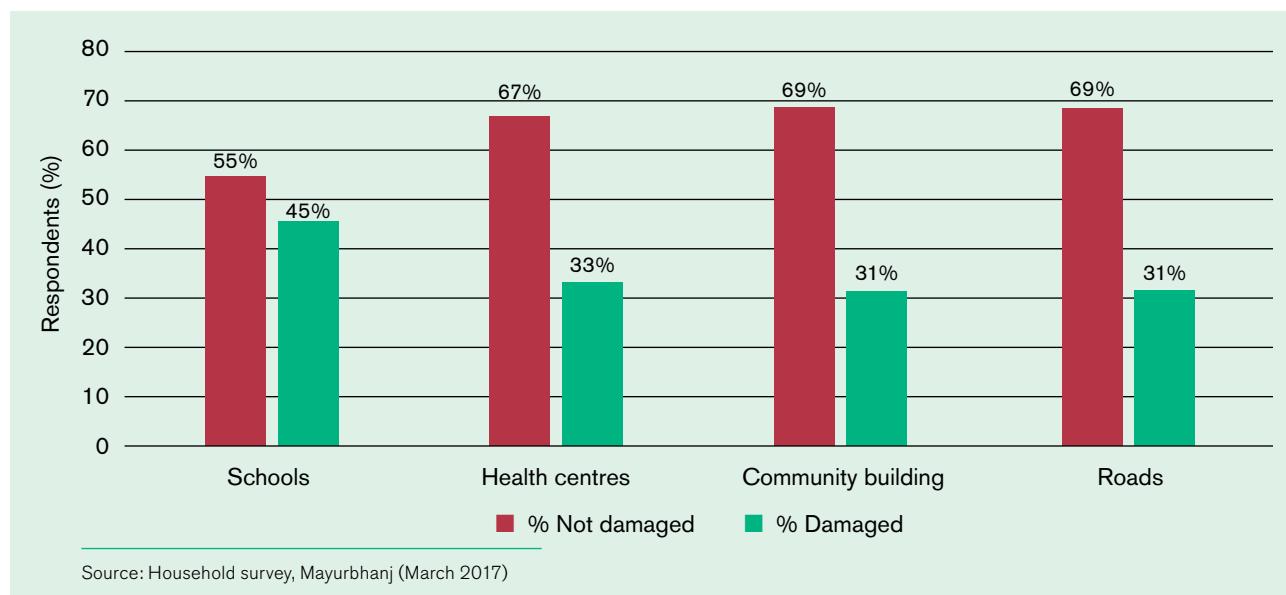
Figure 5: Impact of drought or flooding on ecosystem services in Mayurbhanj

Source: Household survey, Mayurbhanj (March 2017)
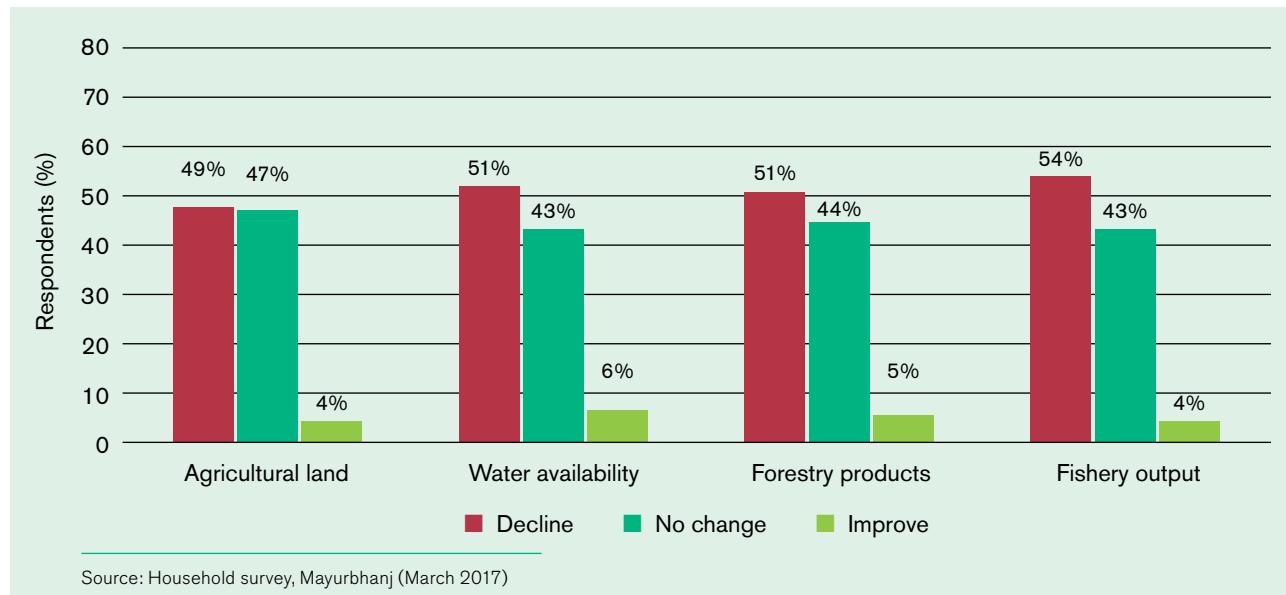
MGNREGS role in building resilience to drought and flooding in Odisha

5

Mayurbhanj is exposed to both drought and flooding. The frequency and intensity of drought has been increasing in the past decade; there have been four droughts since 2009. The district's exposure to these climate hazards is compounded by the sensitivity of its inhabitants – many of whom lack the ability to effectively manage drought or flood risk. Drought and flooding are likely to negatively impact household income, consumption, assets and capabilities and the ecosystem services households rely on, as they increase in frequency and magnitude due to climate change in the years ahead.

But MGNREGS can help reduce households' sensitivity to climate hazards through convergence initiatives that improve rural livelihoods and strengthen resilience. This section outlines our main findings on how MGNREGS can help build the resilience of households, the local economy and ecosystems to drought and flooding in Mayurbhanj.

5.1 Contribution to household resilience

MGNREGS can improve the capacity of households to absorb, adapt and transform in the face of increasing climate risk. This section brings together our analysis from interviews, focus group discussions and our household survey to outline how MGNREGS delivers different pathways to resilience at the household level. We present these findings in the format outlined in our theory of change (see Figure 1), focusing on the role of MGNREGS instruments and livelihood capitals in delivering resilience outcomes and presenting our high-level findings of how MGNREGS contributes to specific resilience outcomes in Mayurbhanj.

5.1.1 Role of MGNREGS instruments

Different MGNREGS instruments contribute in different ways to supporting household resilience in Mayurbhanj.

- **Guaranteed wages** are important in delivering absorptive resilience – and to a lesser extent, adaptive or transformational resilience. Responses highlighted that MGNREGS plays an important role in maintaining and increasing household-level consumption and income, giving some households the source of income they need to transform their livelihoods away from climate-vulnerable activities.

- **Institutional strengthening** was overwhelmingly linked to building adaptive resilience through changes in human, social, physical and financial capital. These changes in livelihood capitals were a result of: increasing household incomes beyond a threshold

where climate risk affects household wellbeing; a change in households' asset base to crops – such as rubber and mangos – that are less vulnerable to drought; and/or a change in capabilities supported by skill development. These findings highlight the important role OLM initiatives play in helping Mayurbhanj households transition their livelihoods away from climate-vulnerable activities.

- **Infrastructure investment** through MGNREGS was linked to adaptive – and to a lesser extent, absorptive – resilience. This confirms that households are benefiting from MGNREGS infrastructure through convergence with the Department of Horticulture, which is improving or maintaining their overall wellbeing.

- **Skills development** was particularly important in building livelihood capitals that led to adaptive resilience. In a small number of cases, skills development also helped households transform their livelihoods away from climate-vulnerable activities. These responses outline the added value of convergence initiatives introducing new livelihood skills to help households adapt and transform in the face of climate risk.

Interviews with MGNREGS beneficiaries and local officials indicated that **a combination and layering of MGNREGS instruments** – guaranteed wages to improve household consumption; infrastructure investment to create new horticulture plantations; skills development to grow new horticulture crops and develop businesses with value-added processing and marketing; and institutional strengthening to create producer cooperatives, fruit, vegetable and cashew producer companies and rubber producer societies – was essential for helping households improve or transform their wellbeing and therefore build adaptive or transformative resilience despite increasing climate impacts.

5.1.2 Livelihood capital contribution to resilience outcomes

Our data indicate that changes in a **combination of livelihood capitals** are important for delivering adaptive and transformative resilience in Mayurbhanj. According to interviews with MGNREGS officials in the district, the scheme helps boost natural capital by creating private assets – the mango, cashew, guava and rubber plantations.

Through convergence, DSMS builds social capital by helping MGNREGS beneficiaries establish institutions that support their new horticulture livelihoods. DSMS also provides physical capital –storage and processing

machinery – that can helps producer companies and cooperatives add value to their products, and provides skills training to build human capital.

Cumulatively, these interventions help MGNREGS beneficiaries improve their financial capital by increasing their sales of agricultural products and sabai handicrafts. Overall, it is this change in a combination of livelihood capitals that has helped many beneficiaries increase their wellbeing to build adaptive or transformative resilience.

5.1.3 Resilience outcomes

Absorptive resilience

More than 20 per cent of survey respondents in Mayurbhanj reported that they had improved their capacity to absorb the impact of drought and flooding as a result of MGNREGS.

Two-thirds of the households in the absorptive resilience category came from Betnoti or Suliapada, where households did not benefit from the construction of horticulture plantations. Though households in Suliapada did participate in sabai handicraft cooperatives, our focus group discussions found that income from these cooperatives was only enough to maintain household consumption and did not contribute to savings or investment in productive assets. Our household survey also showed that guaranteed wages were mostly likely to lead to absorptive resilience outcomes across all five capitals, and that medium-wellbeing households were more likely to achieve absorptive resilience through MGNREGS than high-wellbeing households.

Together, these findings highlight the important safety net function that MGNREGS wages plays in helping households maintain income, consumption, assets and capabilities despite the impacts of flooding and drought. In areas where convergence has not occurred, these findings show that MGNREGS can still support households to adapt to climate shocks. But they also show that households are many households. But our findings also show that a significant number of households that benefited from rubber, guava, mango or cashew plantations in Badasahi and Morada have yet to see an increase in their wellbeing that would help them build adaptive resilience or transform their livelihoods away from activities that are vulnerable to climate hazards.

Adaptive resilience

Just over 25 per cent of our survey respondents said they had built adaptive resilience by improving income, consumption, assets and capabilities. These respondents strongly linked convergence interventions – institutional strengthening, infrastructure investment and skills training – with their ability to increase their own wellbeing. This, in turn, reduced their livelihoods' sensitivity to climate hazards and helped them develop adaptive resilience.

Approximately 30 per cent of households in Badasahi, Betnoti and Morada said they had achieved adaptive resilience through MGNREGS. In Badasahi and Morada, where households have benefited from the creation of mango, cashew, guava and rubber plantations, this is consistent with expectations on the benefits of convergence between MGNREGS and OLM in the form of improved assets, skills training, processing facilities and market linkages. But the findings in Patliputra *panchayat* in Betnoti are surprising, given the lack of MGNREGS investment in flood protecting assets and horticulture that have driven adaptive resilience elsewhere. This suggests that further research is needed to understand whether this is a sampling error or if it is driven by factors not captured in our analysis

Transformative resilience

Fifteen per cent of our survey respondents said they had built transformative resilience as a result of MGNREGS. High-wellbeing households were three times more likely to report transformative resilience outcomes as a result of MGNREGS than medium-wellbeing households.

We observed two distinct patterns among the households that have achieved transformative resilience. Nearly 50 per cent were in Badasahi and Morada, where MGNREGS has helped move some households to completely new livelihoods and businesses – such as rubber and cashew processing –that are less sensitive to drought. Here, a layering of MGNREGS instruments boosted a combination of livelihood capitals to achieve transformative resilience.

The other 50 per cent were in Betnoti, where households are vulnerable to flooding and no horticulture plantations have been created. Interviews with MGNREGS officials in this block indicated that MGNREGS had not been able to help households manage flood risk, due to the high material costs associated with flood-resilient infrastructure, and the corresponding restriction on MGNREGS material cost exceeding 40 per cent of total expenditure within the District.

This discrepancy suggests we may need to be cautious with our findings on transformative resilience. It may highlight an error in our household survey sampling in Betnoti, or there may be an alternative explanation not captured in our analysis. Further research is needed to understand alternative pathways to transformative resilience in Betnoti, beyond convergence in establishing horticulture plantations.

Decline in resilience

Nearly 15 per cent of households reported a decline in wellbeing due to climate hazards, despite participating in MGNREGS. Looking at a spatial distribution of these households, we observe that half were sabai weavers in Suliapada and the other half were mango, cashew and guava plantation beneficiaries from Morada. In both cases, it seems likely that MGNREGS has not adequately helped certain households address their underlying sensitivity to specific climate hazards. This is particularly so in Suliapada, where focus group discussions highlighted that income from sabai was only enough to help households maintain existing levels of consumption. In particular, it is likely that in years of drought – such as 2016, which immediately preceded our fieldwork – their income was not enough to help households absorb the impact of climate shocks. In Morada, it could be that the plantations have not yet matured, and so have not started to deliver the changes in wellbeing that would help households build absorptive or adaptive resilience to drought.

Hybrid resilience

Nearly 25 per cent of respondent households in Mayurbhanj did not fall into a specific category of building absorptive resilience, adaptive resilience or registered a decline in resilience despite MGNREGS. We classified these as hybrid households.

5.2 Contribution to resilience in the local economy

Our study found that the impact of MGNREGS extends beyond the household into the local economy by improving wages and skills in the rural labour market and increasing the number of rural enterprises. More than 85 per cent of respondents reported that MGNREGS and OLM had helped them develop agricultural and non-agricultural enterprises and new livelihoods such as rubber processing, sabai handicraft production for external markets and mango, cashew and guava production. Another 35 per cent reported an increase in skills, and just under 35 per cent an increase in the local wage rate. These findings highlight the importance of MGNREGS convergence initiatives in promoting rural enterprise development as well as contributing to changes in household resilience.

Figure 6: Household perceptions of change in the local economy as a result of MGNREGS, despite climate impacts

Source: Household survey, Mayurbhanj (March 2017)
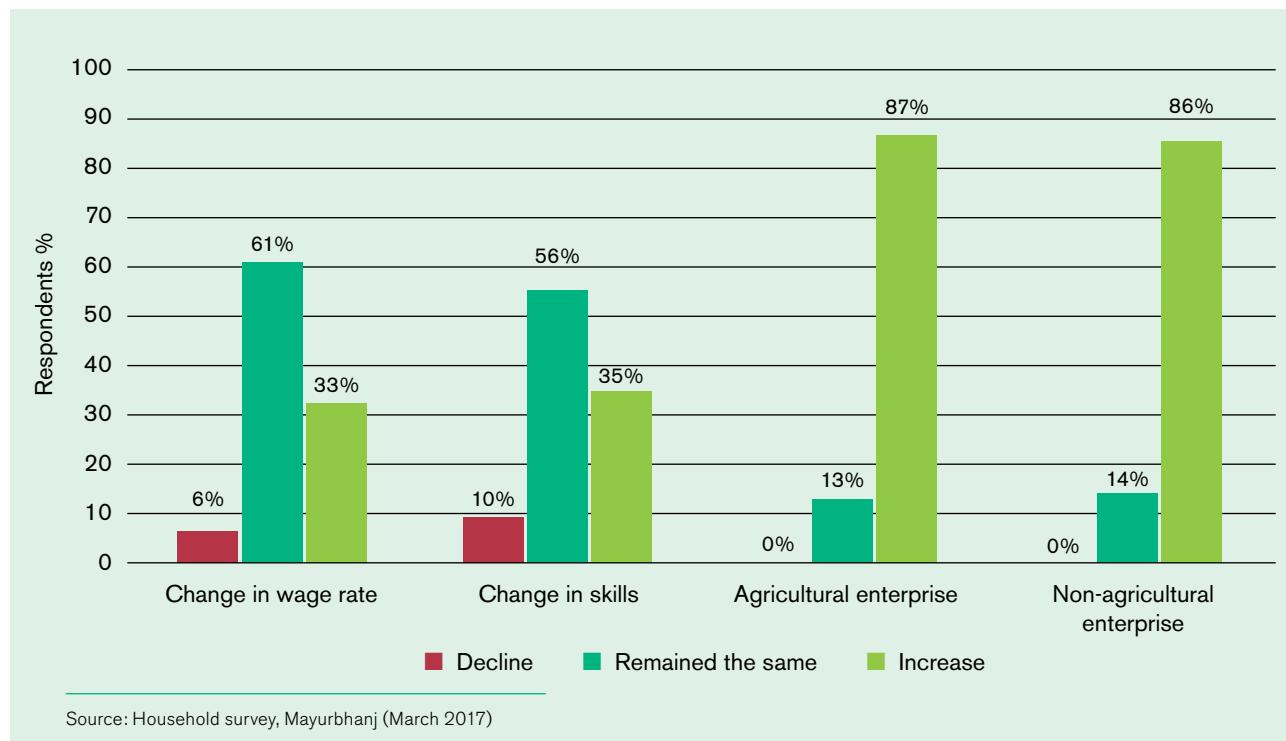
But at the same time, more than half of all respondents reported no change in skills and nearly 15 per cent reported no change in enterprise development. This indicates that households have benefited unevenly from MGNREGS across our four study sites – for example, respondents in Suliapada and Betnoti did not benefit from MGNREGS and OLM horticulture plantations, while those in Badasahi and Morada did. As we outlined above, this may partially explain why some households reported a decline in resilience.

5.3 Contribution to resilience of ecosystems

Our survey respondents indicated that MGNREGS has also led to improvements in ecosystem services, with 90 per cent reporting improvements in agricultural production, 85 per cent increased crop diversity and 40 per cent increased irrigation and availability of agricultural land.

These findings confirm that MGNREGS has helped increase natural and physical capital through investment in horticulture plantations and water infrastructure and through improved skills training delivered in convergence with OLM, Department of Horticulture, Department of Agriculture and ITDA. In turn, these improvements in ecosystem services have helped many households in Mayurbhanj maintain, improve or transform their livelihoods in the face of droughts and flooding.

A small number of households reported a decline in water access, agricultural land and agricultural productivity despite MGNREGS. This could be because some households remain so exposed to climate hazards that MGNREGS has not been able to address its impacts. Key informant interviews with MGNREGS officials in Betnoti and Badasahi indicated that due to high material costs, flood protection infrastructure in low-lying areas next to rivers had not been sanctioned under MGNREGS, leaving households exposed to flooding at risk of losing crops and damage to land and irrigation infrastructure.

Figure 7: Household perceptions of change in ecosystem services as a result of MGNREGS, despite climate impacts

Source: Household survey, Mayurbhanj (March 2017)

Looking forward

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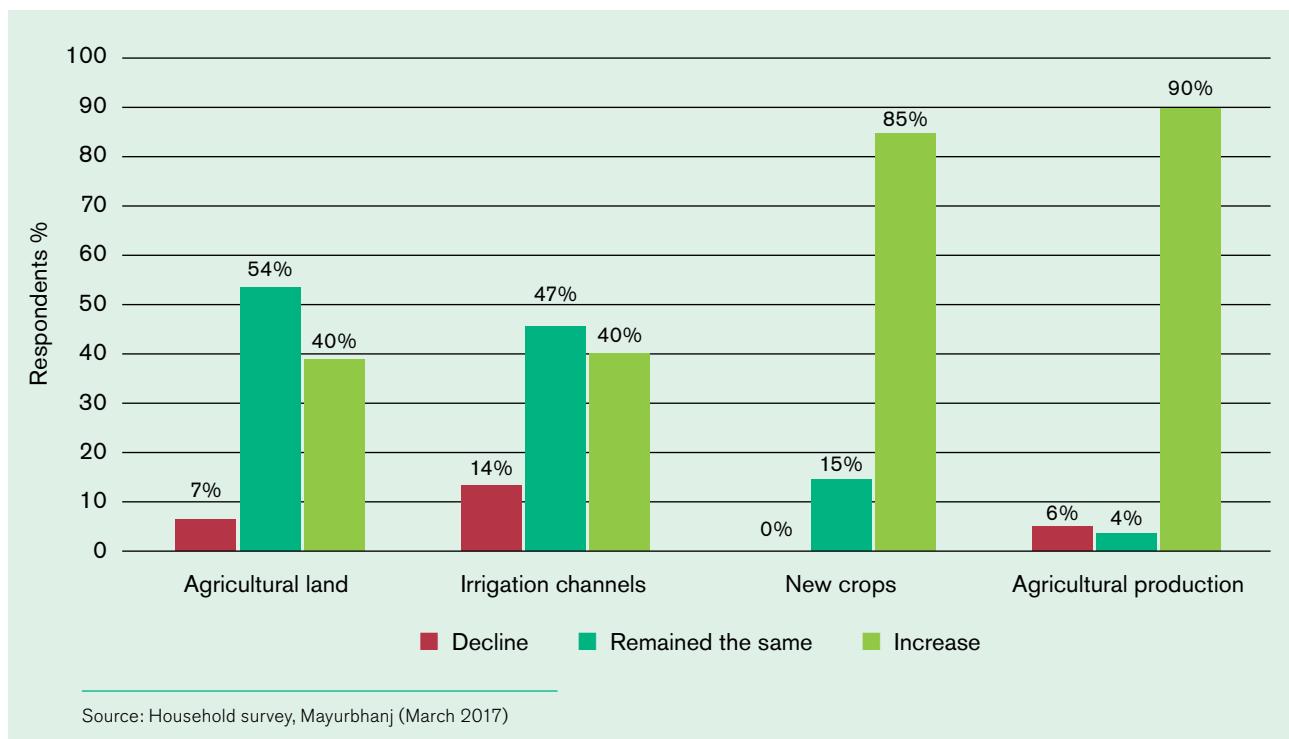
Policy Recommendations

Drawing on lessons from our case study in Mayurbhanj, research from the three state briefings that accompany this report (Steinbach *et al.* 2017a and 2017b; Kaur *et al.* 2017b) as well as a meta-analysis of social protection and climate resilience literature (Agrawal *et al.* 2017), we make the following recommendations for policymakers, to strengthen MGNREGS' contribution to resilience:

1. **Deliver a combination of MGNREGS instruments** to provide a stronger foundation to build resilience.

   Our research suggests that households that have access to multiple MGNREGS instruments are better equipped to manage climate hazards. While not all households who benefited from multiple MGNREGS instruments were able to build adaptive resilience (some still registered a decline or no change in wellbeing), the majority of households in the adaptive resilience category – in other words, those that were able to increase their wellbeing in the face of drought and flooding – benefited from multiple MGNREGS instruments.

   In Odisha, the combination of guaranteed wages, horticulture plantations and institutional strengthening to develop cooperative businesses (with associated investments in infrastructure, skills training, marketing and distribution) have helped many households build adaptive resilience. But households who received MGNREGS wages and sabai handicraft training, marketing and distribution support from OLM experienced a decline in resilience or were only able to absorb, but not adapt or transform the impact of climate change. This highlights that a combination of MGNREGS instruments is not a silver bullet for strong resilience outcomes at the household level.

2. **Integrate climate risk management into MGNREGS programming** to strengthen households' ability to build resilience to climate hazards and respond to new opportunities (see Figure 8).

   Our research found that MGNREGS can build absorptive, adaptive and transformative resilience through its main programme instruments – particularly where a household benefits from a combination of these instruments. But evidence from our four case studies shows that resilience outcomes are spread unevenly among our sample households, with many households still not experiencing improved resilience outcomes. The following options can help policymakers integrate climate risk management into different MGNREGS instruments, to improve their delivery of climate resilience.

a. **Climate-resilient wage labour**:

   – Continue to deliver scaled up MGNREGS labour in response to climate hazards and develop procedures to scale up MGNREGS wages rates and deliver payments before shocks occur. To deliver anticipatory payments, the government will need to invest in climate information systems to recognise rapid and slow-onset climate shocks in their initial stages; develop scenarios with parameters and thresholds that trigger payments; and establish operational guidelines and appropriate delivery structures.

   – Provide clear information to households on changes to MGNREGS daily wage rates and the number of available working days in response to climate hazards. Although MGNREGS already has a process for increasing both these days and wage rates, many beneficiaries felt that decisions to trigger these are unpredictable, non-transparent and unevenly applied. With improved information and communication, households can plan appropriate risk management strategies and decide how best to engage in MGNREGS wage labour when climate hazards occur.

   – Revise the MGNREGS wage rate during climate hazards to ensure households earn enough to meet their consumption needs. While in some cases, MGNREGS offers increased wages to help households cope during climate hazards, many beneficiaries felt these wages are still insufficient for household consumption during this time. To ensure household consumption is not impacted by climate hazards, we recommend the MGNREGS wage rate increases are tied to a consumer price index of basic household goods that is adjusted for inflation caused by the hazard.

b. **Climate-resilient infrastructure**:

   – Ensure that the design, selection and construction of MGNREGS assets is flexible and appropriate to localised climate risk. MGNREGS should integrate climate information and spatial planning tools for land use, landscape management and watershed approaches when identifying, designing, building and maintaining MGNREGS assets.

– Sanction the construction of new labour-intensive assets that boost the capacity of ecosystems to absorb the impact of rapid-onset and high-intensity climate hazards such as flooding or cyclones. For example, this could include planting and maintaining shelter belts or mangrove forests in cyclone and flood-affected areas.

– Sanction the construction of material-intensive assets that build community resilience – such as cyclone shelters, flood protection infrastructure or large water storage infrastructure to manage droughts – in highly exposed areas. Additional material budget could be covered through convergence with other schemes.

– Create infrastructure that helps highly exposed households transition away from agricultural livelihoods into new activities that are less exposed and less sensitive to climate hazards.

– Develop new asset categories that create new livelihood opportunities in low-carbon and climate-resilient development. This could include off-grid renewable energy infrastructure or other investments in green technology.

c. **Climate-resilient local institutions**:

– Support local institutions – such as *gram sabahs*, MGNREGS technical engineers and social auditors – to use climate information and spatial planning tools to improve decision making, planning and construction of MGNREGS assets that help manage climate risk.

– Continue to help households access formal banking institutions.

– Link financial access to investments in climate-resilient livelihoods by training rural banking institutions to promote investment in locally-appropriate, climate-resilient activities such as improved access to irrigation; climate-resilient agriculture that increases productivity of farms and reduces the climate sensitivity of households; or renewable energy and other green technologies.

– Create new cooperatives or businesses in sectors that are less exposed or sensitive to climate hazards.

d. **Climate-resilient skills**:

– Develop skills training programmes – for example, through Project LIFE or convergence initiatives – to help households develop climate-resilient livelihoods. This could include existing livelihood activities in a community or introducing new activities such as small-scale renewable energy to help households transition away from climate-sensitive sectors and promote green growth in rural areas.

– Train barefoot engineers and engineering consultants to identify, design and construct climate-resilient and low-carbon infrastructure that reduces households' exposure and/or sensitivity to localised climate risk and is tailored to communities' current livelihood needs and future livelihood opportunities.

3. **Converge MGNREGS with other initiatives, schemes and programmes that support climate risk management** to build more resilient households and communities. This can also help programme implementers spread the financial and delivery costs of resilience activities. There will need to be additional dialogue to identify convergence options that build absorptive, adaptive or transformative resilience. Some options for convergence include:

a. Working with Departments of Forestry or Horticulture to build assets such as shelter belts and mangroves to help ecosystems absorb the impact of cyclones.

b. Improving agricultural livelihoods that help households absorb shocks or adapt to become less sensitive to climate hazards. Interventions could include: increasing access to irrigation; introducing new agricultural practices or crops, such as drought-resistant horticulture; helping farmers develop cooperatives or agricultural businesses by providing them with skills training, infrastructure investment, marketing and distribution support; and building new productive assets that improve agricultural production. In some cases, building more material-intensive assets – such as large water storage tanks for irrigation – may be more effective in delivering resilience outcomes. Here, MGNREGS can supply labour and 40 per cent of the material cost, with partnering agencies bearing the additional material cost.

c. Helping households transform their livelihoods away from activities that are exposed or sensitive to climate hazards. This could include skills training for non-agricultural livelihoods through Project-LIFE; partnering with public agencies or private companies to build new renewable energy or green technology infrastructure; or helping households to access financial services to invest in new business ventures.

4. **Ensure that MGNREGS interventions promote spillover benefits to the local economy and the provision of ecosystems services** to create more resilient communities.

Recommendations 1–3 focus on helping households to build resilience. But these efforts can be strengthened by ensuring that resilience building also creates positive feedback loops to the local economy and natural environment. A stronger local economy and improved ecosystems services will, in turn, lead to more resilient households and by extension, more resilient communities.

Figure 8: Combining and layering climate risk management and social protection instruments
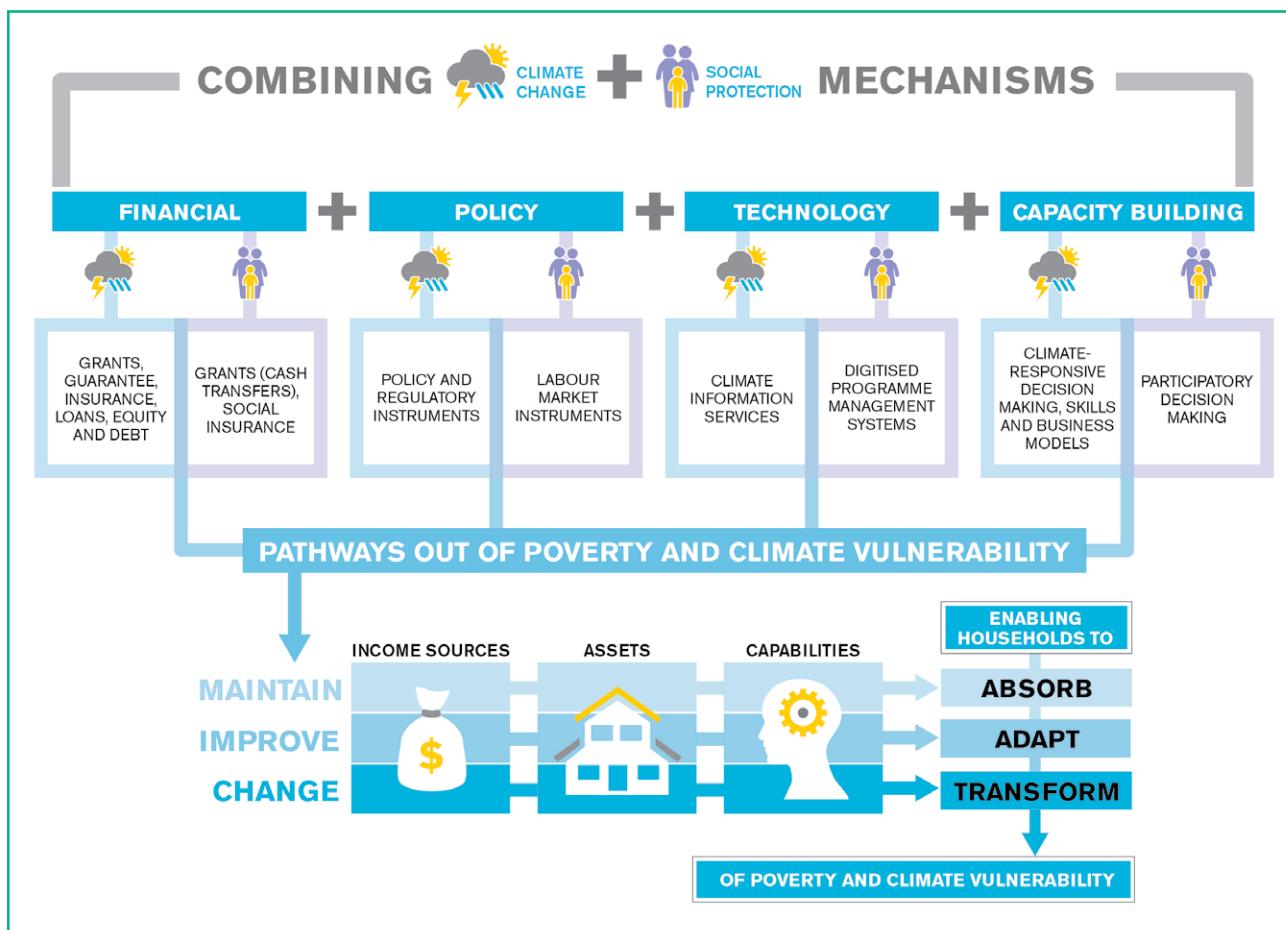
Acronyms

DSMS	District Supply and Marketing Society
ITDA	Integrated Tribal Development Authority
Project LIFE	Livelihoods in Full Employment (Project)
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
OLM	Odisha Livelihood Mission

Related reading

Agrawal A *et al.* (2017) Social protection programmes and climate resilience: a review and meta-analysis. IIED

Kaur, N *et al.* (2017) Building resilience to climate change: MGNREGS and climate risks.

Kaur, N et al. (2017) Building resilience to climate change: MGNREGS and climate-induced droughts in Sikkim. IIED issue paper. http://pubs.iied.org/10184IIED

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Kaur, N *et al.* (2017b) Building resilience to climate change: MGNREGS and climate-induced droughts in Sikkim. IIED issue paper.

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The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) is one of India's flagship social protection programmes. This paper is part of a series of briefings that analyse how MGNREGS builds the resilience of rural households to different climate shocks. The goal of the series is to identify options for Indian policymakers to integrate climate risk management into MGNREGS. These findings can also provide global policymakers with evidence on how to mainstream climate risk management into social protection programmes, or combine and layer social protection instruments with climate risk management instruments to address poverty in the context of climate change.

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