



Building resilience to climate change through social protection

Lessons from MGNREGS, India

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The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) is India's flagship social protection programme. This paper is part of a series of studies that analyse how MGNREGS builds and strengthens the resilience of rural households to different climate shocks. The series identifies options for Indian policymakers to integrate climate risk management into MGNREGS. It also provides evidence for global policymakers on how to integrate climate risk management into social protection provision and combine and layer risk management instruments to address poverty in the context of climate change.

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Summary

There has been substantial progress in reducing poverty across the globe. But the rising challenge of climate change threatens to reverse development gains, reinforce structural barriers to development and push up to 720 million people back into poverty (Granoff et al. 2015). To deliver lasting development outcomes, policymakers must address the multifaceted risks posed by social and economic exclusion in a context of escalating climate change risks.

Social protection and climate change instruments support inclusive and climate-resilient development, respectively. Integrating climate risk management into social protection policies can yield synergistic results by helping poor and climate-vulnerable households invest in climate-resilient livelihood strategies. Social protection programmes like India's Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) help poor households and communities cope with poverty and marginalisation. With some adjustments, they can help them absorb the effects of climate risks, adapt to climate impacts and transform their capacities and strategies to address growing climate stresses (Agrawal et al. 2017).

Through four state case studies, this paper examines how MGNREGS builds and strengthens resilience to various climate shocks. We also explore how integrating climate risk management into the provision of social protection, and convergence with broader risk management interventions can address poverty and climate risks. Finally, we identify options for Indian and global policymakers for integrating climate risk management into their social protection policies.

Main findings

Our case studies show that MGNREGS' core social protection interventions – guaranteed wage labour, new rural infrastructure, stronger local institutions and developing new skills – help households change their **livelihood capitals** to achieve absorptive, adaptive and transformative resilience to address complex risks.

MGNREGS plays a significant role in **building resilience** to climate risks in the poorest households and within the local economy. Of the 651 surveyed respondents across Andhra Pradesh, Jharkhand, Odisha and Sikkim, 64% changed their livelihood capitals to absorb, adapt or transform to address the

Livelihood capitals are assets that can effectively and sustainably reduce poverty and vulnerability, contributing to and consolidating livelihoods (see Figure 1). They include:

- Natural capital: natural resources and healthy ecosystems
- Physical capital: built and community infrastructure
- Human capital: education, skills, training, health, knowledge and motivation
- Social capital: relationships, networks, institutions, and
- Financial capital: privately-owned funds and assets.

impacts of climate change. But 19% reported a decline in household wellbeing and reduced resilience, despite MGNREGS support.

In convergence with other programmes, MGNREGS helps build absorptive, adaptive and transformative resilience. It is most effective in contributing to **absorptive resilience**, helping 34% of sampled households across all four states maintain their original structure by absorbing the

impact of climate change. Contextual factors influencing absorptive resilience include exposure to infrequent low to medium-intensity climate risks. MGNREGS made the largest contribution to absorptive resilience in Andhra Pradesh, where 65% of surveyed households absorbed the impact of low-intensity cyclone events. Access to public and private infrastructure for natural resource management and guaranteed wages allowed these households to accumulate natural and financial capital to maintain consumption during and after adverse climate events. But they could not save enough income for additional productive investments.

Adaptive resilience is a household or system's ability to improve its original structure to manage future risks and bounce back effectively after shocks. Twenty-six per cent of respondents said they had adapted to the

Policy convergence refers to aligning policies in terms of their objectives and instruments, so that different policy areas are coherent and reinforce each other.

impacts of climate hazards. MGNREGS was most effective in contributing to adaptive resilience in Sikkim, where 64% of sampled households reported adapting to the impacts of low-intensity winter droughts.

Contextual factors influencing adaptive resilience outcomes include exposure to low-intensity climate risks. Households with adaptive resilience had access to all four MGNREGS interventions in convergence with other agriculture-based livelihood interventions, allowing them to accumulate all five livelihood capitals to anticipate climate risks and bounce back effectively.

Our findings suggest a different set of livelihood capitals required for adaptive – rather than absorptive – resilience. Access to natural capital is important to benefit from ecosystem services during a hazard. But households with adaptive resilience rely more on physical, social and human capital to create and maintain adaptive assets. Individual productive assets created through MGNREGS, knowledge, skills and networks all helped these households bounce back from and prepare for climate hazards.

Transformative resilience relates to a household or system's ability to move beyond vulnerability thresholds. MGNREGS is not designed to contribute to a fundamental change in the structure of a household's income, consumption, assets and capabilities. But we found that, for a small group of households, it acted as a stepping stone to transformative resilience when delivered in convergence with other risk management instruments. This was clearest in Odisha, where 15% of surveyed households had fundamentally changed their income source, consumption, assets and capabilities. As well as to guaranteed wages and productive plantations through MGNREGS, they accessed climate-smart irrigation schemes through the Directorate of Horticulture and market linkages through the Odisha Livelihoods Mission. These combined interventions enabled households to invest in new income sources and access new job opportunities to move out of poverty and climate vulnerability, possibly for a long duration.

Decline in resilience: 19% of sampled households experienced a decline in wellbeing. Primarily reliant on MGNREGS wages, these households' prior low levels of wellbeing and assets meant that new public infrastructure was not enough to change their livelihood capitals. In Jharkhand and Odisha, it was clear that MGNREGS wages alone cannot strengthen resilience to frequent and high-intensity hazards and impacts.

Resilience in the local economy: Preliminary evidence also suggests that MGNREGS has improved the resilience of productive activities in the local economy.

Gender differentiated impacts

Women are particularly vulnerable to climate change, because their household responsibilities are more sensitive to weather shocks, they are excluded from decision making and they have limited access to services. Our analysis shows that, although men and women are almost equally able to absorb, adapt and transform their livelihoods in response to climate hazards, women are seven percentage points more likely to register a decline in resilience. This suggests that, although they have benefited from having equal access to MGNREGS employment and equality in wages, private infrastructure, institutions and skills development need to provide more gender-responsive opportunities. It is also possible that women are more excluded from benefiting from the convergence of investments with other development programmes. Greater attention to women's excluded social status could enable female-headed households and women within households to change their livelihood capitals to anticipate and manage climate shocks.

Recommendations

Our findings indicate that the level of climate exposure and the nature of livelihood capitals influence the type of resilience outcomes that households can achieve. A structural change in livelihood capitals is needed for adaptive and transformative resilience.

By providing guaranteed wages and creating public natural resource management infrastructure, MGNREGS can help households accumulate the natural and financial capital they need to maintain consumption when exposed to infrequent and low to medium-intensity climate hazards. But for households to adapt and transform their livelihoods in response to high-intensity climate shocks, access to MGNREGS interventions, including guaranteed wages; public and private infrastructure; institutional and skill strengthening, **in combination with** wider support to livelihoods and risk management tools is key. We make nine specific recommendations to help policymakers:

- **Integrate climate risk management into MGNREGS provision** to deliver shock-responsive wages and climate-resilient infrastructure, strengthen institutions to use climate information and build skills in climate-resilient livelihoods so households can absorb, adapt and transform to climate risks and respond to opportunities.
- **Deliver MGNREGS interventions in convergence with wider investment in risk management instruments** to build and sustain the resilience of households and the local economy over time in the face of uncertain climate risks and enable them to access new opportunities. This will share the burden of risk management across ministries.

1

Introduction

The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) is India's flagship social protection programme and the largest development investment globally. Under the scheme, all rural households are entitled to 100 days' guaranteed wage employment as unskilled labourers. More than a decade has passed since MGNREGS was launched. In that time, the scheme's objectives have expanded to include improving rural infrastructure, strengthening rural institutions and enhancing the skills of rural labour. It is an example of a graduation approach, providing a coherent package of interventions that supports households to meet short-term consumption gaps during a hazard and build longer-term livelihood strategies to move out of poverty (Heinemann et al. 2018). Many studies of MGNREGS have examined its contributions to poverty reduction and reached positive conclusions (Carswell and Neve 2014, Kumar and Joshi 2013, Ravi and Engler 2015).

Even as MGNREGS has addressed poverty, climate change has emerged as a major threat to vulnerable poor households and communities and to the global development agenda. There is increasing evidence that the rural poor in developing countries will be most affected by a changing climate (IPCC 2014 and 2018; Sen 1999). Unchecked climate change could push more than 720 million people worldwide back into extreme poverty (Granoff et al. 2015) and lead to a 12% decline in living standards in some Indian districts by 2050 (Mani et al. 2018).

Although programmes like MGNREGS have been effective in reducing poverty – albeit unevenly – climate change could reverse the development gains they have enabled and reinforce social and economic structural barriers to continued development. The increased frequency and intensity of extreme weather events and long-term changes in weather patterns will exacerbate the stresses that poor households already face and reinforce underlying drivers of poverty (IPCC 2014, Mearns and Norton 2009, Hallegatte et al. 2016). When exposed to increasingly frequent and high-intensity risks, social, economic and ecological systems will need to absorb, adapt and transform if they are to maintain development gains and address the impacts of climate change.

Social protection programmes like MGNREGS can play an important role beyond helping households and communities cope with poverty and marginalisation. By integrating climate risk management into MGNREGS provision and combining and layering social protection instruments with other public and private risk management instruments, they can play a central role in helping households and local economies 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). Without doing so, beneficiaries will probably register a decline in wellbeing when exposed to a combination of climate and socioeconomic shocks. And MGNREGS providers will probably face an increased demand for wage labour during climate shocks, a decline in the durability of assets created under the programme and an increase in expenditure.

MGNREGS beneficiaries are among the most climate-vulnerable households in India because of high poverty rates and their dependence on climate-sensitive livelihoods like agriculture. But few systematic attempts have shown how MGNREGS contributes to rural households' capacity to address climate change risks and impacts.

This paper brings together findings from research investigations in four states and a meta-analysis of social protection and climate resilience to fill the evidence and analysis gap on how social protection programmes can

address climate vulnerability. It examines and assesses how MGNREGS builds the resilience of vulnerable women and men to high and low-intensity climate hazards, including droughts in Jharkhand, Odisha and Sikkim, floods in Odisha and cyclones in Andhra Pradesh. It also identifies options for integrating climate risk management into MGNREGS. The evidence in this paper will help policymakers design and implement social protection interventions that build resilience to complex risks and opportunities.

2

Background and approach

Our analysis and policy recommendations rely on triangulated information and findings from three main sources of evidence:

- A review of national and global studies of social protection and climate risks to assess their findings on the potential contributions of social protection to resilience outcomes
- Secondary data on MGNREGS, climate trends and related risks for India, and
- Primary data from focus group discussions, key stakeholder interviews and a survey of 651 poor households in Andhra Pradesh, Jharkhand, Orissa and Sikkim states. These all focus on MGNREGS cardholding households who have self-selected as needing unskilled wage labour. The states represent different social contexts and climatic risks and help us assess how variations in types of climate risks affect resilience outcomes within the household and local economy.

Our analysis is based on a theory of change that considers how MGNREGS interventions enable changes in livelihood capitals that in turn structure household resilience to climate change (see Porritt 2007). Figure 1 provides an overview of the analytical framework that represents our theory of change. The central message is that resilience outcomes are influenced by a household's existing levels and forms of vulnerability. And that access to MGNREGS

interventions can provide a pathway to resilience by enabling households to accumulate livelihood capitals to absorb, adapt and/or transform their wellbeing strategies in the context of climate change.

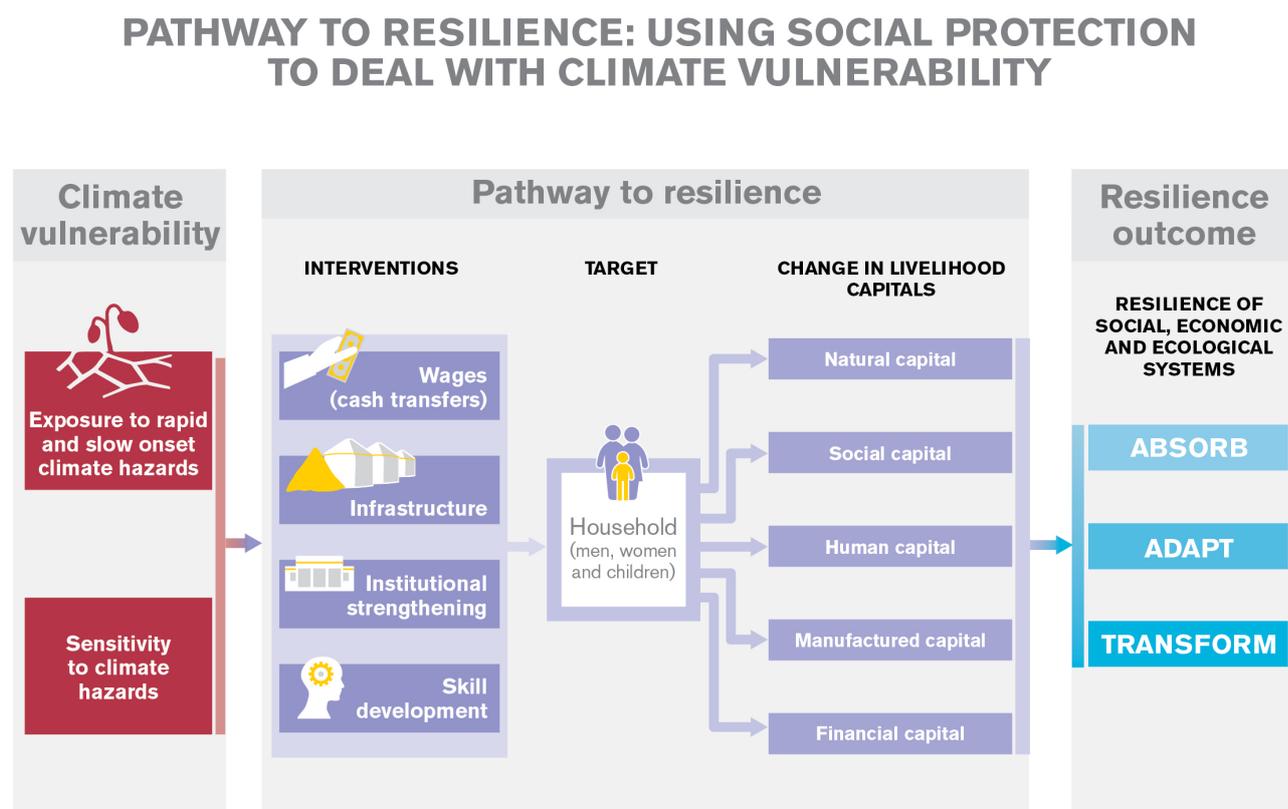
WHAT ARE LIVELIHOOD CAPITALS?

These are assets related to livelihoods that can effectively and sustainably reduce poverty and vulnerability, thus contributing to and consolidating livelihoods (see Figure 1). They include:

- Natural capital: natural resources and healthy ecosystems
- Physical capital: built and community infrastructure
- Human capital: education, skills, training, health, knowledge and motivation
- Social capital: relationships, networks, institutions, and
- Financial capital: privately-owned funds and assets.

To operationalise our theory of change, we use a 'context, mechanism and outcome' approach, common in realist evaluative methods (Pawson and Tilley 2004 and Pawson et al. 2004), which we explain below.

Figure 1: Analytical framework on how MGNREGS contributes to resilience



Context

'Context' refers to the background climatic, socioeconomic and political factors that affect households and communities where MGNREGS is implemented. Our research design, data collection and analysis particularly focused on climate exposure and sensitivity.

To understand climate exposure, we explore the intensity and nature of climate hazards in our research sites, which experienced exposure to high and low-intensity drought, flood and cyclones. To understand households' sensitivity to a climate hazard, we focus on its prior

wellbeing levels and dependence on climate-sensitive livelihoods (Table 1).

We found that households in Jharkhand and Odisha are highly vulnerable to climate hazards. They are exposed to high-intensity hazards, rely on climate-sensitive livelihoods and have a higher percentage of lower-wellbeing households. This is bearing in mind that all the households we surveyed were MGNREGS cardholders, so this is an assessment of the relative poverty within all the households that need to access unskilled waged labour.

Table 1: Exposure and sensitivity to climate change

LOCATION		EXPOSURE	SENSITIVITY		
STATE	DISTRICT		RELATIVE HOUSEHOLD WELLBEING (%)	DEPENDENCE ON CLIMATE-SENSITIVE LIVELIHOODS (%)	
Odisha	Mayurbhanj	High-intensity floods and low-intensity drought	Low	3	64
			Medium	51	
			High	42	
Jharkhand	West Singhbhum	High-intensity drought	Low	33	33
			Medium	50	
			High	16	
Andhra Pradesh	Srikakulam	Medium to low-intensity cyclones	Low	37	70
			Medium	48	
			High	15	
Sikkim	South Sikkim	Low-intensity drought	Low	0	50
			Medium	50	
			High	50	

Source: Household survey, February–April 2017.

Mechanism

'Mechanism' refers to **programme interventions** that seek to enable vulnerable households to build their **livelihood capitals** and thereby absorb, adapt and transform in response to climate hazards. Here, we explore the **four MGNREGS mechanisms**, which are deployed through standalone MGNREGS implementation or in convergence with other government programmes and interventions.

- 1. Guaranteed wages:** MGNREGS guarantees up to 100 days' work in rural areas to every household whose adult members volunteer for unskilled work. Households use MGNREGS wages to supplement other sources of income and smooth consumption gaps. Job cardholders can demand wage labour when other income sources are undermined by climate hazards, making it an implicitly climate-responsive instrument. Recognising this, the scheme now offers 150 days of work in times of severe drought. On average, MGNREGS gives work to 50 million households every year (MoRD 2016).
- 2. Creating private and public assets:** MGNREGS builds individual and public rural infrastructure to support long-term livelihood strategies and strengthen the local economy (Gol 2017). To date, it has created 3.8 million infrastructure assets, including:

- Integrated natural resource management: water and soil conservation infrastructure – such as check dams, ponds and trenches – afforestation and land development works. Around 57% of MGNREGS total expenditure has been used to create individual and community natural resource management assets in the last five years.
- Agriculture-based livelihoods: irrigation channels, plantations, livestock, fisheries infrastructure, water and grain storage structures. Around 63% of MGNREGS total expenditure has been used to create rural infrastructure that supports agriculture-based livelihoods.
- Other infrastructure: roads, footpaths, sanitation infrastructure and community buildings.

WHAT IS CONVERGENCE?

Policy convergence refers to aligning policies in terms of their objectives and instruments, so that different policy areas are coherent and reinforce each other.

3. Strengthening institutions: MGNREGS

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

- Enhancing household participation in local governance bodies – such as the village-level *gram sabhas* – and their decision making around MGNREGS labour allocation and infrastructure selection.
- Improving financial inclusion by linking job cardholders to banks with digitised payments through the electronic fund management system. MGNREGS uses this system to pay about 94% of wages into beneficiary accounts, making it one of the best examples of direct benefit transfers across Indian government programmes (MoRD 2016).
- Strengthening community institutions such as self-help and producer groups to build collective action and create stronger market linkages by converging with other government programmes. This includes convergence of MGNREGS technical, institutional and financial resources with other public sector interventions to deliver better programme outcomes.

- 4. Skills training:** In recent years, MGNREGS has focused on strengthening beneficiaries and service providers' capabilities to plan and deliver durable assets and upgrade livelihood strategies. This includes training service providers and barefoot technicians – selected from MGNREGS beneficiaries – in integrated natural resource management, geospatial information systems and developing *gram panchayat* plans. MGNREGS job cardholders have access to training from Deen Dayal Upadhyaya Grameen Kaushalya Yojana for placement-based employment or from rural self-employment training institutes (MoRD 2016).

Livelihood capitals

Livelihood capitals play a central analytical role in our study by mediating the effects of MGNREGS interventions on household wellbeing.

A livelihood capitals lens (Scoones 1998) helps explore and elucidate links between different forms of livelihood capitals and reduced vulnerability and improved wellbeing (Moser 1998). Focusing on how poor households manage their livelihood capitals to generate adequate income, consumption, assets and capabilities, it offers a clear analytical framework for understanding the diverse pathways through which households mobilise benefits from social protection programmes like MGNREGS to build greater resilience.

Livelihood capitals are five forms of capital assets that can effectively and sustainably reduce poverty and vulnerability (Moser 1998), thereby contributing to and consolidating livelihoods (Bebbington 1999, Scoones 1998):

- **Natural capital** refers to productive natural resources and healthy ecosystems. Equitable access to natural capital contributes goods and services to the household economy. At the same time, household actions can improve the productive capacities of the natural resource base, setting up a virtual cycle.
- **Physical capital** includes built infrastructure such as roads, communications facilities, irrigation reservoirs and channels, schools and meeting places that contribute to the production process, safeguard human capital and support social capital development.
- **Human capital** refers to education, skills, training, good health, knowledge and motivation, which all contribute to a household's ability to make decisions and respond to climate impacts in an informed and effective way. Households need to identify the best available coping options and new strategies to manage persistent and intensifying risks.

Table 2: Service provision under MGNREGS 2014–2018

LOCATION	AVERAGE NUMBER OF DAYS' WORK PER HOUSEHOLD	COMPLETED WORKS	AVERAGE % OF PAYMENT THROUGH ELECTRONIC FUND MANAGEMENT SYSTEM
Odisha	40	192,472	100
Jharkhand	44	154,782	100
Andhra Pradesh	52	805,223	100
Sikkim	58	3,032	20

Source: MGNREGA MIS (accessed on 22 January 2019) <http://nrega.nic.in/netnrega/sthome.aspx>

- **Social capital** refers to the relationships, networks and institutions that contribute to social status, power relations and a household’s ability to access services or maintain and develop human capital.
- **Financial capital** relates to privately-owned funds and assets that contribute to a household’s ability to maintain consumption, savings and investments when exposed to climate shocks.

Outcomes

Resilience outcomes concern the way households, socioeconomic and ecological systems successfully deal with change by absorbing, adapting and transforming to address complex risks and new opportunities. The key outcomes of interest for our study are:

Absorptive resilience outcomes, which concern social, economic and ecological systems’ ability to maintain their original structure by absorbing infrequent and low-intensity risks. Early analyses of resilience often focused most directly on absorptive outcomes, but recent studies emphasise the need to consider other forms of outcome, especially in the context of social and social-ecological systems.

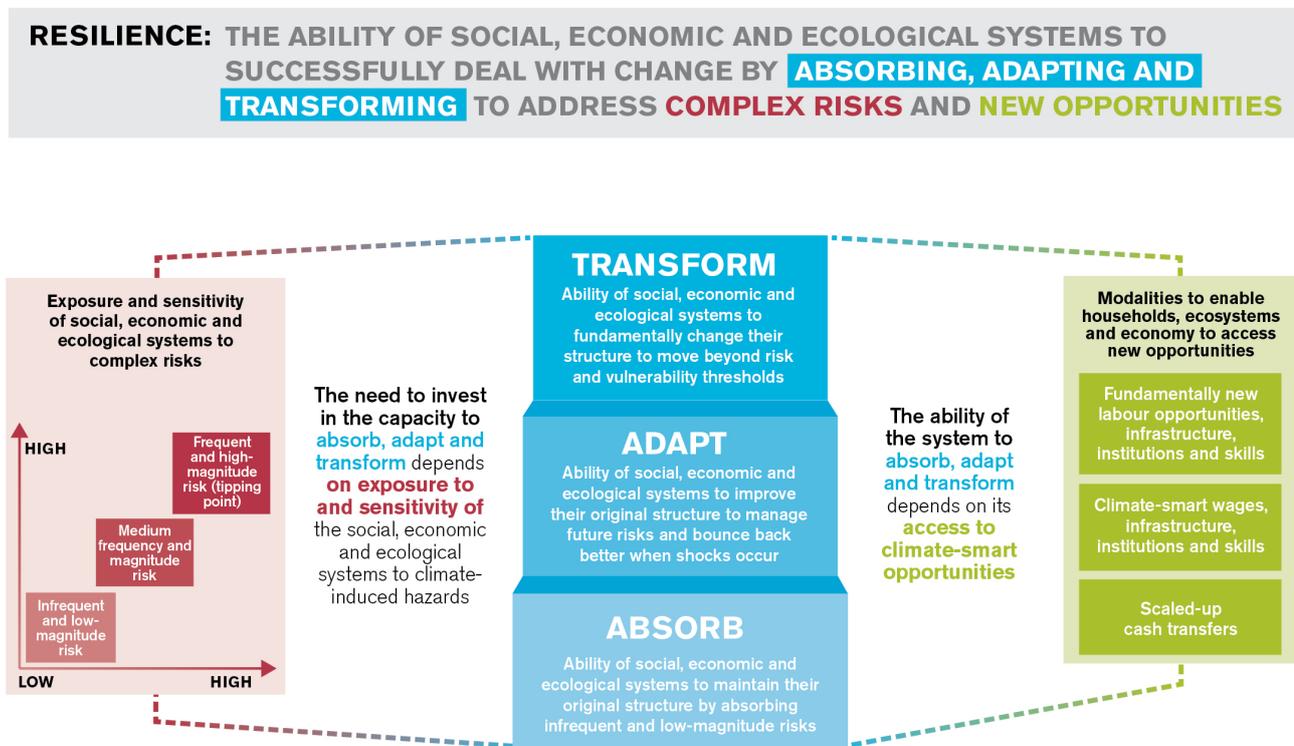
Adaptive resilience outcomes, which relate to these systems’ ability to improve their original structure to manage future risks and thereby use existing strategies to manage risks more effectively to bounce back better in the aftermath of climate shocks.

Transformative resilience outcomes, which refer to systems’ ability to fundamentally change their structure and enable new strategies that allow them to move beyond vulnerability thresholds.

Building on substantial literature on social-ecological resilience from the past three decades (Adger 2000, Carpenter et al. 2010, Duit et al. 2010, Bene et al. 2014), we provide a conceptual representation of these three types of resilience that can characterise household, community and higher-level social-ecological systems in response to climate impacts. Figure 2 shows that social, economic and ecological systems’ capacity to absorb, adapt or transform depends on their exposure and sensitivity to climate-induced hazards and their ability to access climate-smart opportunities or investments that support climate-smart responses.

We particularly draw on Bene et al. (2014), whose explicit analysis of absorptive, adaptive and transformative capacities builds on earlier contributions related to different conceptions of social-ecological

Figure 2: Building resilience to complex risks and opportunities



systems that emphasise learning and transformability of systems in contrast to non-sentient communities (Berkes et al. 2003, Folke 2006). Their distinction between the ways and degree to which socioeconomic and ecological systems respond to external stress allows us to lay the groundwork for considering how characteristics of a system, in conjunction with different stresses, support variable responses when it comes to climate resilience (see also Cutter et al. 2008, Smith and Stirling 2010).

Other work on absorptive, adaptive and transformative resilience suggests that efforts to strengthen resilience in the face of multiple, higher-frequency and more intense stressors will likely require interventions to support all three forms of resilience rather than focusing on individual features of system resilience (O'Brien 2012, Folke et al. 2010, Pelling 2010).

Our analysis of MGNREGS' contribution to household resilience found that the same interventions can enable absorptive, adaptive or transformative resilience in different households, depending on prior levels

of wellbeing, the nature of climate hazards and the livelihood capitals they can access (see also Bahadur and Tanner 2014, Joakim et al. 2015, Rose 2011, Ziervogel et al. 2016).

To understand MGNREGS' contribution to household resilience, we gathered evidence on changes in household wellbeing for households that had experienced climate shocks and participated in MGNREGS. To facilitate our analysis, we built a household wellbeing index using reported levels of and changes in income, consumption, assets and capabilities. We combined the multidimensional poverty index (OPHI) and the capabilities approach (Sen 1999) to understand how households can maintain (absorb), improve (adapt) or fundamentally change (transform) their sources of income, consumption, assets and capabilities to respond to climate risks (see Appendix 1 for details of our methodology). Assessing these changes also allowed us to examine how changes in the household economy can trigger changes in the rural labour market and productivity.

3

MGNREGS contribution to climate resilience

Our assessment of social protection and climate risk literature examined 65 studies from poor countries in 53 published peer-reviewed articles and identified three core findings (Agrawal et al. 2017):

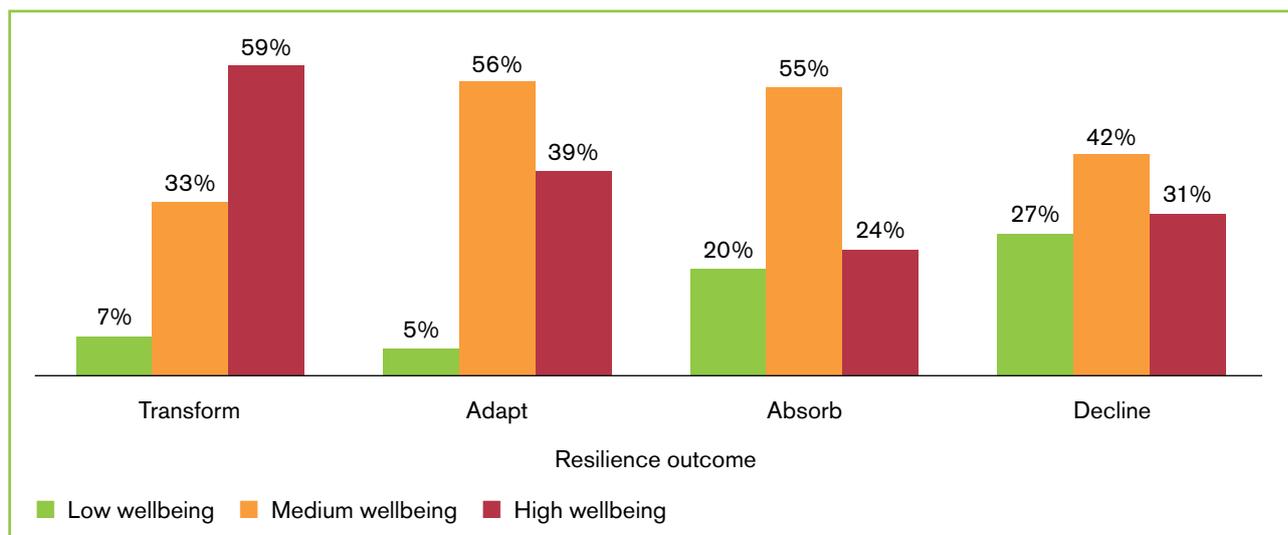
1. Social protection systems can improve household resilience: Across lower-income countries, social protection efforts show potential for supporting effective responses to climate risks and there is some evidence that their implementation improves households' resilience to experienced climate stresses.
2. Social protection enables some resilience, but needs reorientation to deliver more transformative resilience: Although existing social protection increases household resilience, improvements tend to be in absorptive and adaptive rather than transformative resilience. Most available empirical evidence is drawn from studies of households and communities that receive social protection benefits and rarely include control groups or over-time data. But they do suggest that transformative resilience outcomes are rare, despite the potential for social protection to contribute to heightened resilience. As such, the government may need to purposively reorient existing social protection programmes towards climate resilience objectives and integrate or layer social protection with other programmes that aim to improve climate resilience for vulnerable households.
3. Social protection interventions vary in the way they support different types of resilience outcomes: Social protection programmes' wage and income components are not enough to support transformative resilience outcomes on their own. When they work, these components are associated more with absorptive resilience outcomes, especially when recipient households are not exposed to substantial or high-intensity climate impacts. Where adaptive resilience outcomes are in evidence, they relate to investments in skill enhancement, institutional strengthening and, in some cases, infrastructure development to support new occupations.

These findings support and resonate with the analysis of our primary data.

Resilience in the household economy

Our findings indicate that MGNREGS plays a significant role in helping households strengthen their livelihood capitals and demonstrate resilience in the face of experienced climate hazards. Of the 651 households we surveyed, 64% displayed some kind of resilience to the impacts of climate change by absorbing (34%) or adapting to (26%) climate stresses or in a few cases, transforming (4%) their livelihoods. But 19% of

Figure 3: Resilience outcomes, disaggregated by relative wellbeing

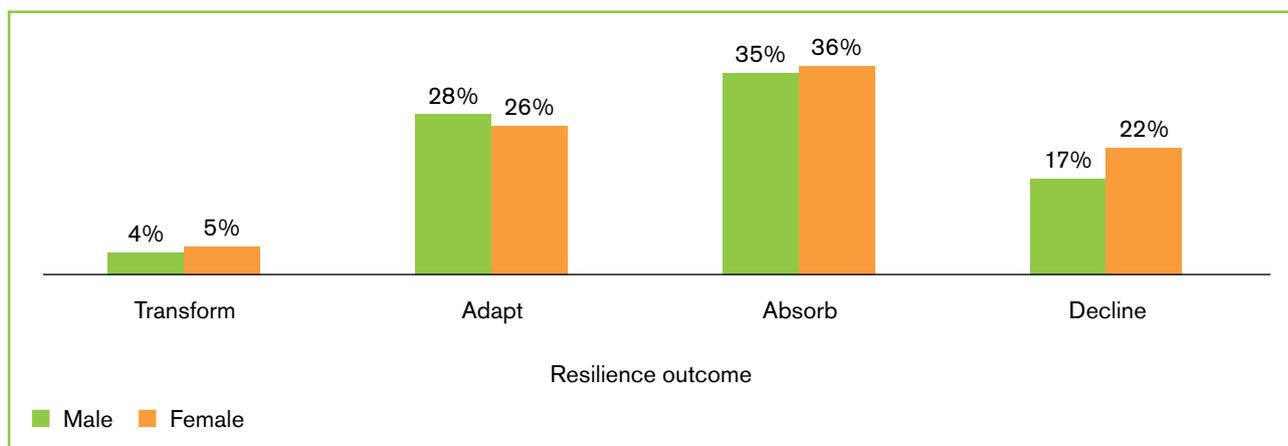


respondents reported a decline in household wellbeing, despite having access to MGNREGS interventions¹ (Figure 3).

All our households have self-identified as needing unskilled waged labour, so none of them are rich. But we did find differences in their relative wellbeing. And although the relatively higher-wellbeing MGNREGS cardholders were more likely to be able to transform their livelihoods, they also relied more on climate-sensitive livelihood options such as smallholder farming. As a result, they were also more likely to register substantial declines in wellbeing when exposed to climate hazards. As we might expect, households with lower wellbeing levels were less likely to be able to absorb, adapt or transform their livelihoods and more likely to suffer further declines in wellbeing from climate hazards (Figure 3). This is a result of having lower savings and fewer productive assets.

Although men and women are almost equally able to absorb, adapt and transform their livelihoods in response to climate hazards, women are more likely than men to register a decline in their resilience (by 7% of responding households). This suggests that, although women have benefited from having equal access to MGNREGS employment and equality in wages, it may be necessary to create private infrastructure and orient institutions and skills development interventions to support gender-specific opportunities. It is also possible that women are more excluded from benefiting from the convergence of investments from other development programmes. Paying greater attention to women's excluded social status in this way will enable female-headed households and women within households to structurally change their livelihood capitals to anticipate and manage climate shocks.

Figure 4: Gender-disaggregated resilience outcomes



¹ We collected data from 651 households across four states. We categorised 17% of all responses as having 'hybrid' levels of wellbeing as their responses were mixed in terms of changes in consumption, income, assets and capabilities, the four measures of wellbeing on which we collected data. It is also worth noting that we based our assessment of the causal effects of MGNREGS primarily on household responses to our questions about how MGNREGS affected their livelihood capitals and wellbeing rather than an analysis of statistical correlations (see Appendix 1).

MGNREGS pathways to household resilience

A household's ability to absorb, adapt, transform or register a decline in its wellbeing is associated with its exposure and sensitivity to climate hazards and its access to MGNREGS interventions.

Absorptive resilience

MGNREGS is most effective in contributing to absorptive resilience. We found that 34% of our sampled households across four states were able to absorb the impacts of climate hazards.

Its largest contribution to absorptive resilience is visible in Andhra Pradesh, where 65% of sampled households were able to absorb the impact of cyclones. It has also contributed to absorptive resilience in Sikkim (29%), Jharkhand (23%) and Odisha (22%).

Contextual factors influencing absorptive resilience outcomes of households in Srikakulam district, Andhra Pradesh, include exposure to medium/low-intensity cyclones and high dependence on climate-sensitive livelihoods. We found that households in this district have access to higher quality MGNREGS interventions, including public infrastructure for soil and water conservation and guaranteed wages delivered through timely bank transfers. Such interventions contribute to a household's financial and natural capital, enabling them to maintain their income, consumption, assets and capabilities in the aftermath of a cyclone. For example, access to wage employment enabled households to rebuild infrastructure damaged during a cyclone, maintaining consumption and allowing children to continue attending school. Access to assets created

under MGNREGS – in the form of an irrigation channel – also provided an effective means to drain cyclone-induced water logged, arable land.

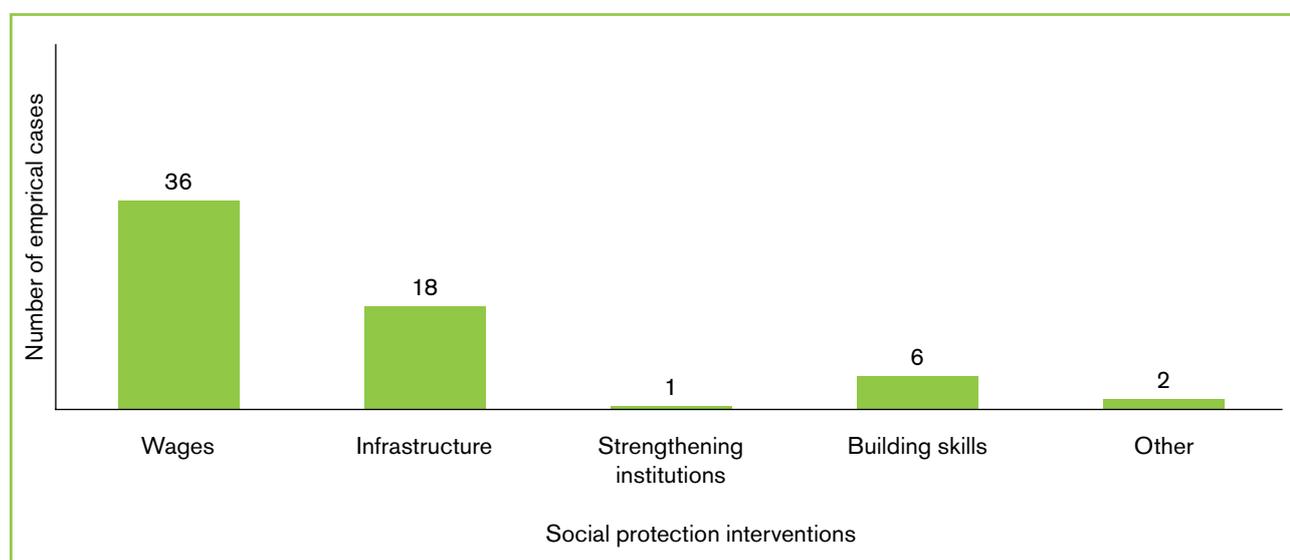
These results are consistent with our meta-analysis, indicating that access to wages and public infrastructure contributes to a household's capacity to absorb shocks (see Figure 5).

Adaptive resilience

MGNREGS contributed to the adaptive resilience of 26% of our sampled households across the four case study sites. It is most effective in contributing to adaptive resilience in Sikkim, where 64% of the sampled households adapted to the impacts of winter drought. It contributed at a lower rate to adaptive resilience in Odisha (26%), Jharkhand (12%) and Andhra Pradesh (7%).

Contextual factors shaping adaptive resilience outcomes of households in South Sikkim district include exposure to low-intensity and infrequent winter droughts. Although our Sikkim respondents were from households that depend primarily on climate-sensitive livelihoods such as agriculture, their wellbeing levels were relatively higher than those in the other case study sites. Our study also suggests that households with adaptive resilience have access to all four MGNREGS interventions – guaranteed wages, public and private infrastructure, strengthened institutions and skills development – and, through convergence, to other risk management interventions targeting natural resource management and agricultural livelihoods. Together, these contributing factors enable households to positively change all five types of livelihood capital to improve incomes, consumption, assets and capabilities in the face of continued climate exposure.

Figure 5: Social protection and absorptive resilience



The livelihood capitals a household needs for adaptive resilience are qualitatively different from those they need for absorptive resilience. Although access to natural capital is important for securing ecosystem services during a hazard, households with adaptive resilience appear to rely more on physical capital in the form of individual productive infrastructure created under MGNREGS. For example, MGNREGS beneficiaries in South Sikkim have benefitted from individual cardamom plantations and livestock sheds. These assets, which are less sensitive to the impacts of winter drought, have supported households to engage with agricultural practices that can withstand the impacts of climate change.

MGNREGS interventions have also helped households accumulate social and human capital, including knowledge, skills and networks to create and maintain adaptive assets. For example, by building and maintaining springshed recharge structures, plantations and livestock sheds, MGNREGS households have accumulated skills and knowledge to better manage available groundwater during winter droughts and undertake agricultural practices that are more resilient to frequent and prolonged droughts.

Access to digitised guaranteed wages and income from productive assets created under MGNREGS allowed beneficiaries to accumulate financial capital to save and make investments in adaptive inputs. Such structural changes in livelihood capitals are necessary for households to bounce back from hazards and anticipate and plan for future hazards.

Our meta-analysis substantiates these findings (see Figure 6), indicating that households with adaptive resilience have access to multiple services under social protection programmes.

Transformative resilience

On its own, MGNREGS does not contribute to transformative resilience. But it can act as a stepping stone when delivered in convergence with other risk management instruments that enable households to access livelihood opportunities that are not sensitive to climate hazards.

Across our case study sites, 4% of the sampled households were able to transform their livelihood strategies in response to climate hazards. A small number of households in Odisha provided the clearest example of transformative resilience. In Mayurbhanj district, 15% of sampled households developed transformative resilience with improved consumption and fundamental changes in their income sources, consumption, assets and capabilities (Steinbach et al. 2017).

Contextual factors influencing transformative resilience outcomes in this district include exposure to drought, significant dependence on climate-sensitive livelihoods and higher levels of initial wellbeing compared to households in the other case study sites.

Households in Mayurbhanj have access to multiple MGNREGS interventions as well as risk management/resilience-building interventions provided through other government initiatives. For example, access to guaranteed wages and rubber, mango and grass plantations under MGNREGS, in convergence with the Directorate of Horticulture, Ministry of Agriculture, gave MGNREGS beneficiaries productive assets and financial capital. The district council provided drip irrigation for these plantations from bore wells and farm ponds. The plantations – which are better able to withstand the impact of floods and droughts and

Figure 6: Social protection and adaptive resilience

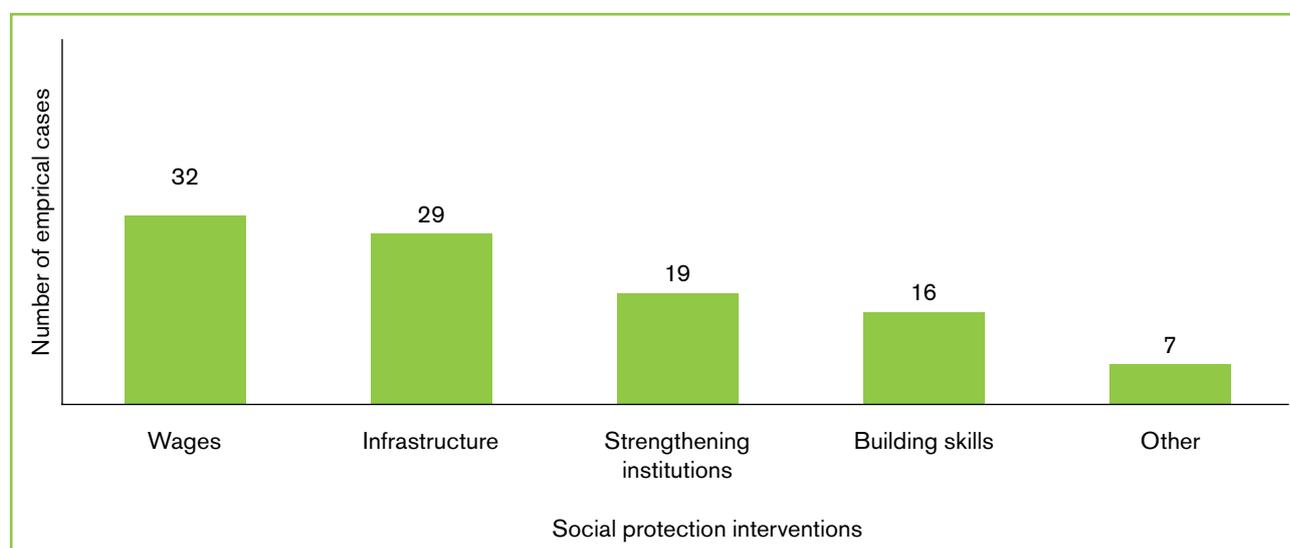
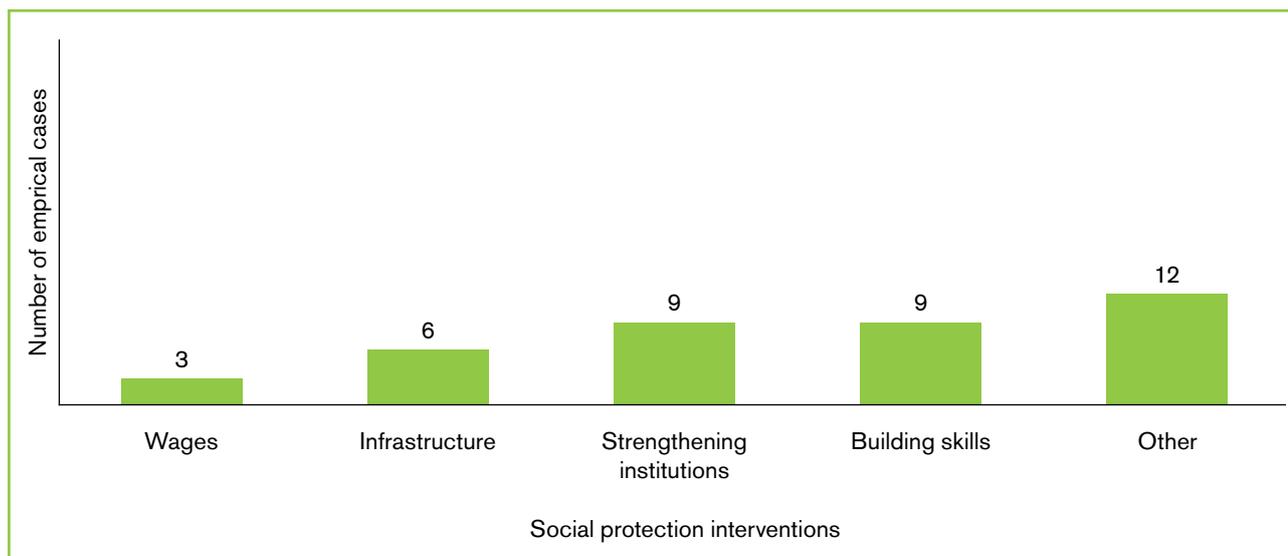


Figure 7: Social protection and transformative resilience



provide mitigation benefits – were set up in 2011–12 and have a survival rate of 96% (UNDP 2015). Through convergence with the Odisha Livelihoods Mission, an autonomous society under the government of Odisha’s Department of Panchayati Raj, these beneficiaries have formed producer groups and been linked to market actors, including rubber, dairy and handicrafts companies. Beneficiaries generate an estimated annual average income of US\$420 from the plantations (UNDP 2015).

By contributing to their natural, physical, social, human and financial capital, these combined interventions have enabled households to invest in new income sources and access new job opportunities to move out of poverty and climate vulnerability.

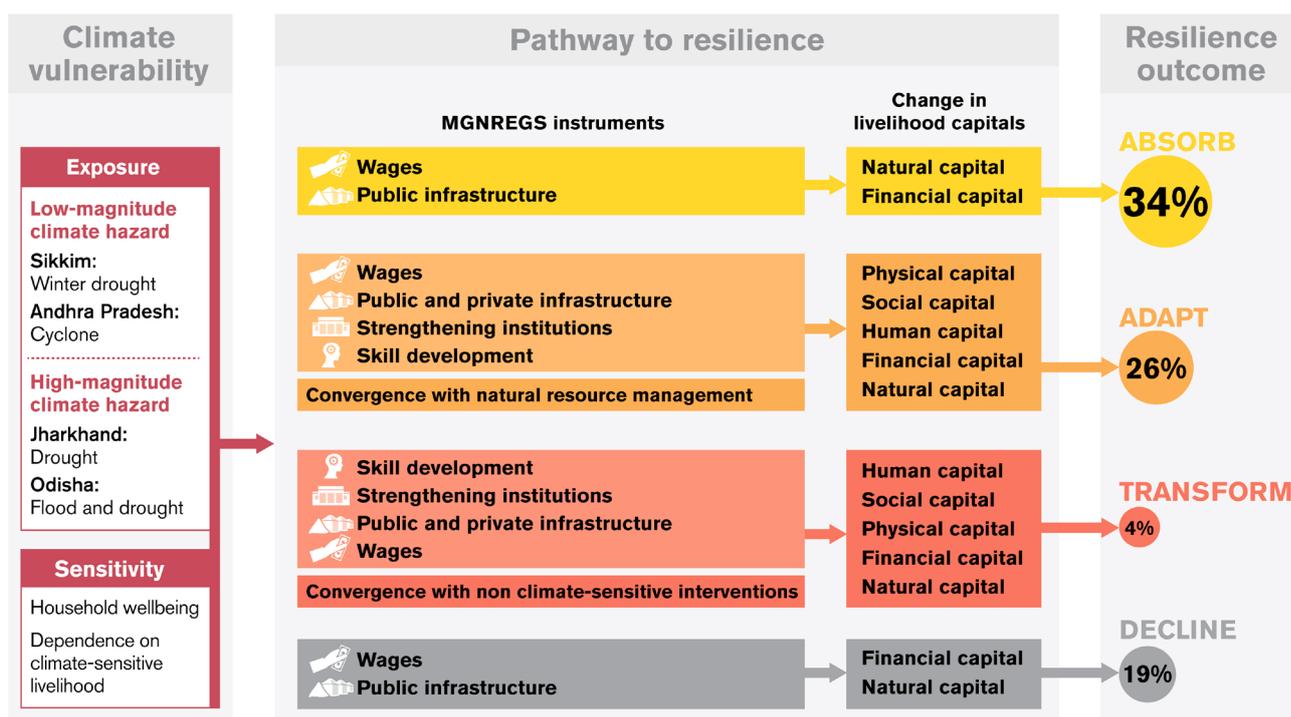
Findings from our meta-analysis indicate that households with transformative resilience rely significantly on interventions that strengthen institutions and skills, in combination with other risk management interventions to step out of poverty and climate vulnerability.

Decline in resilience

Despite having access to MGNREGS, 19% of our sampled households reported a decline in resilience. This outcome was more frequent in Jharkhand, where 50% of sampled households reported a decline in wellbeing after exposure to high-intensity droughts. Across our case studies, households that registered a decline in resilience only had access to wages and public infrastructure created under MGNREGS. They reported a decline in financial and natural capitals, which left them unable to maintain their income, consumption and assets.

These findings demonstrate important considerations for the future effectiveness and sustainability of MGNREGS in the context of increased climate variability and extreme weather events.

Figure 8: MGNREGS pathway to resilience



Resilience in the local economy

MGNREGS' contribution to climate resilience in the household economy has subsequent benefits for resilience in the local economy. Across our case study states, we found that, despite exposure to climate hazards, the rural labour market, infrastructure and agricultural productivity have remained the same or improved.

In the case of the rural labour market, 96% of sampled households stated that wage rates have remained the same or improved in the context of a changing climate. The reported wage rate increase is consistent with MGNREGA wage revisions proposed by central government for each state, based on the Consumer Price Index – Agricultural Labour. The consumption basket used to set the index was designed in 1983 and does not take into account the impact of climate change.

Ninety-six per cent of households acknowledged MGNREGS' contribution to strengthening skills in the rural economy and 36% reported an improvement in their skills. This important finding indicates that MGNREGS beneficiaries are accumulating skills that

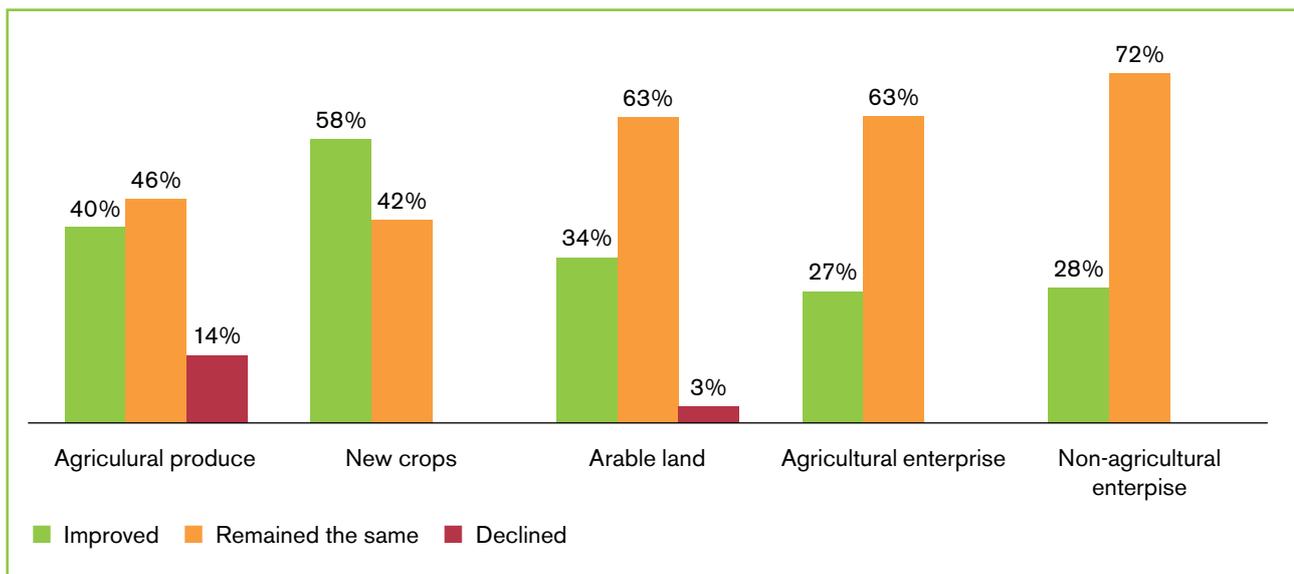
enable them to absorb, adapt and/or transform their livelihood strategies in response to climate change. As we outlined in the cases of Sikkim and Odisha above, these changes include skills to identify and create climate-resilient assets such as ground water recharge structures, to effectively manage assets such as drought-resistant plantations and organic farms and to engage in market networks.

Preliminary evidence also suggests that MGNREGS has improved the resilience of productive activities in the local economy. For example, despite exposure to climate change, 34% of households stated that assets created under MGNREGS have improved arable land; 40% stated that infrastructure and skills created through MGNREGS have improved agricultural production; and 27% stated that market linkages and skills development under MGNREGS had improved opportunities for agriculture-based industries. Interestingly, 58% of households also perceived MGNREGS to have contributed to the introduction of new crops, including drought-resistant varieties and 28% said it had contributed to new opportunities to engage with non-agriculture-based enterprises. Overall, these responses indicate the emergence of new potential pathways to transformative resilience.

Figure 9: MGNREGS' contribution to climate resilience in the rural labour market



Figure 10: Reported MGNREGS contribution to climate-resilient productivity



4

Scaling up MGNREGS' contribution to climate resilience

Our findings indicate that social protection programmes like MGNREGS can support households to absorb and adapt to low-intensity climate hazards. But when exposed to higher-intensity hazards, despite an increase in demand for MGNREGS, households register a decline in resilience.

We find that, by providing guaranteed wages and creating public natural resource management infrastructure, MGNREGS can enable households to accumulate natural and financial capital to maintain consumption when exposed to infrequent and low to medium-intensity climate hazards. Households that can access a combination of MGNREGS interventions – including wage labour, productive assets, institutional support and skills development – in convergence with other risk management/resilience building interventions can structurally change their natural, physical, human, social and financial capitals to achieve adaptive and transformative resilience. Our analysis shows the importance of households benefiting from more than just the guaranteed wage labour days if they are to thrive and build any form of resilience to climate shocks. It also shows the value of combining MGNREGS

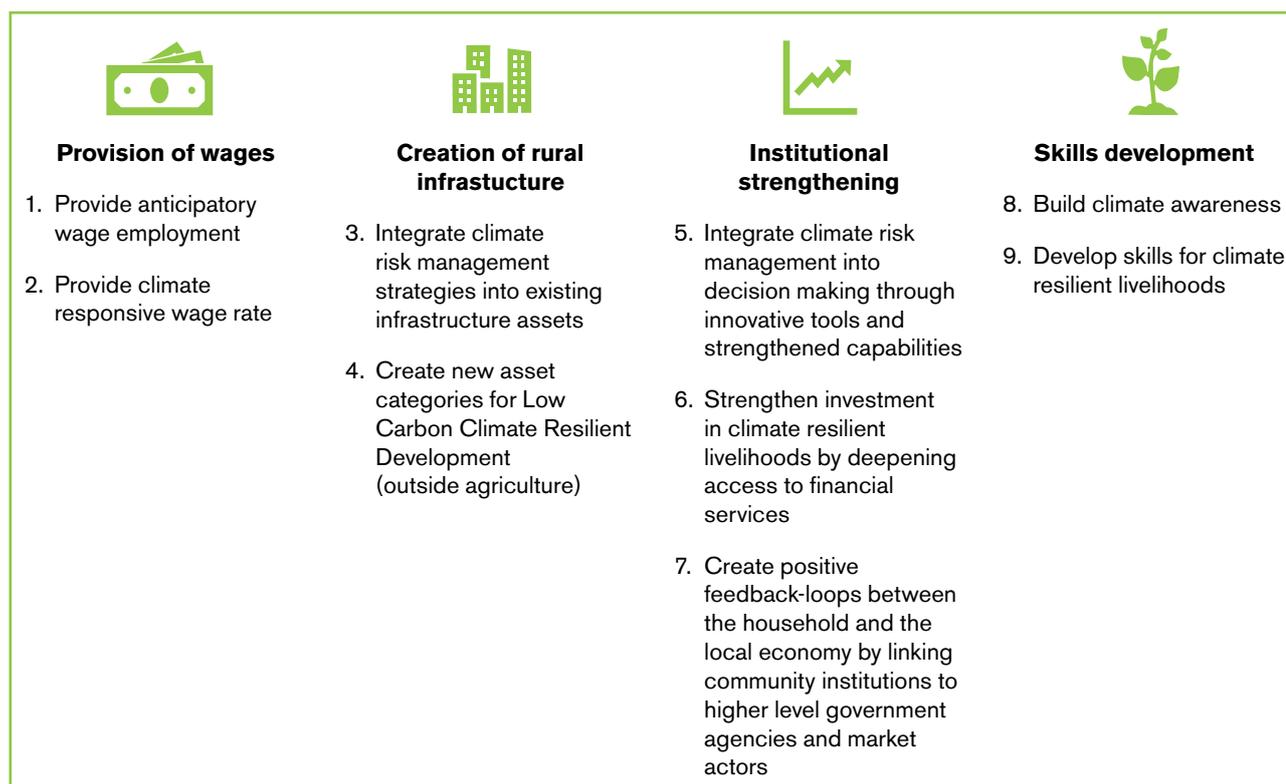
interventions with wider support to livelihoods and risk management tools.

Our study highlights two options for programmes such as MGNREGS to scale up and contribute more effectively to poverty reduction and climate resilience in households and the local economy.

Integrating climate risk management into MGNREGS provision

Our first policy option focuses on integrating climate risk management into MGNREGS provision to deliver shock-responsive wages and climate-resilient infrastructure, strengthen institutions to use climate information and build skills in climate-resilient livelihoods so that households can absorb, adapt and transform to climate risks and respond to opportunities. Figure 11 shows nine recommendations for integrating climate risk management into the four MGNREGS intervention pathways.

Figure 11: Recommendations for integrating climate risk management into MGNREGS provision



Climate-smart wages

Guaranteed wage labour enables households to absorb the impacts of infrequent and lower-intensity climate hazards. When delivered with other interventions, it can also contribute to adaptive resilience. By providing additional wage labour days in response to droughts and allowing households to demand wage labour at any time of year, MGNREGS is already implicitly responsive to the impacts of climate change. But to strengthen its responsiveness, we recommend that policymakers consider adding the following two actions to its wage labour component.

Recommendation 1. Provide anticipatory wage employment: This will enable households to access additional wage labour before a hazard and build monetary reserves to absorb climate shocks. By building their financial capital, these contributions will also improve households' capacity to maintain consumption during a hazard and bounce back more quickly by being able to rebuild assets, repay loans and buy insurance (Kaur 2017). Evidence already suggests that timely wage employment reduces distress migration of landless labourers and unskilled workers by 8–100% (Esteves et al. 2013) and that US\$1 invested in preparedness actions before disaster strikes saves US\$4–7 for relief actions after the disaster (Together we stand 2016). Anticipatory cash transfers are being piloted in Bangladesh under the forecast-based financing model where humanitarian agencies,

meteorological services and communities at risk agree on selected actions that are worth carrying out once a forecast reaches a certain threshold (Together we stand 2016).

To provide anticipatory wage employment, MGNREGS service providers will need to use weather forecasts to anticipate climate hazards and define thresholds that would trigger anticipatory employment for each climate hazard. Decision makers would then have to develop operational guidelines and identify appropriate sources of finance.

Recommendation 2. Provide a climate-responsive wage rate: This will allow households to accumulate higher levels of financial capital to absorb the impact of acute climate risks. Central government sets MGNREGS wage rates for each financial year, following Section 6(1) of the MGNREGS Act. Individual states can set a higher wage rate and pay the difference from state-level funds. The wage rate is based on the consumer price index (CPI) for agricultural labourers, which draws on 1983 consumption patterns (IIED 2017). An expert committee has recommended revising the baseline index to account for consumption patterns that rely on the rural CPI (van Klaveren et al. 2015), but wage rate notifications do not consider the impact of increasingly frequent and higher-intensity climate hazards on the rural CPI. For example, while wage rates have led to an overall increase in household income by around INR 50 (US\$0.7) a day post-MGNREGS

(Esteves et al. 2013), many beneficiaries indicated that their wages did not meet their household consumption needs during a severe drought (Steinbach et al. 2017).

By introducing climate-responsive wage rates that are scaled up in response to climate shocks to help rural households cope with the impacts of climate change, MGNREGS could increase its contribution to absorptive resilience. Analysing the impact of climate change on consumption patterns with different intensities of climate hazard would be a good basis for reviewing wage rates.

Climate-smart infrastructure

Public and private infrastructure created under MGNREGS can strengthen household and local economy resilience. Evidence suggests that infrastructure targeted at natural resource management and agricultural development has contributed to households' natural, physical and financial capital. But infrastructure created under MGNREGS is also sensitive to the impact of frequent and higher-intensity climate impact. For example, floods have undermined the durability of soil and water conservation infrastructure in Odisha and droughts have undermined the durability of water conservation infrastructure in Sikkim and Jharkhand. To integrate climate risk management into the selection, creation and maintenance of infrastructure under MGNREGS, we recommend that policymakers consider adding the following two actions to its rural infrastructure component.

Recommendation 3. Integrate climate risk management into existing infrastructure categories by using climate information services (CIS) and monitoring and evaluation (M&E) systems to improve planning and durability of MGNREGS infrastructure.

Using CIS for climate-responsive planning and asset design will involve understanding the demand for and supply of CIS, designing accessible and responsive CIS and strengthening institutional capabilities to access and use CIS in MGNREGS planning and delivery of assets.

Operationalising M&E systems will involve drawing on the MGNREGS management information system, the Geo-MGNREGA initiative – which tags and monitors assets created under MGNREGA – and MGNREGA social audits to evaluate the quantity and quality of assets delivered under MGNREGS and their contribution to resilience.

Recommendation 4. Create new asset categories for low-carbon and climate-resilient development:

These are necessary for households to step out of climate-sensitive livelihoods such as agriculture. As well as the four MGNREGS asset categories, *gram*

sabhas (village committees) can sanction additional 'special works' infrastructure, which are agreed at state level. This category includes *anganwadi* (mother and child health) centres, household latrines and individual homes. Within this category, MGNREGS can also include infrastructure that helps highly vulnerable households transition away from agricultural into new livelihood activities that are less exposed to climate hazards. While there is no precedent for this, policymakers can revise the MGNREGA schedule of works to create new infrastructure categories that support:

- Livelihood opportunities in low-carbon and climate-resilient development, including off-grid renewable energy infrastructure such as solar and wind energy or biogas, and
- Green technology investments such as passive housing to reduce exposure to heat extremes or creating innovative building materials.

Investing in these types of manufactured capital will create new skills (human capital) and income sources (financial capital) which can all help households address escalating climate stresses and benefit from new market opportunities (transformative resilience).

Climate-smart local institutions

Integrating climate risk management into MGNREGS' strengthening institutions component has the potential to improve local governance, leading to greater financial inclusion and supporting cross-scale linkages. These shifts are critical if MGNREGS is to lead more reliably to adaptive and transformative – rather than absorptive – resilience. As such, we suggest that policymakers consider adding the following three actions to its strengthening institutions component.

Recommendation 5. Integrate climate risk management into MGNREGS decision making to strengthen planning and delivery. As we outlined under Recommendation 3, CIS and M&E systems can strengthen MGNREGS beneficiaries and functionaries' capabilities to anticipate and plan for climate change, including the ability to:

- Provide anticipatory and climate-responsive wages (Recommendations 1 and 2) and allocate labour effectively
- Improve the durability of MGNREGS infrastructure (Recommendations 3 and 4)
- Deepen access to financial services (Recommendation 6), and
- Build climate awareness and identify climate-resilient skills development opportunities (Recommendations 8 and 9).

Recommendation 6. Deepen access to financial services for climate-resilient investments:

MGNREGS should continue to link rural households to formal banking institutions by opening bank accounts for job cardholders and providing digitised payments to improve their financial capital to invest in climate-smart opportunities. Evidence from Bihar and Andhra Pradesh indicates that digitised payment systems reduce inefficiencies and provide timely payments, enabling households to cope with shocks (Banerjee et al. 2014, Muralidharan et al. 2014). MGNREGS service providers can promote the use of MGNREGS financial mechanisms to improve the quality of finance targeting poverty and vulnerability reduction (see recommendation on financial convergence below).

Recommendation 7. Create positive feedback loops between household and local economies by strengthening linkages between community institutions and higher-level government bodies and market actors:

MGNREGS contributes to resilience in the household economy, which has a knock-on effect on resilience in the local economy, providing opportunities for creating climate-resilient jobs, productivity and rural infrastructure. This creates positive feedback loops. Policymakers can focus on these positive feedback loops more explicitly by strengthening linkages between community institutions and higher-level government bodies and market actors. This will sustain and scale up MGNREGS' contribution to climate resilience. For example, in South Sikkim, MGNREGS has invested in livestock sheds and organic composting infrastructure at scale, creating a new dairy industry in the district. In convergence with other programmes, MGNREGS has supported beneficiaries to form producer groups, which are now linked to the dairy cooperative. Similarly, in Odisha, MGNREGS has created productive assets in the form of plantations. In convergence with the Odisha Livelihood Mission, beneficiaries have organised into producer groups and linked to market enterprises, providing a steady source of income and new job opportunities.

Climate-smart skills

Although MGNREGS rightly focuses on providing wage employment to unskilled workers through infrastructure development initiatives, job cardholders across our case study locations and states have also developed their human capital through knowledge and vocational skills they learned while building new assets. These skills have helped them absorb and adapt in response to climate hazards and opportunities and have given them the potential to transform their livelihoods. We recommend that MGNREGS service providers build greater climate awareness among MGNREGS functionaries and beneficiaries and focus on developing

skills to help beneficiaries move out of climate-sensitive livelihoods, and shape and benefit from ongoing economic transitions in the region.

Recommendation 8. Build MGNREGS functionaries and beneficiaries' climate awareness:

Local decision makers who are informed about climate change and beneficiaries who have greater awareness of climate will be better able to anticipate and plan for climate hazards. Integrating climate awareness programmes into existing training modules – such as *e-Saksham* training on integrated natural resource management, geospatial information systems and *gram panchayat* plan development – can help.

Recommendation 9. Develop skills for climate-resilient livelihoods: MGNREGS can roll out training programmes – for example, through Project LIFE or in convergence with the National Skill Development Programme – to train households in climate-smart livelihoods and activities such as small-scale renewable energy initiatives. This would help households transition away from climate-sensitive sectors and promote green growth in rural areas. Training barefoot engineers to identify, design and build climate-resilient and low-carbon infrastructure, like renewable energy and green infrastructure, would reduce households' exposure and/or sensitivity to localised climate risk and would be tailored to communities' current livelihood needs and future livelihood opportunities.

Delivering MGNREGS in convergence with other risk management instruments

Our second policy recommendation is to deliver social protection interventions, like MGNREGS, in convergence with wider investments in climate risk management instruments. This will enable MGNREGS service providers to draw on technical and financial resources from other development missions/ investments to integrate climate risk management into MGNREGS provision. This will help build and sustain household and local economy resilience over time in the face of increasingly frequent and higher-intensity climate hazards and uncertainty.

Convergence is a policy focus of the Ministry of Rural Development, which encourages integrated planning by converging technical and budgetary resources available under its five rural development schemes and other programmes. This is expected to improve the coherence of the delivery of the range of investments the government of India is making.

Convergence with agricultural, natural resource management and livelihood initiatives has improved MGNREGS' contribution to absorptive and adaptive resilience in the household economy as we saw in the cases of Sikkim and Odisha. Building on this objective, Figure 12 depicts several options to combine and layer MGNREGS with climate risk management instruments.

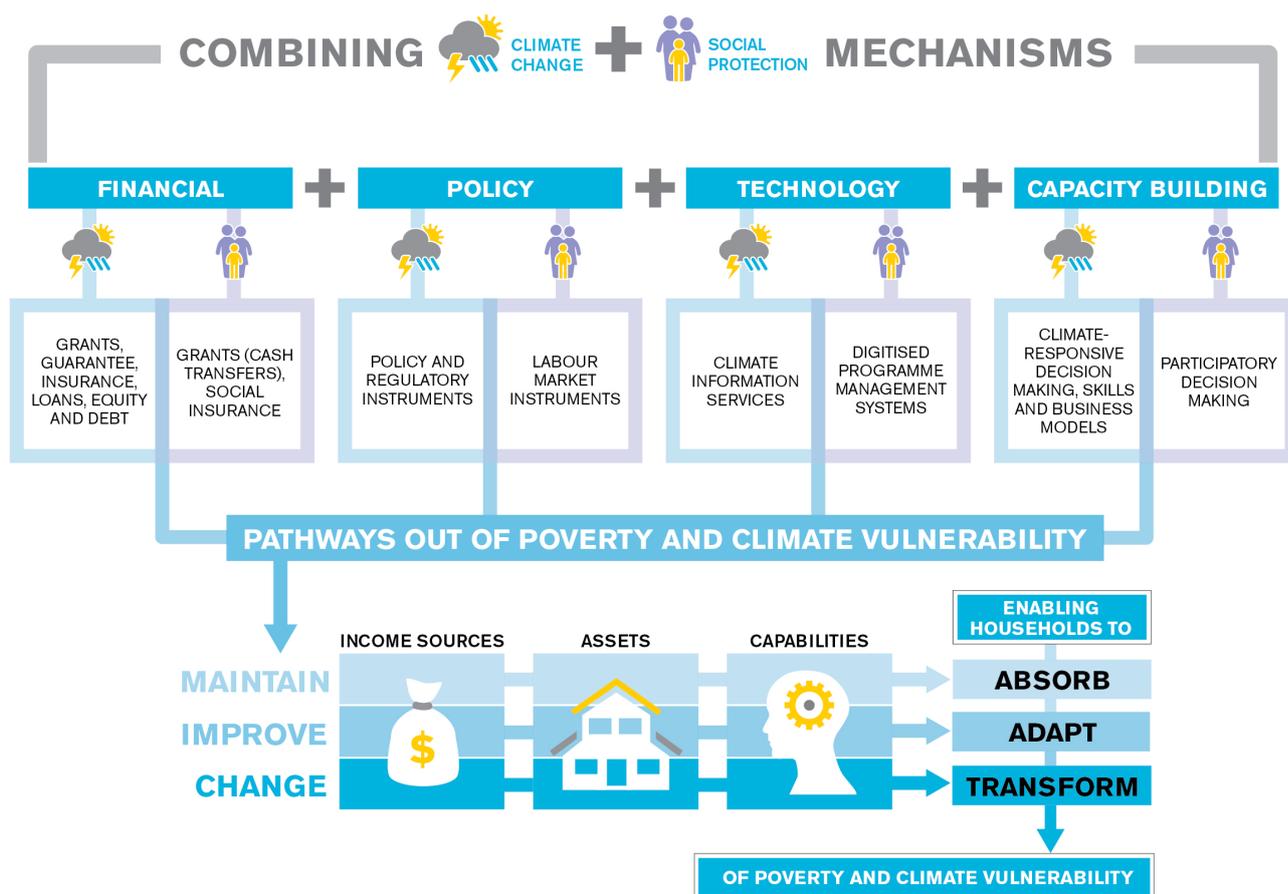
Convergence between MGNREGS and climate policy instruments: This ongoing initiative reinforces the country's commitment to resilience, supports institutional coordination to deliver this policy objective and improves implementation through effective design, resource use and greater reach. Guidelines for converging MGNREGS with the Ministry of Environment, Forest and Climate Change's Green India Mission outline that integrated planning between both initiatives will improve the scale and quality of afforestation efforts as well as the planning of

MGNREGS assets. It will also generate green and sustainable employment. By pooling budgets and using similar institutional arrangements, convergence should result in effective and efficient use of resources and improved governance (MoEF&CC 2015).

Convergence between MGNREGS and the National Mission on Sustainable Agriculture and Water has also resulted in the joint implementation of organic farming interventions and the creation of climate-resilient soil and water conservation infrastructure and modern food storage facilities.

Ongoing pilots under the National Mission on Sustainable Habitats are using MGNREGS workers for solid waste management and the Solar Appliances for Rural Energy Guarantee and Appliances – a self-sustaining programme for energy generation and youth employment – envisages using MGNREGA as

Figure 12: Delivering MGNREGS interventions in convergence with other risk management instruments



Source: Kaur, N et al. (2016)

its implementation model. Convergence with these missions will enable MGNREGS workers to move into fundamentally new livelihood opportunities that offer more climate-resilient and lower-carbon pathways out of poverty.

Convergence between MGNREGS and climate finance mechanisms can deliver greater quantity and quality of finance to scale up MGNREGS' contribution to climate resilience and help manage climate-induced financial risks to the programme. For example, India could use climate finance from the National Climate Change Missions, the National Adaptation Fund for Climate Change and international sources to integrate climate risk management into MGNREGS. These sources could help meet the additional cost of creating climate-resilient infrastructure and skills. MGNREGS service providers can also explore using risk finance through insurance and forecast-based financing instruments to maintain investment in climate-resilient assets in the event of a climate shock and use resilience bonds to scale up investment in these assets.

Convergence between the financial mechanisms used to deliver these finances can also improve the quality of investment. For example, MGNREGS' Employment Guarantee Fund is a basket fund that

can pool finance from different sources and allocate them to community-identified priorities. Its Electronic Fund Management System provides direct budget transfers to beneficiaries, making it the government's most transparent and efficient fund transfer mechanism. MGNREGS can use these mechanisms to channel additional sources of climate finance to scale up investment in inclusive and climate-resilient interventions (Kaur et al. 2019).

Convergence between technological and capacity building interventions can support climate-resilient decision making, resulting in innovative solutions to climate risk management. For example, convergence between technological solutions like climate information and geo-tagging services and MGNREGS' digitised payments system can support the provision of anticipatory wages and targeted budget allocation to create climate-resilient infrastructure. Convergence between capacity building initiatives rolled out through the National Climate Change Missions, MGNREGS and the National Skill Development Mission can also contribute to the creation of climate-resilient rural skills, enabling poor households to shape and benefit from green jobs and investments.

Looking forward

Social protection programmes like MGNREGS can contribute to a household or community's resilience by enabling access to:

- Scaled-up cash transfers to absorb the impact of infrequent climate hazards
- Climate-smart wages, assets, institutions and skills development opportunities to adapt to climate trends, and
- New labour and skills development opportunities to transform livelihoods in response to increasing frequency or intensity of climate hazards.

Such programmes already help poor households and communities manage poverty and marginalisation. But can they also help them address the stresses produced by climate threats? We have seen that MGNREGS already helps households absorb the impacts of low-intensity hazards and, when delivered alongside other risk management instruments, it helps them adapt and transform their livelihood strategies to deal with more frequent and higher-intensity hazards.

To contribute effectively to poverty reduction and climate resilience in the face of the increasingly frequent and bigger climate hazards, MGNREGS needs to develop a coherent approach that converges the range of climate risk management tools available under rural development investments. To do this, it must better integrate climate risk management in its design and delivery and improve its linkages with other risk management instruments. Climate-smart wages, infrastructure, institutions and skills can help households absorb, adapt and transform to climate risks and respond to opportunities, while delivering MGNREGS interventions in combination with other risk management instruments can build and sustain household and local economic resilience.

Governments, civil society and private sector organisations worldwide implement many social protection strategies to help households and citizens manage the ill-effects of socio-environmental risks and losses. They invest trillions of dollars annually to support effective responses to risks and losses from disease, natural disaster, old age, poverty, social marginality, discrimination or unexpected adverse experiences. Existing social protection programmes can confer greater resilience against climate hazards. They can do this by making small adjustments to their design and implementation, covering incremental costs with additional financing and ensuring greater consistency and coherence with wider investments. Such a creative shift is not only possible; it is a critical and obvious next step in a world whose people and communities, species and ecosystems are increasingly threatened by unprecedented climate challenges.

This paper documents and demonstrates how the world's largest social protection programme and its largest development investment, founded on guaranteeing the security and dignity of employment, has also delivered greater climate resilience – almost in passing – to millions of households and their communities. Different social protection programmes will need different changes in design and execution to ensure they contribute to climate resilience. These will vary according to socio-economic and political contexts and experienced disasters.

But for there to be effective action in this climate-challenged world, there is a critical need for research to identify how governments can effectively manage social protection initiatives for greater climate resilience, and which of the many different forms of social protection are likely to create relatively greater resilience for people, communities and ecosystems.

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Appendix 1: Methodology

The methodology we followed for our study had four broad stages:

1. Analytical framework
2. Literature review and meta-analysis
3. Data collection
4. Data analysis

Analytical framework

The first step was developing an analytical framework to assess how MGNREGS contributes to resilience in the household and local economy. Using a theory of change model, we identified multiple pathways associated with absorptive, adaptive and transformative resilience. We present the analytical framework in the background and approach section of the main report.

Literature review and meta-analysis

We undertook a systematic review of peer-reviewed literature on social protection programmes and MGNREGS to assess how they have helped build climate resilience. Our objective was to collect information from existing studies to inform analyses of how MGNREGS can provide a pathway to climate resilience.

We selected papers for our review from two online research paper databases – *Scopus* and *Web of Science* – using 35 keywords and their combinations. A preliminary review of the 814 article abstracts we recovered from the searches removed duplicates and studies that were not relevant for drawing lessons for MGNREGS (high-income country and urban contexts), lacked measurable outcomes or focused on historical cases. We also excluded working papers that had not undergone peer review or were unavailable through inter-library loan within the research period.

This screening exercise excluded 435 papers. We reviewed the remaining 379 for our meta-analysis. They fell into four categories:

- 1. Direct empirical studies:** Papers containing at least one case study of a direct programmatic intervention by governmental agencies, non-governmental organisations or private corporations to promote both positive climate and social outcomes.
- 2. Indirect empirical studies:** Papers containing at least one case study of community-initiated or household-level adaptation efforts to promote positive climate and social outcomes in the wake of climatic shocks.
- 3. Theoretical papers:** Papers that contained relevant content but lacked a direct or indirect case study or intervention.
- 4. Background papers:** Literature reviews and surveys of multiple studies.

To draw relevant lessons for MGNREGS implementation, we coded the information from the final set of direct empirical studies, categorising programme activities to correspond with the four MGNREGS components: wages, assets/infrastructure, strengthening institutions and building skills. We classified the many social protection programme studies that also incorporated additional actions and outcomes – such as insurance and loan guarantees – as ‘other’.

After removing theoretical and conceptual papers, background papers, field surveys and indirect empirical studies, as well as those with insufficient information on programme implementation and results, we drew up a final list of 53 papers. These contained information on 65 case studies, including 24 studies of MGNREGS projects in different parts of India (see Table 1).

Table 1: Spread of MGNREGS components in reviewed case studies

COMPONENT	NUMBER OF CASE STUDIES
Wages	37
Assets/infrastructure	35
Building skills	17
Strengthening institutions	23
Other	18

Table 2: Study states and climate hazards

STATE	CLIMATE HAZARD(S)	
	RAPID ONSET	SLOW ONSET
Andhra Pradesh	Cyclone	–
Jharkhand	–	Drought
Odisha	Flood	Drought
Sikkim	–	Drought

Data collection

We carried out a detailed study of MGNREGS interventions and outcomes at four sites across four states (see Table 2). In consultation with national policymakers, we selected these states primarily on their exposure to different climate hazards and experience of addressing these hazards through MGNREGS interventions. As the focus of our fieldwork was to understand what works for climate resilience, our selection was biased towards states identified by MoRD with better MGNREGS implementation.

After identifying the states, we created a preliminary shortlist of districts affected by particular climate hazards, based on the following general and state-specific criteria:

- Presence of a high number of vulnerable households
- Affected by recurrent cyclones (Andhra Pradesh), recurrent drought (Jharkhand), recurrent floods and droughts (Odisha) and rainfall variability and recurrent winter droughts (Sikkim).

We then used the following parameters to create a MGNREGS performance index for shortlisted districts:

- Days of employment per household (person days)

- Percentage of wages paid within the stipulated time, and
- Work completion rate (per cent).

To calculate the index, we scaled the absolute values of each performance metric to a value between 0 and 1 by dividing each performance metric's observed absolute value by its highest achieved absolute value across the state. We added the scores for the different performance metrics to arrive at an index value between 0 (lowest) and 3 (highest) (adapted from Mathur and Bolia 2016).

One of our main objectives was to document experience with different types of MGNREGS interventions (wages, assets, institutional strengthening and skills upgrading) to ensure we were covering a wide range of interventions and assets across the four sites. As it was not possible to discern this detail from the composite index, we selected the districts and specific sites within them based on local experts and key informants' domain knowledge. Based on this exercise, we selected the sites in Table 3 for our fieldwork.

After selecting the sites, we collected site-specific secondary data on climate hazards and local livelihoods from government agencies and other published or online sources. We collected data on MGNREGS interventions from the MGNREGS MIS web portal.²

² <http://mnregaweb4.nic.in/netnrega/MISreport4.aspx>

Table 3: Sites selected for fieldwork

STATE	DISTRICT	SITES ³
Andhra Pradesh	Srikakulam	Rushikudda village, Rushikudda <i>Gram Panchayat</i> , Sompeta <i>Mandal</i> Isakalapalem village, Isakalapalem <i>Gram Panchayat</i> , Sarubujjili <i>Mandal</i> Kammasigadam village, Kammasigadam <i>Gram Panchayat</i> , Ranastalam <i>Mandal</i>
Jharkhand	West Singhbhum	Kuira village, Jaipur <i>Gram Panchayat</i> , Hat Gamharia Block Hatna Beera and Pahar Bhanga villages, Asura <i>Gram Panchayat</i> , Jhinkpani Block
Odisha	Mayurbhanj	Dhadasahi and Kakudia hamlets, Chitrada <i>Gram Panchayat</i> , Morada Block Demphouda village, Patalipura <i>Gram Panchayat</i> , Betnoti Block Kujidihi village, Kujidihi <i>Gram Panchayat</i> , Suliapada block Jadunathpur village, Jadunathpur <i>Gram Panchayat</i> , Badasahi Block
Sikkim	South Sikkim	Chupa Phong, Tanzi Bikmat, Mellidara, Maniram Phalidara, Damthang <i>Gram Panchayats</i> of Namchi, Namthang and Sumbuk Blocks

Our qualitative primary data is mainly from focus group discussions with:

- Officials involved in MGNREGS planning and implementation at national, state, district, block, *panchayat* and village levels **key person interviews**
- Officials of other relevant agencies involved in addressing climate risks, such as Disaster Management Agency and Department of Meteorology
- Officials of other relevant agencies involved in convergence programmes with MGNREGS, such as Forest Department, Fisheries Department and State Rural Livelihoods Missions
- Officials of other agencies with potential for convergence with MGNREGS, and
- Experts with special knowledge on climate hazards, rural livelihoods or MGNREGS.

We conducted 21 **focus group discussions** with MGNREGS workers and community members involved in other related initiatives such as the State Rural Livelihoods Missions. We conducted separate focus

group discussions with male and female workers, where feasible.

We used a questionnaire-based household survey across all four states to collect data on:

- The status of the household economy, ecosystems and local economy
- Climate change and its impact, and
- MGNREGA implementation and its contribution towards building climate resilience.

We conducted the **household survey** in the same sites where we collected qualitative data. We only included households with MGNREGS job cards in the survey, selecting active and inactive job cardholders on a ratio of 9:1, with a target of minimum 150 households per site. We interviewed one MGNREGS worker per household. Half our respondents (50.2%) were women and 75% were household heads.

Our survey covered 651 households. Table 4 shows the breakdown of respondents by state and sex.

Table 4: Respondents, by study state

STATE	NUMBER OF RESPONDENTS		
	WOMEN	MEN	TOTAL
Andhra Pradesh	86	83	169
Jharkhand	85	79	164
Odisha	83	77	160
Sikkim	73	85	158

³ Each state in India is divided into districts, which are further sub-divided into smaller administrative units such as mandals or blocks, which, in turn, are sub-divided into gram panchayats that cover one or more villages.

We piloted and field-tested our questionnaire with nine respondents in Srikakulam district, Andhra Pradesh. A team of field investigators administered the survey at each site after two days' training. They collected data through tablet-assisted personal interviews. We ensured prior informed consent, informing respondents about the nature and purpose of the study before starting the survey.

Data analysis

Our analysis of the qualitative data allowed us to understand the broad socioeconomic and political context MGNREGS operates in at different sites and key stakeholders' perspectives on MGNREGS' performance and impact. We were also able to develop state-level illustrative case studies, highlighting MGNREGS' role in building climate resilience of the poor.

Our quantitative data analysis using data from the questionnaire-based survey covered three broad areas:

household wellbeing; change in wellbeing owing to climate hazards; and MGNREGS' role in building resilience to climate shocks.

Household wellbeing analysis

To facilitate our analysis, we built a household wellbeing index using reported levels of and changes in income, consumption, assets and capabilities. We combined the multidimensional poverty index (OPHI) and the capabilities approach (Sen 1999) to understand how households can maintain (absorb), improve (adapt) or fundamentally change (transform) their sources of income, consumption, assets and capabilities to respond to climate risks. The index combined parameters related to a household's income, consumption, assets and capabilities (ICAC), giving equal weight to each dimension. We scored households 1 or 0 for each parameter. The resulting wellbeing index ranged between 0 and 4. We then divided the additive score for the index by four, so the final value ranged between 0 and 1.

Table 5: Study parameters, by key household wellbeing dimension

INCOME	
Per capita daily income above the official poverty line	1
Per capita daily income below the official poverty line	0
CONSUMPTION	
Adequate food for all household members for all days in the calendar year before the survey	1
Insufficient food for at least one household member for one or more days in the previous calendar year	0
ASSETS	
Land ownership	0.5
Landlessness	0
Ownership of any specified asset: well, borewell, farm equipment, mobile phone, radio, TV	0.5
Lack of any specified assets	0
CAPABILITIES *	
High or medium-level participation in <i>gram sabha</i> meetings ⁴	1
Low or no participation in <i>gram sabha</i> meetings	0
Any household job cardholder with formal schooling	1
No household job cardholder with formal schooling	0
Any household member with technical knowledge	1
No household member with technical knowledge	0

* Note: Because we took three capability parameters into account, we gave a score of 1 if present and divided the additive score by 3.

⁴Village assembly consisting of all voters in a *gram panchayat*.

Climate impact on household wellbeing and local economy

We assessed the change in wellbeing for all households that reported impact from climate shocks by examining the impact of cyclone, flood, drought or rainfall variability on ICAC wellbeing parameters. Each surveyed household reported whether parameters – such as income or food intake – decreased, did not change or increased due to exposure to the climate shock they had experienced.

We scored households as +1 for reported increase, 0 for no change and -1 for decrease and compiled the scores to analyse impact on household wellbeing index as a result of the shocks. We classified households that scored -1 or lower overall as having suffered a decline in wellbeing due to a climate shock; households that scored between -1 and +1 overall as having experienced no change in wellbeing; and households that scored above +1 overall as having improved their wellbeing.

We assessed climate impacts on the local economy through changes in critical public infrastructure such as roads, health centres, schools, community and government buildings and impact on key ecosystem services that support economic activities such as agriculture (arable land, fresh water) and local barter or sale, such as forest products.

MGNREGS' contribution to resilience

We assessed MGNREGS' role in building resilience to climate in terms of absorptive, adaptive and transformative resilience. If a household reported no overall change in ICAC score due to MGNREGS interventions, we considered it a case of absorptive resilience; if it reported an increase in overall ICAC score, we considered it a case of adaptive resilience; and if it reported a structural change in ICAC parameters, we considered it a case of transformative resilience.

To assess whether households underwent a change, and whether that change was transformative, we examined MGNREGS' impact on the five livelihood capitals – financial, physical, human, natural and social – at household level and any consequent change in ICAC score. We scored ICAC responses for each type of the capital as +1 for increase, 0 for no change and -1 for decline, so households could score between -4 and +4 for each type of capital. We considered all

households that scored -1.5 or lower as having suffered a decline; those that scored between -1.5 and +1.5 as having experienced no change; and those with a score of more than +1.5 as having experienced an enhancement in wellbeing. We then asked respondents to rank the MGNREGS interventions – wages, assets, institutional strengthening and skills upgrading – that were responsible for the impact.

To assess whether a household had undergone an absorptive, adaptive or transformational change in resilience, we focused on the option that a respondent household reported most often as its resilience outcome. So, if a household responded 'yes' most often to 'no change', we considered that household to be in the absorptive resilience category; if it responded with a 'yes' most often to 'increase', we considered it to be in the adaptive resilience category; and if 'structural change' had the highest number of 'yes' answers, we considered it to be in the transformative resilience category. We classified any household with the same score for two options as being in a 'hybrid' category.

After classifying all households into absorb, adapt, transform (and hybrid) categories for a given type of capital, we examined respondent households to see which form of capital was most frequently associated with the reported resilience outcome. This approach allowed us to examine how different types of livelihood capitals were associated with absorptive, adaptive or transformative outcome.

We assessed MGNREGS' impact on the local economy through respondents' perceptions about changes to rural labour markets, public infrastructure, agriculture productivity, enterprises and institutions. For impact on rural labour markets, we considered both wages and skill upgrading. For public infrastructure, we assessed impact on key infrastructure such as roads and irrigation channels as well as overall change. For agriculture, we assessed changes to arable land, productivity and the introduction of new crops and for impact on entrepreneurship, changes in the number of enterprises (agriculture as well as non-agriculture) and institutions to promote economic activities.

We combined the results of the quantitative data analysis with the qualitative data and insights gained through key person interviews, focus group discussions, secondary data review and our meta-analysis to prepare the national report. The report focuses on key insights and policy recommendations to strengthen MGNREGS' climate resilience benefit.

The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) is India's flagship social protection programme. This paper is part of a series of studies that analyse how MGNREGS builds and strengthens the resilience of rural households to different climate shocks. The series identifies options for Indian policymakers to integrate climate risk management into MGNREGS. It also provides evidence for global policymakers on how to integrate climate risk management into social protection provision and combine and layer risk management instruments to address poverty in the context of climate change.

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