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Gender & Intersecting Vulnerabilities to Climate Change: Does India's National Rural Employment Guarantee Act reduce women's vulnerabilities?

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Gender and intersecting vulnerabilities to climate change: does India's national rural employment guarantee act reduce women's vulnerability?

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Abstract

Social protection has become a component of global development. Recently, there has been a growing interest in its potential to reduce women's vulnerability to climate shocks; however, there is a lack of evidence to substantiate these links. This paper contributes to the current limited empirical evidence by investigating the potential of the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) to reduce women's vulnerability to climate shocks, through mixed method case-study research in three villages in Odisha, Bihar and Chhattisgarh in India. The findings provide evidence that MGNREGA's potential to reduce women's vulnerability to climate shocks is limited by: (1) Lack of access to employment that does not depend on climate sensitive economic activities (2) Unpaid care work responsibilities (3) Lack of bargaining power and control in decision-making on planning and implementation of MGNREGA (4) Lack of implementation and monitoring of gender sensitive provisions in MGNREGA (5) Uneven distribution of benefits from asset creation in MGNREGA.

Keywords: climate change; vulnerability; gender; social protection; MGNREGA; India

1. Introduction

Climate change is now widely recognised as one of the greatest challenges facing humanity. It will likely lead to potentially devastating impacts on livelihoods, food security, water supply, mental health, and well-being (IPCC, 2014). But people will not all face this challenge in the same way, as the impacts of climate change are unevenly distributed; people that are marginalised in society are especially vulnerable to climate change because of intersecting social processes that create multidimensional inequalities (IPCC, 2014). Hallegatte and Rozenberg's (2017) recent study estimates that up to 122 million additional people could be in extreme poverty in 2030 due to climate change.[i]

Climate change and the inequalities in its impact are a key challenge for social protection programmes aimed at combating extreme poverty in the Global South. Climate change is likely to intensify the types of risks that those enrolled in social protection programmes will experience in the future. Many social protection programmes target women as the main beneficiaries, indeed women as a group are often more vulnerable to climate change when it reinforces existing patterns and practices of discrimination.

Recently, there has been growing interest in the potential role of social protection programmes for reducing women's vulnerability to climate change.

While there are increasing examples of good practice, there is limited robust empirical evidence showing how social protection interventions, directly and indirectly, support women to reduce their vulnerability to climate change. Therefore, this paper aims to add to this limited empirical evidence by 'investigating the potential of the Mahatma Gandhi National Rural Employment Guarantee Act[ii] to reduce women's vulnerability to climate shocks, via mixed method case study research in Khairani, Mansapur, and Annapurna in India. The paper specifically aims to answer two questions: 1) How do socio-cultural contexts and power axes of social differentiation influence how women (including Scheduled Caste and Scheduled Tribe women) are impacted and respond to climate change? 2) How can social protection programmes like MGNREGA facilitate adaptation that addresses women's intersecting vulnerabilities to climate change? India is a suitable place for this research as it is one of the most vulnerable countries to climate change globally and MGNREGA is the largest state-led public works programme in the world, with £53,024 million invested, generating 23,440 million person-days since 2005.

This paper begins by conceptualising vulnerability, gender and social protection, and then outlines the empirical approach adopted for this research. It goes on to examine five key factors that limit MGNREGA's potential to reduce women's vulnerability to climate shock: a lack of access to employment that does not depend on climate sensitive economic activities, unpaid care work responsibilities, lack of bargaining power and control in decision-making on planning and implementation of MGNREGA, lack of implementation and monitoring of gender sensitive provisions in MGNREGA, and uneven distribution of benefits from asset creation in MGNREGA.

2. Unpacking gender, vulnerability and social protection

2.1 Gender and intersecting vulnerabilities

Vulnerability is a differentiating process (Hilhorst and Bankoff, 2014), its uneven distribution arises from non-climatic factors and from intersecting socio-political processes that create multidimensional inequalities (IPCC, 2014; Seager, 2009). Multiple forces and processes cause vulnerability itself (Kelman et al., 2015; Bankoff, 2003; Wisner et al. 2004), these are often structural. Their underlying causes are largely shaped by economic, demographic, political, social and gendered processes (Thompson-Hall et al., 2016; Marino and Ribot, 2012; Wisner et al., 2004).

The persistent determinants of vulnerability expand to contextual gender and power relations (Blaikie et al. 1994). Gendered vulnerabilities often occur in concert with other vulnerabilities, resulting in synergistic and reinforcing constraints (Tschakert and Machado, 2012). The impacts of climate variability and change are experienced differently by men and women. This is due to socio-cultural norms and practices that influence: access and distribution of resources across time and space; participation in decision-making and politics; division of labour; knowledge and skills; safety and security; power structures, and persistent inequalities (Tschakert, 2012; Nelson and Stathers, 2009; Rossi and Lambrou 2008). This highlights the importance of structures of dominance and social relations in shaping vulnerabilities at the local level (Wisner et al., 2004). Indeed, feminist research has found that households are not uniform units (Agarwal, 1990; Sen, 1990), rather they are sites of competing claims, rights, power, interests and resources, with negotiations frequently shaped by differences (Chant, 2004; Jackson, 2002).

Climate variability and change is likely to exacerbate gendered vulnerabilities (Sultana, 2014). Women as a group are often more vulnerable to various climate and non-climate stresses when such stresses reinforce existing patterns and practices of discrimination (Sultana, 2010; Nelson et al., 2002). A range of socio-cultural practices across socio-economic classes reinforces such vulnerabilities (Kumar and Quisumbing, 2014; Sultana, 2010). However, different groups of women in the same community or even household are not affected equally, or experience the same level of vulnerability (Carr et al., 2016; Sultana, 2014; Wisner et al., 2004) as power operates to create inequalities based upon not only gender, but also other social differences (Nightingale, 2017; Moosa and Tuana, 2014). There are multiple, intersecting axes of difference and identity that shape how the impacts of climate variability and change will be distributed and experienced by individuals and groups (Osbourne, 2015; Elmhirst and Resurrección, 2008). Gender intersects with race/ethnicity, caste, class, age, religion, education, sexuality, seniority, household headship, (dis)ability, life cycle stage, relationship status, and other forms of social difference simultaneously, known as intersectionality (see Crenshaw, 1991; Mohanty, 1988). Intersectionality – 'the interaction between gender, race and other categories of difference in individual lives, social practices, institutional arrangements, and cultural ideologies and the outcomes of these interactions in terms of power' (Davis, 2008: 68), influence the differentiated nature of resilience and its diverse repercussions on vulnerability to climate variability and change (Arora-Jonsson, 2014; Resurrección, 2013; Nightingale, 2011).

Thompson-Hall et al. (2016) argue that the intersection of gender and seniority leads to differentiated vulnerability. Carr and Thompson's (2014) study in Mali found that senior women may be more vulnerable to variable precipitation compared to junior women as they are more dependent on added market sales of rain-fed peanuts to bolster their earnings from their home gardens. Huynch and Resurrección's (2014) study in Vietnam found that gender, household headship, age and stage of life

influence women's access to water, forestland and credit, which in turn determines their capacity to respond to agricultural water scarcity. For instance, some female-headed households could not adapt to water scarcity through increasing use of water from reservoirs due to their constraints in time and labour management compared to other women and men in male-headed households. In Bihar, Ravera et al's (2016) study found that some higher caste women with higher levels of education and wealth were better able to re-negotiate their roles in decision-making and develop a diversity of proactive ecosystem-based management strategies to reduce their vulnerability to a range of stresses.

2.2 Climate change and social protection linkages

Recently, there has been a growing interest on the part of government and non-governmental organisations (NGOs) in the potential of social protection programmes to reduce vulnerability to climate variability and change for women and vulnerable people (see Heltberg 2007; Stirbu, 2010). Social protection programmes encompass a range of interventions from safety-net programmes to social insurance programmes that enhance vulnerable people's resilience to adverse stresses and shocks that *transfer income and assets to the poor, protect the vulnerable against livelihood risks and enhance the social status and rights of the marginalised, with the overall objectives of extending the benefits of economic growth and reducing the economic or social vulnerability of the poor, vulnerable and marginalised groups'* (Sabates-Wheeler and Devereux, 2006).

Indeed, there is some evidence to suggest that social protection programmes and climate change adaptation can potentially be complementary approaches as both aim to reduce vulnerability. Incorporating climate change adaptation into social protection would mean understanding the ways in which social protection instruments and interventions can potentially contribute to climate change vulnerability reduction (see Table 1).[iii]

Table 1. Promoting vulnerability reduction to climate variability and change through adaptive social protection

Time-frame	Social protection category[iv]	Social protection instrument	Potential co-benefits for climate change vulnerability reduction
Short-term ↓ Long-term	Protective (coping)	• Social service provision • Social transfers (food/cash), including safety nets • Social pension schemes • Public works programmes	• Protection of those most vulnerable to climate risks, with low levels of adaptive capacity
	Preventative (coping)	• Social transfers • Livelihood diversification • Weather-indexed crop insurance • Social insurance	• Prevents damaging coping strategies as a result of risks to weather dependent livelihoods
	Promotive (adapting)	• Social transfers • Access to credit • Asset transfers or protection • Starter packs (drought/flood-resistant) • Access to common property resources • Public works programmes	• Promotes resilience through livelihood diversification and security to withstand climate related shocks • Promotes opportunities arising from climate change
	Transformative (adapting)	• Promotion of minority rights • Anti-discrimination campaigns • Social funds • Proactively challenging discriminatory behaviour	• Transforms social relations to combat discrimination underlying social and political vulnerability

Source: Davies et al. (2009), p205

Note: These categories of interventions may overlap. For instance, public works projects can both 'promote' incomes as well as 'prevent' deprivation as they aim to transfer short-term food or cash (prevention) and build long-term infrastructure (promotion) (Coirolo, et al., 2013).

However, there are few projects that integrate both climate change adaptation and social protection objectives, despite an adaptive social protection approach offering much potential in supporting women and vulnerable people to reduce their vulnerability to climate shocks (see Table 2). This is a key challenge given the effect that climate change will likely have on social protection interventions and programmes, and will change the types of risks that vulnerable people face (Kuriakose et al., 2013). While there are an increasing number of examples of good practice (Jones et al., 2010), there is limited robust empirical evidence showing how social protection interventions, directly and indirectly reduce women's vulnerability to climate variability and change (Davies et al., 2013).

Table 2. Potential benefits of adaptive social protection

• Introduces a longer-term perspective for social protection and climate change interventions. • Aligns social protection programmes with current and future climate change impacts in the project region. • Supports and strengthen poor and fragile livelihoods based on climate-sensitive economic activities. • Diversifies livelihoods into income generating activities that are less vulnerable to the impacts of climate change. • Creates integrated strategies of resilience to tackle climate change through improved coordination between ministries responsible for climate change and social protection. • Reduces the need to adopt distress coping strategies that maintain or reinforce vulnerability to climate change. • Uses existing structures or systems to target support (e.g. use social protection systems to direct support to vulnerable climate groups).

Source: adapted from Coirolo, et al. (2013), Davies et al. (2009), Harvey, (2007)

3. Research design and methods

3.1 Selection and description of case study sites

This paper is based empirically on case study research in India, which has been identified, as one of the most vulnerable countries to climate change impacts according to the Global Climate Risk Index 2018 (Eckstein et al., 2018). This study is part of the United Kingdom Government Department for International Development funded 'Infrastructure for Climate Resilient Growth' (ICRG) programme, which provides technical assistance to India's Ministry of Rural Development (MORD) and three states of India, Bihar, Chhattisgarh and Odisha, to improve the design and implementation of natural resource management activities under India's central anti-poverty scheme, the MGNREGA. The ICRG villages selected for this research were *Khairani* (case study village 1) in Nuapada block, located in Nuapada district, under Odisha state, *Mansapur* (case study village 2) in Laukahi block, in Madhubani district, under Bihar state, and *Annapurna* (case study village 3) in Premnagar block, in Surajpur district (Premnagar was formerly located in Surguja district)[v], under Chhattisgarh state.

These ICRG villages were selected as a suitable case study to investigate the potential of the MGNREGA to reduce women's vulnerability to climate shocks, because of their location in climate vulnerable districts, 'backward' blocks, and the phase of ICRG implementation. The case study villages were selected through a range of criterion. The Central Research Institute for Dryland Agriculture's (CRIDA) climate vulnerability rank and India's Ministry of Agriculture's drought frequency measures outlined in the 'Scoping Study on Infrastructure for Climate Resilient Growth through MGNREGA' (2016) were used as the two sorting criteria to identify the most vulnerable districts to climate change in Odisha, Bihar and Chhattisgarh.[vi] However, less weight was given to the drought frequency measure given that this refers only to frequency, rather than severity. Then the ICRG block within these districts

with the lowest backwardness rank were selected. However, the criterion had to be relaxed in some cases, as some of the blocks initially selected did not have ICRG work planned or underway at the time of the selection of the case study sites. The village selected from each of the three short-listed blocks were chosen to ensure that there was variation in the phase of ICRG execution across the cast study villages, in order to allow for the examination of heterogeneity of planning and implementation. The key characteristics of the case study villages are outlined in Table 3 and 4.

Table 3. **Current climate variability assessment and climate change projections at block level**

Climate Parameter		**Case study village 1** Khairani village, Nuapada block, Nuapada district, Odisha state	**Case study village 2** Mansapur village, Laukahi block, Madhubani district, Bihar state	**Case study village 3** Annapurna village, Premnagar block, Surajpur district, Chhattisgarh state
Climate change vulnerability				
CRIDA-NICRA vulnerability rank (district level)		197	29	151
Temperature				
Highest temperature recorded (1984-2014)		c. 45 ºC<	c. 42 ºC?	c. 45 ºC
Mean maximum temperature (1984-2014)		c. 35ºC>	c. 37 ºC?	c. 37 ºC?
Change in mean maximum temperature (1984-2014)		0.22ºC	0.6 ºC	c. 0.29 ºC
Change in maximum temperature by 2035 (2021-2050) relative to the historical 1984-2014 period		1.3ºC	c. 2.5ºC	c. 0.4ºC
Rainfall				
Mean June-Sept rainfall	1984-2014	1,134mm	995mm	1,147mm
	2021-2050	c. 1,070mm	c. 1,200mm	c. 1,000mm
Percentage change in mean June-Sept rainfall during the projected period (2021-2050) compared to the historical period of 1984-2014		c. -8%	c. 18%	c. -11%
Standard deviation June-Sept rainfall (1984-2014)		306mm	287mm	343mm
Rainfall variability based on coefficient of variation JJAS rainfall	1984-2014	26.98%	28.84%	29.9%
	2021-2050	32.8%	58.9%	46.4%
Average number of rainy days (> 2.5 mm/day)/year	1984-2014	62 days	62 days	62 days
	2021-2050	113 days	63 days	80 days
Change in number of rainy days (> 2.5 mm/day) during the projected period (2021-2050) compared to the historical period of 1984-2014		45.3%	2%	23%
Average number of rainy days (51-100 mm/day)/year	1984-2014	6.27 days	3.5 days	2.63 days
	2021-2050	-	-	-
Change in number of rainy days (51-100 mm/day in the projected		-	-	-

scenario (2021-2050) relative to the historic period (1984-2014)				
Average number of rainy days (100> mm/day)/year	1984-2014	2.07 days	0.5 days	0.2 days
	2021-2050	-	-	-
Change in frequency of occurrence of rainfall events of 100> mm/day in the projected Scenario (2021-2050) relative to the historic period (1984-2014)		-	-	-
Highest rainfall event (mm)/day (1984-2014)		148mm	235mm	176mm
Number of years with normal sowing rainfall (June) during the historic period (1984-2014)		6 years	9 years	6 years
Drought events				
Drought (1984-2014)	Mild	c. 12 years	c. 10 years	-
	Moderate	c. 4 years	c. 5 years	1 year
	Severe	-	-	1 year
Government of India Ministry of Agriculture (MoA) drought frequency (2000-2015, 5 year internal) (district level)		2	3	2

Source: Indian Institute of Science (2017a, 2017b, 2017c); Samaj Pragati Sahayog (2016)

Note: data is at block level unless otherwise stated.

Table 4. Key characteristics of case study villages

Key characteristics		**Case study village 1** Khairani (Nuapada block, Nuapada district, Odisha state)	**Case study village 2** Mansapur (Laukahi block, Madhubani district, Bihar state)	**Case study village 3** Annapurna (Premnagar block, Surajpur district, Chhattisgarh state)
Village profile				
Households		265	921	321
Population		1,454	5,621	1,506
Backwardness rank (block level)		521	119	636
Religion composition of household	Hindu	100%	100%	100%
	Muslin	0	0	0
	Christian	0	0	0
Caste	Brahmin	0	200 (21.72%)	0
	Other general caste (other than Brahmin)	0	0	-
	Other backward class	22.26%	32.57%	-
	Scheduled caste	3.02%	39.20%	-
	Scheduled tribe	74.72%	6.51%	-
Major crops grown		Paddy, vegetables	Maize, sugarcane, vegetables, paddy, wheat	Paddy, maize, wheat, red gram, sesame, black gram, chickpea, horsegram
Source of drinking water		Tubewell, well	Tubewell	Tubewell, wellcanal/river/stream
Source of other used water		Tubewell, tap, well, pond/ditch	Tubewell, pond/ditch	Tubewell, well, canal/river, pond/ditch
Climate risk				
Ranking of climate risks		1. Drought, heat stress 2. rainfall variability 3. rainfall intensity 4 waterlogging 5 flooding	1. Waterlogging, heat stress 2. Drought 3. monsoon rainfall variability 4. Rainfall intensity and flooding	1. Heat stress 2. Drought 3. Monsoon rainfall variability 4. Rainfall intensity 5. Waterlogging 6. flooding
MGNREGA				
Year of implementation of NREGA		2006	2007	2006
Active job cardholders		258	-	-
	2014	200	-	173

Households actively seeking MNREGA work in the last 4 years	2015	170	-	163
	2016	150	-	203
	2017	147	-	193
Daily wage rate for MNREGA work		176 rupees	-	172 rupees
Number of households completed 100 days in the last 4 years	2013-2014	10	-	13
	2014-2015	5	-	17
	2015-2016	5	-	21
	2016-2017	4	-	15
Total MGNREGA person days in the last 4 years	2013-2014	-	-	12,052 (17.72% days by women, 5.63% by schedule caste or scheduled tribes, 0% days by disabled persons)
	2014-2015	-	-	14,012 (26.54% days by women, 6.23% by schedule caste or scheduled tribes, 0% days by disabled persons)
	2015-2016	-	-	14,970 (34.11% days by women, 6.39% by schedule caste or scheduled tribes, 0% days by disabled persons)
	2016-2017	3,950 (39.49% days by women, 52.91 by schedule caste or scheduled tribes, 0% days by disabled persons)	-	16,279 (25.27% days by women, 6.22% by schedule caste or scheduled tribes, 0% days by disabled persons)
Total MGNREGA expenditure (materials plus labour costs) in last 4 years.	2013-2014	-	-	2,031904 rupees
	2014-2015	-	-	2,299884 rupees
	2015-2016	-	-	2,651990 rupees
	2016-2017	1,050000 rupees	-	2,899988 rupees

Source: field data (2018a, 2018b), Jordan, Samaj Pragati Sahayog (2016)

3.2 Research methods

This study is based on a mixed methods multiple case study design (see Yin, 2009) to understand the potential of MGNREGA to reduce women's vulnerability to climate shocks. The data was collected from October to December, 2017 and in January and June 2018, and involved a total of 255 residents of three villages, representing 30.94% of total households in Khairani (case study village 1), 9.66% in Mansapur (case study village 2) and 26.17% in Annapurna (case study village 3). These case studies primarily followed a qualitative and interpretative approach with an emphasis on context, quality, depth, richness and understanding (Valentine, 2001; Gelo et al., 2008). The qualitative data from the main data-gathering phase of this study is based mostly on in-depth one-to-one semi-structured interviews with 60 female village inhabitants, and 15 focus group discussions with 78 village inhabitants (68 females and 10 males), each lasting approximately 1.5 to 2 hours. Participant observation and transect walks were carried out in each village (see Table 3). The qualitative data was supplemented with 60 household surveys with the head of household or his/her spouse, each lasting approximately 45 minutes to 1 hour, and 3 village surveys with 48 key informants, each lasting approximately 3 to 4 hours. Informed verbal consent was obtained from participants prior to participation in the study. Participants were selected through purposeful sampling (see Patton, 2002) as it enables close focus on cases and issues of interest.

Table 3. Overview of research methods

Type of Method		**No. of instruments**	**Duration**	**No. of participants**	**Type of participant**
Semi-structured household interviews		60	2 hours	60	Female village inhabitants
Focus group: discussions	Community profile (including climate risk) and seasonal calendar exercises (climate context and livelihoods)	6	2 hours	34	Female village inhabitants
	NREGA and ICRG planning, decision-making, and implementation	6	2 hours	31	Female village inhabitants that are NREGA job cardholders
	Social mapping exercises	3	1.5 hours	13	Key informants - Mukhiya, ward members, and village inhabitants (10 males and 3 females)
Transect walks (to supplement social mapping exercises)		3	4 hours	13	Village inhabitants along transect walk (8 males and 5 females)

Participant observation	3	6 hours	3	Female village inhabitants
Household surveys	60	45 minutes to 1 hour	60	Head of household or his/her spouse.
Village surveys	3	3 to 4 hours	48	Key informants[vii] - Panchayat Rojgar Sewak, Sarpanch, Mukhiya, ward members and village inhabitants (37 males and 11 females).

Interview and focus group discussions focused on issues relating to (1) Priorities and needs, (2) Perception and understanding of climate shocks (3) Ranking of climate-related shocks, (4) Impacts of climate shocks and associated responses (5) MGNREGA and ICRG planning, decision-making, and implementation, specifically from a gender perspective (6) Local decision-making. Discussions were recorded with consent and coded through intensive content analysis to draw out key themes, sub-themes and patterns.

4. Results

The findings from empirical evidence highlights five key factors that limit MGNREGA's potential to reduce women's vulnerability to climate shocks: (1) Lack of access to employment that does not depend on climate sensitive economic activities (2) Unpaid care work responsibilities (3) Lack of bargaining power and control in decision-making on planning and implementation of MGNREGA (4) Lack of implementation and monitoring of gender sensitive provisions in MGNREGA (5) Uneven distribution of benefits from asset creation in MGNREGA.

Lack of access to employment that does not depend on climate sensitive economic activities can reduce resilience to climate shocks. The findings indicate the need to create alternative livelihoods, both non-farm and off-farm to reduce the dependency on agricultural land for income and to increase women's economic empowerment. Women agricultural labourers are worst affected by droughts and floods as they lose their wage because of no harvesting. Most of the respondents lease land as sharecroppers. As leasing land is not legal in Bihar state, tenants do not get any compensation for crop loss due to extreme climatic events like drought and flood as they do not have any legal documents. Landowners whose investment on crop production is meagre are compensated for crop loss, however this financial support is often not passed onto tenants. Hence, tenants and small, marginal farmers are worst affected by climate shocks due to lack of access to and control over land.

It is clear that climate shocks are reinforcing established migration patterns in the villages, the majority of interviewees indicated that many families are migrating out of the village for extended periods of time (for example, up to six months in Odisha) due to drought. In these instances, inadequate arrangements are sometimes made for family who stay at home; creating additional burdens. The evidence highlights that this increases the responsibilities of de facto female household heads, with added pressure to provide food and meet basic needs without the support of the main income generator. While most interviewees confirmed that MGNREGA work provides livelihood opportunities, the number of work days is not enough to reduce food insecurity or to increase resilience against the impacts of climate shocks. The delay in MGNREGA payments and the complicated payment process creates further difficulties for households accessing financial support at times of acute need.

Women's unpaid care work responsibilities increase their drudgery and limit their participation in the workforce. Unpaid care work is understood as the set of domestic household responsibilities, care of people and tasks such as fetching water and gathering firewood. Many women with children that lack access to childminding support (both at home and absence of crèche facilities at MGNREGA worksites) are unable to fully participate in MGNREGA. It is common for older women within the household to take on childcare responsibilities while women go to work, in some cases it was even found that young girls have to take off school for housework and taking care of younger siblings during MGNREGA work. Hence, irrespective of age, women and girls are responsible for unpaid care work, and participation in MGNREGA can deepen their time poverty.

Unpaid care work responsibilities are becoming more challenging due to climate shocks and drying of the water sources (specifically in the summer months), and the decreasing size of the forest. Collecting drinking water is particularly challenging in case study village 3 due to the elevation of the land and poor quality roads. While it usually takes women on average 10 to 60 minutes to collect water, this increases to 30 minutes to 2 hours for the majority of families during the summer months as most of the tube wells installed by the government are completely dry or only small amounts of water are available. Some of the hamlets, like Behera Dhab and parts of Salewa para in case study village 3, face even greater difficulties collecting water, with women having to invest at least one to two hours to collect drinking water each time. The water structures, pond or the small well, constructed under the MGNREGA could have reduced the drudgery of women by reducing the time allocated for water collection, however, due to low rainfall, most of the structures are dry, even in the month of November, just after the monsoon season. More generally, socio-cultural norms prevent women from touching the tube well or water sources during menstruation, this not only increases their dependency on others, but also increases their workload as they often have to travel longer distances to collect water from the limited water sources they are permitted to touch in the local area.

Women's bargaining power and control in decision-making on planning and implementation of MGNREGA can be reduced by gender specific ideologies surrounding socio-cultural norms. Women's unpaid care work responsibilities, purdah norms, location of the meeting venue (gram panchayat bhawan), and unavailability of other family members to look after the house, were cited as reasons for women not attending village meetings. Women often feel uncomfortable to speak in public in the presence of male relatives, this is particularly the case for women of general caste and other backward castes, in comparison to scheduled caste families. Nevertheless, it was found in case study village 1 that the participation of women in the panchayat meetings has increased as the MGNREGA programme requires participation of women Self Help Group (SHG) members in the Panchayat decision-making process. While women SHGs were specifically invited to meetings related to MGNREGA, not all women are members of SHGs, specifically, recently married women, young mothers and those who migrate for most of the year. In contrast, women's participation in the community decision-making process specifically related to government schemes and programme implementation was found to be meagre in case study village 3. In case study village 2, irrespective of gender, participation in the Panchayat decision-making process is quite low in the village. Most of the villagers were unaware of the village meeting, locally called Gram Sabhas. Critically, the majority of interviewees were unaware of any meetings held to decide the type of ICRG work or specific location of the site in the village.

Lack of implementation and monitoring of gender sensitive provisions in MGNREGA – childcare crèches, provision of good quality drinking water, shade for children and periods of rest, limits its ability to reduce women's vulnerability to climate shocks. More generally, MGNREGA tackles a very narrow group of able women who can perform arduous, manual labour. Indeed, the main reasons cited for lack of women's participation in MGNREGA work, include, hardship of soil digging, responsibility of unpaid care work responsibilities, and house construction work during the summer months. Moreover, female-headed households are dependent on males from other households to participate in MGNREGA as digging and throwing of mud or soil on worksites is commonly done in pairs. The absence of a male partner to work with was highlighted as a reason for not participating in MGNREGA as women tend to be involved in throwing mud or soil rather than digging, although none of the respondents indicated any social restriction against digging. Hence, female-headed households are often (this was not the case in case study village 1) given preference to provide drinking water in the worksites to enable them to participate in the MGNREGA work without depending on males from other households. However, scheduled caste women are not allowed to participate in work involving the distribution of water on worksites as none of the other workers from other castes would accept the water.

Uneven distribution of benefits from asset creation in MGNREGA is in part due to circuits of control and power at the local level (exploitative patron-client relationships) that may act to reproduce exclusion and injustice within the village; reducing MGNREGA's potential to address the persistent determinants

of vulnerability to climate change. It was found in one case study village, that most of the MGNREGA work was completed by machinery (rather than MGNREGA job cardholders), coordinated by an influential contractor connected to local village leaders. Many MGNREGA job cardholders reported that their job cards and passbooks were taken away by the local political elite and in return were given a small payment of 100 rupees for every 2,000 rupees earned.

References

Agarwal, B. (1990) Social Security and the Family: Coping with Seasonality and Calamity in Rural India. *Journal of Peasant Studies*, 17(3), 341-412.

Arora-Jonsson, S. (2014) Forty Years of Gender Research and Environmental Policy: Where Do We Stand? *Women's Studies International Forum*, 47, 295-308.

Blaikie, P., Cannon, T., Davis, I. and Wisner, B. (1994) *At Risk: Natural Hazards, People's Vulnerability and Disasters.* 1st ed. London, UK: Routledge.

Bankoff, G. (2003) *Cultures of Disaster; Society and Natural Hazard in the Philippines.* London, UK: Routledge.

Carr, E. R.., Fleming, G. and Kalala, T. (2016) Understanding Women's Needs for Weather and Climate Information in Agrarian Settings: The Case of Ngetou Maleck, Senegal. *Weather, Climate and Society*, 8, 247-264.

Carr, E. R. and Thompson, M. C. (2014) Gender and climate change adaptation in agrarian settings: Current thinking, new Directions, and research Frontiers. Geography Compass 8: 182–197.

Chant, S. (2004) Dangerous Equations? How Women-headed Households became the Poorest of the Poor: Causes, Consequences and Cautions. *IDS Bulletin*, 35(4), 19-26.

Coirolo, C., Commins, S., Haque, I. and Pierce, G. (2013) Climate Change and Social Protection in Bangladesh: Are Existing Programmes Able to Address the Impacts of Climate Change? *Development Policy Review*, 31(S2), o74–o90.

Crenshaw, K. (1991) Mapping the Margins: Intersectionality, Identity Politics, and Violence Against Women of Color. *Stanford Law Review*, 43, 1241-1299.

Davies, M., Oswald, K. and Mitchell, T. (2009) Climate Change Adaptation, Disaster Risk Reduction and Social Protection. OECD: Pars.

Davies, M., Béné, C., Arnall, A., Tanner, T., Newsham, A. and Coirolo, C. (2013) Promoting Resilient Livelihoods through Adaptive Social Protection: Lessons from 124 programmes in South Asia. Development Policy Review, 31(1), 27-58

Davis, K. (2008) Intersectionality as Buzzword: A Sociology of Science Perspective on What Makes a Feminist Theory Successful. *Feminist Theory*, 9, 67-85.

Eckstein, D., Künzel, V. and Schäfer, L. (2018) *Global Climate Risk Index 2018. Who Suffers Most from Extreme Weather Events? Weather-related Loss Events in 2016 and 1997 to 2016.* German Watch, Bonn.

Elmhirst, R. and Resurrección, B. P. (2008) Gender, Environment and Natural Resource Management: New Dimensions, New Debates. In: Resurreccion, B. P., Elmhirst, R. (Eds.). *Gender and Natural Resource Management: Livelihoods, Mobility and Interventions*. London: Earthscan.

Gelo, O., Braakman, D., and Benetka, G. (2008) Quantitative and Qualitative Research: Beyond the Debate. *Integrative Psychological and Behavioral Science*, 42, 266-290.

Hallegatte, S. and Rozenberg, J. (2017) Climate Change through a Poverty Lens. *Nature Climate Change*, 7, 250-256.

Harvey, P. (2007) Cash-Based Responses in Emergencies. London: Overseas Development Institute. Available at http://www.odi.org.uk/resources/download/229.pdf

Heltberg, R. (2007) 'Helping South Asia Cope Better with Natural Disasters: The Role of Social Protection. *Development Policy Review* 25(6), 681-98.

Huynch, P. T. A. and Resurrección, B. P. (2014) Women's Differentiated Vulnerability and Adaptations to Climate-related Agricultural Water Scarcity in Rural Central Vietnam. *Climate and Development*, 6(3), 226-237.

IPCC (2014) *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects.* Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel,

A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press.

Indian Institute of Science (2017a) *Current Climate Variability Assessment, Climate Change Projections and Identification of 'Climate Hotspot Blocks' for ICRG Blocks Under MGNREGA in Odisha.* Infrastructure for Climate Resilient Growth in India (ICRG) Programme. Indian Institute of Science, Bangalore

Indian Institute of Science (2017b) *Current Climate Variability Assessment, Climate Change Projections and Identification of 'Climate Hotspot Blocks' for ICRG Blocks Under MGNREGA in Bihar*. Infrastructure for Climate Resilient Growth in India (ICRG) Programme. Indian Institute of Science, Bangalore

Indian Institute of Science (2017c) *Current Climate Variability Assessment, Climate Change Projections and Identification of 'Climate Hotspot Blocks' for ICRG Blocks Under MGNREGA in Chattisgarh.* Infrastructure for Climate Resilient Growth in India (ICRG) Programme. Indian Institute of Science, Bangalore

Jackson, C. (2002) Disciplining Gender? *World Development*, 30(3), 497-509.

Kelman, I., Gaillard, J. C. and Mercer, J. (2015) Climate Change's Role in Disaster Risk Reduction's Future: Beyond Vulnerability and Resilience. *International Journal of Disaster Risk Science*, 6(1), 21-27.

Kumar, N. and Quisumbing, A. (2014) *Gender, Shocks and Resilience*. 2020 Conference Brief 11, Washington, DC: IFPRI.

Kuriakose, A. T., Heltberg, R., Wiseman, W., Costella, C., Cipryk, R. and Cornelius, S. (2013) Climate-Responsive Social Protection. *Development Policy Review*, 31 (S2), o19-o34.

Marino, E. and Ribot, J. (2012) Adding Insult to Injury: Climate Change and The Inequities of Climate Intervention. *Global Environmental Change*, 22, 323-328.

Mohanty, C. T. (1988) Under Western Eyes: Feminist Scholarship and Colonial Discourses. *Feminist Review*, 30, 61-88.

Moosa, C. S. and Tuana, N. (2014) Mapping a Research Agenda Concerning Gender and Climate Change: A Review of the Literature. *Hypatia*, 29(3), 677-694.

Nelson, V. and Stathers, T. (2009) Resilience, Power, Culture, and Climate: A Case study from Semi-arid Tanzania, and New Research Directions. *Gender and Development*, 17(1), 81-94.

Nelson, V., Meadows, K., Cannon, T., Morton, J. and Martin, A. (2002) Uncertain Predictions, Invisible Impacts, and the Need to Mainstream Gender in Climate Change Adaptations. *Gender and Development*, 10(2), 51-59.

Nightingale, A. J. (2011) Bounding Difference: Intersectionality and the Material Production of Gender, Caste. Class and Environment in Nepal. *Geoforum*, 42, 153-162.

Nightingale, A. J. (2017) Environment and Gender. *The International Encyclopaedia of Geography*, 1-13.

Osbourne, N. (2015) Intersectionality and Kyriarchy: A Framework for Approaching Power and Social Justice in Planning and Climate Change Adaptation. *Planning Theory*, 14(2), 130-151.

Patton, M. Q. (2002) *Qualitative Research and Evaluation Methods* (3rd ed.). Thousand Oaks, CA, Sage.

Ravera, F., Martín-López, B., Pascual, U. and Drucker, A. (2016) The Diversity of Fendered Adaptation Strategies to Climate Change of Indian farmers: A Feminist Intersectional Approach. *Ambio*, 45(3), S335–S351.

Resurrección, B. P. (2013) Persistent Women and Environment Linkages in Climate Change and Sustainable Development Agendas. *Women's Studies International Forum*, 40, 33-43.

Rossi, A. and Lambrou, Y. (2008) *Gender and Equity Issues in Liquid Biofuels Production: Minimising the Risks to Maximise the Opportunities*. Rome: Food and Agriculture Organisation. Available at: ftp://ftp.fao.org/docrep/fao/010/ai503e/ai503e00.pdf

Samaj Pragati Sahayog (2016) *Scoping Study on Infrastructure for Climate Resilient Growth through MGNREGA.*

Seager, J. (2009) Death by Degrees: Taking a Feminist Hard Look at the 2° Climate Policy. *Kvinder, Køn and Forskning*, 3, 11-21.

Sen, A. (1990) Gender and Cooperative conflicts. In: Tinker, I. (ed) *Persistent Inequalities: Women and World Development.* New York, USA: Oxford University Press, 123-149.

Stirbu, M. (2010) *Climate Change, Children and Youth in Cambodia: Successes, Challenges and policy implications, Children in a Changing Climate*. UNICEF Policy Brief. New York: UNICEF. Available at:http://www.childreninachangingclimate.org/database/ids/Publications/IDSPolicyReport_WEB_PDF.pdf

Sultana, F. (2010) Living in Hazardous Waterscapes: Gendered Vulnerabilities and Experiences of Floods and Disasters. *Environmental Hazards*, 9, 43-53.

Sultana, F. (2014) Gendering Climate Change: Geographical Insights. *The Professional Geographer*, 66, 372-381.

Thompson-Hall, M., Carr, E. R. and Pascual, U. (2016) Enhancing and Expanding Intersectional Research for Climate Change Adaptation in Agrarian Settings. *Ambio*, 45(3), S373-S38.
Tschakert, P. (2012) From Impacts to Embodied Experiences: Tracing Political Ecology in Climate Change Research. *Geograf. Tidsskr*, 112, 144-158.

Tschakert, P. and M. Machado (2012) Gender Justice and Rights in Climate Change Adaptation: Opportunities and Pitfalls. Ethics and Social Welfare, 6, 275-289.

Valentine, G. (2001) At the Drawing Board: Developing a Research Design. In: Limb, M. and Dwyer, C. (eds.) *Qualitative Methodologies for Geographers: Issues and Debates*. London, UK: Arnold, 41-54.

Wisner, B., Blaikie, P., Cannon, T. and Davis, I. (2004) *At Risk: Natural Hazards, People's Vulnerability and Disasters.* 2nd ed. London, UK: Routledge.

Yin, R. K. (2009) *Case Study Research: Design and Methods.* 5th ed. London, UK: Sage.

[i] In the poverty scenario with maximum climate impacts (see Hallegatte and Rozenberg, 2017).
[ii] It legally guarantees the provision of 100 days of labour with a minimum salary fixed by the state to every rural household that requests it. This employment is then directed towards the creation of durable assets and works that lead to the enhancement of ecosystem services (e.g. afforestation, micro and minor irrigation works).
[iii] See Davies et al. (2009) for a discussion on the benefits and challenges of social protection for adaptation to climate change.
[iv] See Davies et al. (2013) for an in-depth understanding of the Protection-Prevention-Promotion-Transformation categories.

[v] Surguja district was split into two districts in 2012-2013, Surajpur and Surguja. This resulted in Annapurna village being recategorised as part of Surajpur district. However, the secondary data used in this paper is based on the former district categorisation as data sources prior to 2012-2013 have not been updated. Block level data has been used where possible.

[vi] District level data was used as block level data was unavailable at the time of village selection.

[vii] Seven of the forty-eight participants involved in these interviews do not count towards the total number of participants in the study as they were already interviewed as part of other components of the study.