

3 Gendered vulnerabilities in *Diaras*

Struggles with floods in the Gandak river basin in Bihar, India

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Introduction

A *diara*, from the word *diya* (an earthen oil lamp), is an area where a *diya* is never lit. Here it symbolizes villages located inside the embankments of the floodplains of the Gandak river in Bihar. In a wider sense, *diara* is used to indicate people living in abject poverty and facing multiple vulnerabilities due to frequent flooding of a river, here the Gandak. It is a meandering river that may change its course unpredictably (Choudhary et al. 2019). The Gandak enters India from Nepal where it is known as Narayani or Gandaki. It flows south through seven districts of Bihar and two districts of Uttar Pradesh before joining the Ganga at Hazipur in Bihar. More than 34 million people live in these nine districts (according to the 2011 Census), most of them in flood-prone areas.

People living in diaras in the context of a changing climate may experience either too much or too little water, so it is important to understand their vulnerabilities. The two major climatic parameters – floods in the rainy season and relative droughts in the summer – affect the livelihoods and well-being of the diara inhabitants. The impact of these stressors as well as the capacity to cope with them varies according to caste, class and gender, due to the dissimilar access to resources across social groups. Understanding people's struggles to survive in difficult circumstances is crucial for an understanding of their adaptation and survival strategies in response to various stressors (Gilson 2013). This chapter, which analyzes gender-based vulnerabilities of people living in diaras with respect to their social, economic, environmental and political resources, seeks to inform government policies and plans for disaster management and the promotion of adaptation strategies, as well as to contribute knowledge to ongoing development efforts and to academic discourses on vulnerability.

This chapter takes the view that understanding the vulnerabilities of people from their own perspectives provides a realistic picture of the realities on the ground. It uses participatory assessment tools to understand climatic and socio-economic drivers and conditions contributing to the vulnerabilities of diara residents. Data were collected using various methods, including focus group discussions and interviews, participant observation and transect walks. Both physical aspects of the river, rainfall and the embankment,

and socio-economic aspects including social position and gender, were considered in the analysis. The fieldwork was conducted between February and July 2016 in four different villages in the West Champaran district of Bihar. The four village contexts were, respectively, recurrent floods, new flood zones, floods triggered by infrastructure development and remoteness from government agencies. All the villages were located within the Gandak river embankment.

This chapter is divided into five sections. The first section describes the floods in the Gandak river basin, and the climatic and socio-economic issues faced by the villagers. The second section outlines the conceptual framework for gender-based social vulnerabilities from the existing literature. Empirical evidence from the field is drawn on in the third section to show how gender-based vulnerabilities are an outcome of gender-based norms and values with respect to the use, access and impact of environmental, economic, political and social resources. The next section focuses on the coping and adaptation strategies of the people. The chapter concludes by highlighting our contribution to the literature, especially in terms of research methodologies and conceptualizing the creation of gendered vulnerabilities as well as building resilience and adaptation to climate change.

Diaras: A land knee deep under water

Bihar is prone to flooding: 73 per cent of its land area and 76 per cent of its population are perpetually under this threat (Kumar and Sahdeo 2013). Out of 38 districts, 28 are at risk (Figure 3.1). Mountain-fed river systems like the Kosi and the Gandak, a foothills-fed river system like the Bagmati, and plains-fed river systems like the Burhi Gandak cause floods in the state every year (Sinha and Jain 1998).

Such floods are not always natural but are often caused by a breach in the embankments built to protect people from inundation or by a diversion made in connection with infrastructure development such as roads. In government records the floods of 2004, 2007, 2011 and 2013 are termed natural disasters, whereas the 2008 flood was regarded as breach induced (Government of Bihar 2016). The most recent flood, in 2017, was devastating, breaking a nine-year record of deaths caused by floods. In West Champaran district alone, 42 people died and around 46,000 were affected (Government of Bihar 2017).

Floods are a hurdle to growth in Bihar. The 2011 *India Human Development Report* ranks Bihar in the bottom five states according to the Human Development Index (Government of India 2011). According to the report, the poverty headcount in Bihar in 2009–10 was about 54 per cent in comparison to about 30 per cent for the whole of India (UNDP 2016). West Champaran is one of the poorest districts of Bihar with 77 per cent people living in poverty in 2004–05 (Chaudhuri and Gupta 2009). In rural areas, 81 per cent of households lived below the poverty line (Pankaj and Mishra 2008).

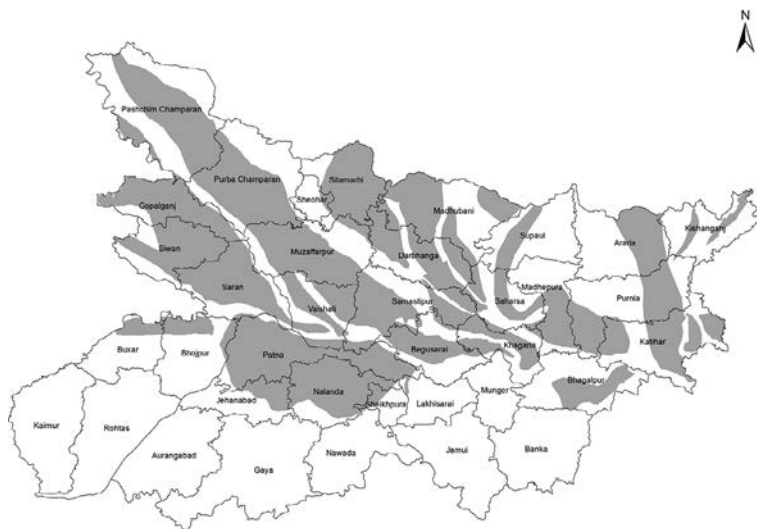


Figure 3.1 Flood zones in Bihar.

Building Material and Technology Promotion Council, Government of India and UNDP (2016), adapted by the authors from <http://www.disastermgmt.bih.nic.in/Map/images/FloodZoneBig.gif>.

The floods caused by the Gandak are one of the reasons for the under-development of West Champaran. The Gandak drains into India through West Champaran, carrying a heavy load of silt and sediments, which causes the river to change its course every year (Sinha and Jain 1998). Of the 1,491 villages in 18 blocks of West Champaran, 156 villages in 17 blocks are regularly affected by floods (DAWC 2013). According to the 2011 Census, 118 villages in the district are uninhabited and many of them have been abandoned, primarily due to the river's frequent changes of course.

The floods are caused not only by localized rain but also by rainfall in the upstream areas of the basin (Ghosh and Mukhopadhyay 2014:3). Whenever there is excessive rain, the gates of the Balmiki barrage on the Gandak are opened to allow the water to flow, to prevent damage in upstream areas and to the barrage structure. The sudden increase in the volume of water in this stretch of the river causes flooding. Failure to communicate information about the opening of the barrage well in advance leads to loss of life and property. Floods caused by the changing course of the river due to deposition of sediment can also inundate habitats.

Flooding in the Gandak generally causes more damage to property than loss of life, since the floods in this area are of the slow onset riverine type, allowing people to anticipate rising water levels and evacuate in time, except in areas of flash flooding. The major challenge here is that the floodwaters inundate the land for at least four months during the monsoon. Loss of property and mobile lifestyles are challenging for people,

some of whom take shelter on public land such as embankments, in high-land areas, or on rented land.

Women, children and the elderly are highly vulnerable to hardship during floods due to socio-cultural norms such as *lajja* (shame), forced mobility, the special needs of women in certain situations and the increased workload of managing water and other local resources to look after the family (Mehta 2007). The lack of local economic opportunities forces men to migrate to work outside the village, while children, women and the elderly are left behind in the flood-affected areas throughout the year (DAWC 2013).

Troubles continue after the monsoon, when the flood waters drain, with severe water shortages and drought in the winter. Bihar experienced significant droughts in 2006, 2009 and 2010 (Government of Bihar 2016). Despite these hardships, people live in the diaras because they have no alternative. For some, the land they used to live on became diaras because the river changed its course. For others, their land fell inside embankments, for example, the Pipara-Piprasi embankment (Figure 3.2). For many others, diaras are the only place left for them to live, because it is impossible to claim land rights elsewhere, given the feudal social structure of Bihar where access to land is skewed.

The socio-economic context and changing climatic conditions in West Champaran

‘Crime, caste and cost [bribery] are push factors for poverty and vulnerabilities in Bihar’ is a local aphorism. Together with climatic stressors, vulnerabilities for some groups of people in West Champaran are rooted in histories of social discrimination and domination.

West Champaran shares a border with Nepal and criminal activities in the area are facilitated by an easy escape across the border. Land ownership is skewed: much of the land is in the hands of a few landlords owning more than 20 ha, who align across a strict caste-based hierarchy. According to the Agriculture Census of 2015–16 (Figure 3.3), 97 per cent of landholders are small and marginal, owning 74 per cent of the land in West Champaran, while the remaining 3 per cent own 26 per cent, i.e., almost one-third of the land (Government of India 2012). Historically, strong caste-based disparities, the *zamindari* system and colonization by the British of indigo plantations have created a structure of domination and inequality in the area. Although the *zamindari* system was abolished and the Land Ceiling Act came into force after independence, skewed land relations persist, indicating the continuation of socio-economic inequality. There is a lower proportion of women landowners in Bihar than the national average of 11 per cent (Rao 2011). A recent study in two districts of Bihar found that only 7 per cent of women are landowners (Golder 2017).

The 2015–16 National Health Survey of West Champaran district shows the low status of women in rural areas (Government of India 2017). The literacy rate for women was 40 per cent, far less than for men (70 per cent).

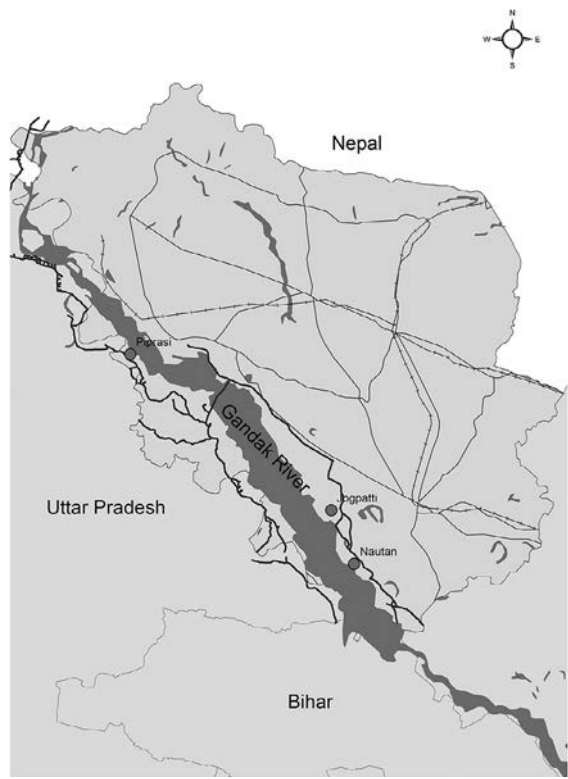


Figure 3.2 Pipra-Piprasi Embankment in Gandak River. Study area plotted with estimation, with respect to GPS map in HI-AWARE (2017).

Source: Adapted by authors from Government of Bihar (2015), HI-AWARE (2017).

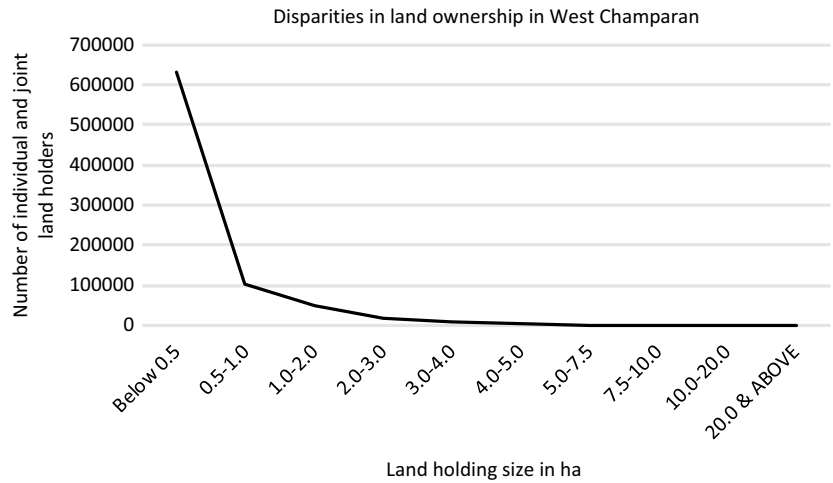


Figure 3.3 Disparities in Landownership in West Champaran.

Agriculture Census, 2016.

Only 12 per cent of women had ten or more years of schooling. Early marriage was widespread. In the rural areas 23 per cent of girls aged 15–19 were either pregnant or already married with children. In addition, 42 per cent of children under five were underweight. Anaemia was widespread: 63 per cent of children aged between 6 months and 5 years, 57 per cent of women and 27 per cent of men between 15 and 49 were anaemic. The caste system continues to thrive in society, regulating all social practices related to birth, marriage, death and various other rituals. Caste-based discrimination still prevails. A strong son preference is common. In rural areas, the sex ratio is 936 women per 1,000 men while the child sex ratio (children under five) is 870 girls per 1,000 boys according to the 2011 Census (Government of India 2017).

Against this backdrop of continuing structural inequality and deprivation, changing climatic conditions are starting to impact West Champaran. An analysis of monthly rainfall data by the Indian Meteorological Department (IMD) during 2013–15 indicates a shortfall in rainfall in West Champaran. Climate data for the area downstream of the Gandaki basin, including West Champaran, over 1981–2010 shows a slightly declining trend with respect to the intensity of rainfall for different thresholds, but none of them were significant (HI-AWARE 2017).¹

The climatic modelling data found a significant increase in temperature over the last 30 years. A scenario for 2050 reveals that regions downstream of the basin, including West Champaran, will be warmer. Currently, the minimum temperature in the Gandaki basin tends to be below 30° Celsius (C). Under the highest Representative Concentration Pathways (RCP) scenario calculated by the Intergovernmental Panel on Climate Change (IPCC) – the 8.5 RCP scenario – areas around Gandak, including West Champaran, will experience heat stress for 1–20 days a year with a minimum temperature of 30° C and possibly more drought (HI-AWARE 2017).

Understanding gendered vulnerabilities

The IPCC defines vulnerability as:

the extent to which a natural or social system is susceptible to sustaining damage from climate change. Vulnerability is a function of the sensitivity of a system to changes in climate (the degree to which a system will respond to a given change in climate, including both beneficial and harmful effects) and the ability to adapt the system to changes in climate (the degree to which adjustments in practices, processes or structures can moderate or offset the potential for damage or take advantage of opportunities created, due to a given change in climate). Under this framework, a highly vulnerable system would be one that is highly sensitive to modest changes in climate, where the sensitivity includes the potential for substantial harmful effects, and one for which the ability to adapt is severely constrained.

(Watson et al. 1998:1)

Adger defines social vulnerability as “the exposure of groups of people or individuals to stress as a result of the impact of climate change” (1996:5). Providing evidence of vulnerabilities due to famine, natural and climate-related hazards, Adger emphasizes the underlying causes of social vulnerability at individual and collective levels. Ciurean et al. (2013) locate social vulnerability as a bottom-up approach in contrast to physical vulnerability approaches, which are top down and focus more on future scenarios (Figure 3.4). The authors highlight the effectiveness of adaptation policies that consider the assessment of social vulnerabilities through a bottom-up approach in relation to physical vulnerabilities, and vice versa.

As a subset of social vulnerability, gender-based vulnerability is part of a process that creates differential vulnerabilities for people belonging to different gender-based social categories (Sugden et al. 2014; Goodrich et al. 2017). It is important to understand that gender is not just an indication for women and men; rather, it is considered as part of heterogeneity in gender categories and inter-sectionalities (Ravera et al. 2016).

Gendered life is defined as an organizing principle of social life, creating and ordering relations between people in a hierarchical manner as well as

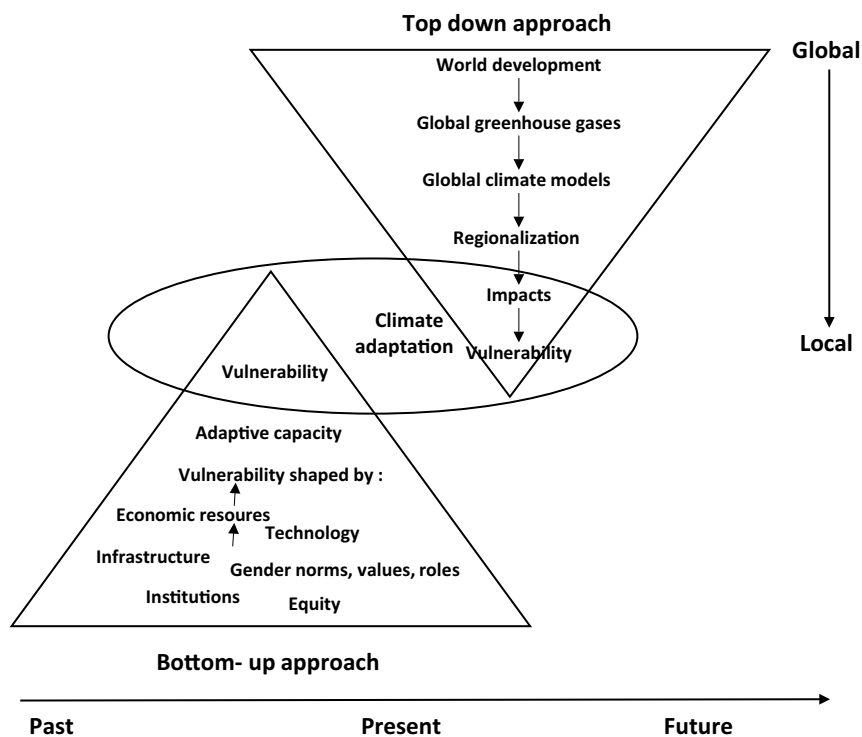


Figure 3.4 Top down versus bottom up approach of vulnerability.

Adapted from Ciurean et al. 2013.

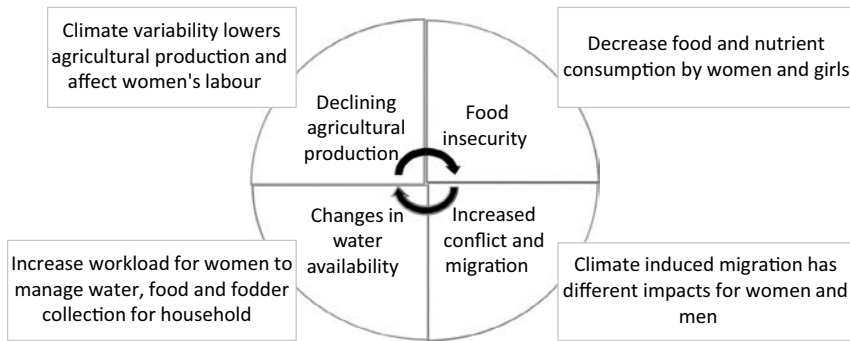


Figure 3.5 Differential gender impact of climate change in an agrarian society.
Compiled by the authors.

giving meaning and legitimization with respect to performance, resource allocation and social practices to certain sex-based groups belonging to specific social categories (cf. Harding 1986). The way different social groups are organized shapes the gender-differentiated possibilities of responding to climatic stressors.

Denton (2002) explains that gender inequalities continue to exist in terms of access to land, control over resources, ability to command and access to paid labour, capacity and strategies for income diversification, as well as time spent on agricultural or forestry-based activities. Gender dimensions of vulnerability, in the context of a changing climate, derive from differential access to social, economic, environmental, political and technological resources and exclusion from decision-making processes that help in coping and/or adapting to these changes (Vincent 2004:41). Access to various livelihood resources is shaped by gender-based social relations reflected in gender-based norms, values, roles and responsibilities. Greater mobility, raising voices and decision making within the family and in public become possible for certain gender-based social groups in response to disasters and stressors, due to a different entitlement to resources and because of social relations that influence access to and control over them (Kabeer 1994; Sen 1999).

The literature on the gender-based impacts of climate change in an agrarian society highlights the impact of water availability and associated resources. It also underscores the gender-based dynamics with respect to the division of roles, increased workload and resulting vulnerabilities (Dankelman 2010). Figure 3.5 summarizes the differential gender impacts of climate change in an agrarian society. What we know less about is the gendered vulnerability and adaptation of people in agrarian contexts like the diaras, where land as basic source of livelihood is destroyed or lost with recurrent floods (Choudhary et al. 2019).

Flood and drought have an adverse gendered impact on health (WHO 2014). In the South Asian context, reduced food productivity and storage at

home impacts women's and children's food intake negatively (WHO 2014). In climate-vulnerable areas, migration, especially by men, is an age-old survival strategy (Farbokto and Lazrus 2012). This has increased the workload for women (Jetley 1987; Paris et al. 2005; Adhikari and Hobley 2011). At the same time, men working in unorganized labour markets face greater uncertainties as they venture into risky jobs or get paid meagre wages considering the amount of work put in.

Gendered vulnerabilities in West Champaran

For the purposes of this study, four villages were selected in Piprasi, Jogapatti and Nautan Blocks in West Champaran District. These villages illustrate the differential nature of, and reasons for, gender-based vulnerabilities of people living along the Gandak (Figure 3.2). Environmental resources are fundamental for agrarian livelihoods, including for the diara inhabitants. The whole area is inundated with water during the monsoon. The waters dry up in winter, resulting in water scarcity. This has implications for the use of land, the basic resource for farming. In our study area, Piprasi Block is located farthest from the district headquarters, Bettiah. The latter, and most of West Champaran, is located on the right bank of the river, whereas Piprasi is located separately on the left bank. Some hamlets in this block become marooned on islands, inundated for three or four months during the monsoon and post-monsoon seasons. They can only be reached by boat.

Another study village in Jogapatti block, which consisted of about 550 households, used to be safe from floods. However, a shift in the river course in 1999 flooded the village; in 2000, the river flowed through the village. In 2001 inundation had become so severe that people began to move to higher places nearby during the monsoons. From 2002, those who could afford to purchase land in safer places started to maintain two homes, one in the village and the other at a higher location to which they could move during floods. The areas inundated by the river expanded every monsoon, turning the village into a diara.

The third village studied, in Nautan block, is a settlement on an old embankment that is government land. A huge flood in 1980 displaced people from their native village. After moving to ten different places in the last 20 years, the villagers settled on this old embankment but had no proper land entitlement. During our field study in 2016, the settlers told us that the floods of 2009 and 2013 had been the most difficult. They also thought that floods had occurred less frequently in the last 10 years. However, the severe floods of 2017 inundated the land for months again, forcing villagers to take shelter on a new embankment.

The fourth study village, further downstream in Nautan, faced several floods between 1974 and 2010. Increased flooding caused famine here. From 2010 onwards, following construction of a road that in practice acted as an embankment, the flood watershed stopped coming inside the village. However, in view of pressure on the road from the river,

construction of a new flush gate is planned, which is likely to lead to the village flooding again.

One significant consequence of flooding in all the villages was that farming was challenged by land degradation. Yet, those who had lost most of their land did not lease land from others. One reason given was that returns from farming were no longer assured, as the uncertain rainfall and dryness in winter lead to crop failure. Irrigation using a (rented) groundwater pump is imperative in the drought season, but the poorest people in the diaras cannot afford to do so. In Nautan, of the 106 households living on the old embankment, only two families own land and only 17 had opted for sharecropping in 2016, while the remainder lived on daily wages. Rice is grown in the rainy season, and wheat and maize in winter. A man from a Dalit caste explained, “If paddy planted in the field gets inundated for more than a week or two, the crop completely fails. Similarly, if we fail to irrigate during the dry period, the harvest will be minimal.”

As a coping strategy, both men and women opt for daily-wage work. Most of the women work in the village, enabling them to cope with their family responsibilities, such as cooking, child care and other household tasks. Men can work outside the village. “Since we have no other way of earning, wage labour provides a more secure income to meet our daily needs compared to the risks associated with farming”, explained a woman from a *Mahadalit* caste.

“We need more men in our homes”

People living in the diaras belong to the most marginalized social groups. For instance, the hamlet on the old embankment in Nautan block consists of 49 per cent *Mahadalit* (socio-economically marginalized *Dalit* caste categorized as *Mahadalit*) belonging to *Mushar* and *Chammar* castes, 38 per cent other backward castes (OBC) belonging to *Hazam*, *Barai*, *Bind*, *Dhobi* and *Malah* castes, 11 per cent *Yadav* (backward caste). The other villages have similar caste compositions. Skill-based, non-farming castes, such as the *dhobis* (who traditionally do laundry work for a living), often possess no land at all.

The society is deeply patriarchal and regressive social practices, such as dowry giving, are prevalent in all the villages and among all castes. Having a daughter is considered a burden rather than something to celebrate. This is because of the social perception that more men means more hands to go out of the village to earn. Girls are considered a liability for whom a dowry has to be provided. Similarly, men in the diaras have difficulty finding a bride from outside the diara. They are a less preferred choice for villagers outside. Marriage is more or less compulsory and occurs when the couple are in their teens. Marriage carries expectations that producing more children, especially sons, can bring in income for the family. It is common for people here to have as many as five children, in comparison to 3.27 as per the 2011 Census data (Govt of India 2011).

In order to understand local perceptions of vulnerability, we asked people living in diaras “Which household is the most vulnerable during a flood?” The answer revealed the societal gender biases: “Households with more daughters are the most vulnerable.” “And why are they the most vulnerable?” we asked. The response was that such households have limited social and financial capital to respond to floods. Social and financial capital are crucial for coping with stressors (Adger et al. 2003).

The search for the most vulnerable households led us to one house where a widow lived with her five daughters, and a second where the woman’s husband had migrated to Punjab for work. This couple had a daughter with a disability. The husband would visit his wife and daughter once every two or three years and provide limited support. In the third house a widow lived with her son who was ill. All these women managed their family’s day-to-day food requirements through waged labour within the village. The problem was that the waged labour was not available all year round, especially during the four months when the agricultural land was under water. Most of these families borrow from moneylenders to survive the four months of flooding, but with repayments spread across the year they find themselves in a perpetual cycle of borrowing and repaying.

How do people protect themselves during times with major floods? With riverine floods, houses are under water for a long time, leading to potential structural collapse. The houses are made of bamboo huts with mud and cowdung plaster and are fragile when they remain in water for long time. Hence, these huts are protected by a tripod-like structure (locally known as *machhan*) attached to nearby trees. At the top there is a seating area, and here the men sit, supporting the structure so it does not collapse. Preparing a *machhan* and guarding household goods are considered men’s work. While this *machhan* can easily be used by men as a toilet, it does not provide the necessary privacy for women. So, women trying to guard their hut and goods face more difficulties. Also, gender-based norms discourage women from performing these tasks; consequently, they tend instead to move to higher places.

As a result, a household with more women members has to rely on men from outside or to accept losses. “When there are more men in a family shifting is easier”, remarked a woman in Nautan. It is a challenge to find men workers when the flood waters are dangerously close. Everyone wants to help their own family first. Female-headed households are therefore most vulnerable during this time as they have to rely on other men in the community. The dowry practice is another reason for women and households with more daughters to be more vulnerable in the diaras. Using baseline data² from 106 households living on the old embankment in Nautan, our third village, a linear trend analysis of the number of loans taken out by a household against the male/female ratio of its family members was undertaken. It showed a positive association between the number of daughters in a family and its loan burden. Households with more male members had fewer loans or no loans at all compared to those with more female members (Figure 3.6). In-depth analyses of ten families from the *Mahadalit* and OBC

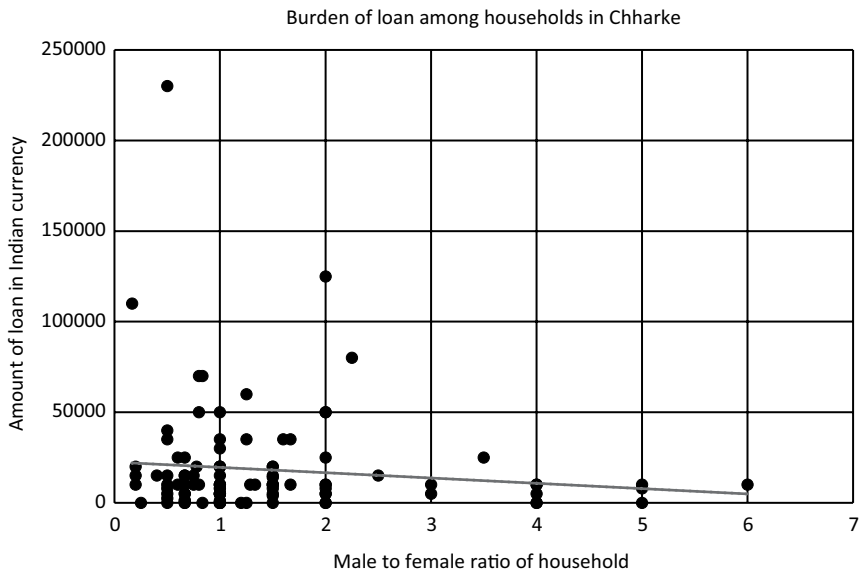


Figure 3.6 Loan burden among households in a village in Nautan.

Source: MPA, 2016.

groups who had taken out loans revealed that the loans were used to pay dowries. Dowry was also mentioned as the main reason for borrowing during the focus group discussions.

For people living in the diaras, more unmarried daughters or women in a household means fewer men able to work outside the village and earn cash incomes for the family,³ as well as less manpower to protect the family's belongings and save lives. Moreover, having more daughters means extra expenses for marriage. If the daughters remain unmarried, then the family has a social stigma to bear. These social factors have made households with more daughters more vulnerable to climatic stressors in the diaras. Our comparative analyses of households led to the conclusion that households with a higher number of women are trapped in multiple vulnerabilities.

Multiple vulnerabilities of work and migration

We analyzed the annual livelihood strategies of the community members in response to climate change. It was found that the male members of all the households in the diaras, from the age of 11 onwards, tend to move out of the village to earn an income for their families. Their mobility peaked from June to November (DAWC 2013). More recently a few young girls have tended to join them in going outside the village to earn. However, families consider this an enforced trend brought about by food scarcity rather than a welcome livelihood strategy.

The women who stayed back observed it was only a temporary solution that family members, mostly men, were leaving the village for work: “Our men who migrate for work are mostly employed in the unorganized sector like construction and mechanized farming, where they are often involved in hazardous work. Besides, there is limited health cover in case of illness.”

There were reports of the disappearance of family members, and of accidents and disabilities – and for some even death – in the case of those who were forced to return. A family identified as most vulnerable in Nautan had a son who had returned with a disability acquired while he was working in Amritsar. He had been bedridden for the last 15 years. Care was being provided by his wife and mother, adding to their workload. A woman in Bairi, where villagers from the Jogapatti block had taken shelter during the floods in 2016, said, “The mother of an 11-year old boy who went to work in Nainital is still in shock after her son died while working.” For the women who remain behind, male members leaving for work in uncertain circumstances causes worry and even mental illness. The lack of employment opportunities in the village itself and going out to work in the informal sector has increased the vulnerability of men. A 60-year-old man said:

We own two *kathas* (1 *katha* = 0.06 acres) of land. Eighteen of our family members are dependent on this land. Our sources of living are sharecropping, four goats and a cow on shared ownership and earnings from bamboo products. Most of our cash income comes from my son who is a casual labourer in Haryana. He left the village 12 years ago. Every month he used to send half his earnings (of about 3,000–5,000 rupees) which we spent on food, healthcare and repaying the debts (Rs.75,000) incurred for the marriage of four daughters. To add to this stress, while working in Haryana in 2014, my son broke his leg in an accident. It took him a year to recover for which we took out a loan of Rs. 100,000 for his medical expenses. He recovered and left for Patna for work.

For people living in diaras, employment opportunities are limited. The decline in farm productivity due to climatic stressors has forced them into waged labour in the village and outside where pay is higher. Members of the same family may find themselves living in two different places. Men who work in the unorganized sector are vulnerable due to lack of health insurance. Women who remain behind are vulnerable due to gender biases. Household work and caring responsibilities constrain women and restrict their involvement in work outside the village. Women doing waged labour in the village can work a bare 10 days a month, earning Rs. 50 a day for 10 hours of work, because the labour market in the village is limited. Food security is a major challenge, the effect of which is reflected in the overall health status of rural women and children in West Champaran. It is worst in the diaras, where our study team observed malnourished children and helpless families with disabilities.

People in the diaras living on public land suffer from an additional vulnerability: not owning land disincentivizes them from investing in improving their homes. A government-employed *Mahadalit* community worker observed, “If we knew we were allowed to stay on this land forever, we could start investing in improving the structure.” Showing us her bamboo hut with a thatched roof, she remarked ruefully: “This structure hardly withstands a minor flood.”

Role of institutions in times of flood

Gender vulnerabilities are also manifest in the availability of and access to government resources during floods. These include health services, drinking water and sanitation, food security and infrastructure development. They are interlinked and together they define social and gendered vulnerabilities in the diaras.

During floods, shallow tube wells or dug wells are widely used for drinking water. However, because these wells source water from a shallow table, they become contaminated. Sanitation is the major issue because of open defecation. Water-borne diseases such as diarrhoea and dysentery are common during the floods and particularly affect children, women with special needs and the elderly (Prakash et al. 2015). Government health centres provide free medication to villagers. However, access to such facilities varies. A village that first became an island and was later inundated now has to depend on boatmen to cross the river to reach these centres. This can sometimes take a whole day, for ferry services may not be available immediately or all the time. In one case, a man came to the health centre in Piprasai by boat in the morning, leaving his sick children at home with his wife. He waited the whole day to be taken back. When the boatman appeared late in the afternoon, he asked urgently: “Are you going back to the village now?” The boatman replied, “No, I am waiting for more people to join. I can make only one trip to the village.”

At least it was possible for this man to travel to the government health centre, although it did affect his work. For women in a similar situation, mobility is restricted by their roles as homemakers and carers and by social norms. Hence, women-headed households and families with a majority of women have to depend on their men to access government services, or often never access them. Floods adversely affect food storage in a household. The entire population of the diaras is below the poverty line and is entitled to a certain volume of rice and wheat under the public distribution system (PDS). This is commonly known as *raashan* (ration) here. However, women-headed households and those with many women reported difficulties in collecting their *raashan*. In one family in a recently flooded village in Nautan, the husband had decided to work outside the village, as all their farmland had been cut off by a branch of the Gandak. His wife had started to work on daily wages while also looking after their five children, one of whom was disabled and four of whom were girls. She depended on other

men to access her quota of *raashan*, which she found difficult in the absence of male members of the household:

Arranging the daily cereal to feed the children is difficult after our farmland had washed away. We are entitled to receive 3 kg of rice and 2 kg of wheat from the government. I cannot go to collect the ration. I depend on my neighbour to bring it for us to save money.

Any infrastructure development should take account of how people will be affected. Two cases of infrastructure development that increased vulnerabilities of people in the diaras were observed during our field study. One concerned road construction, which increased the risk of flooding for one of the villages in the Nautan block. The villagers observed, “Fear of flood due to the sudden opening of the flush gate of the road is much higher than the river flood itself. It could be more disastrous than a riverine flood.” The other case involved a groundwater pump for drinking water which lacked a suitable mechanism and where the water quality had not been safety checked. Groundwater in a village in Nautan block was found to be contaminated with arsenic (Bhatia et al. 2014).

Before the closed tube-well system, dug wells were the source of drinking water in the village. Since tube wells have been widely adopted by households in the last 10–20 years, due to the convenience of extracting water in water-scarce conditions, people have begun consuming arsenic-contaminated water, implying multiple grave health hazards (Singh and Ghosh 2014). The director of the Mahavir Cancer Hospital in Patna claimed that there is an increased incidence of cancer in rural Bihar, which could be due to consumption of arsenic-contaminated water. Men dying of cancer increases the vulnerabilities of women family members. In one case, after the death of the husband from cancer, the wife was left alone to look after the family. To aggravate matters, expenses for the treatment of her husband had increased the family’s loan burden, for which she would now be liable. Remarrying is taboo in these villages.

Conclusion: Surviving and adapting to change in the diaras

This chapter has investigated the level of vulnerabilities of people living in the diaras in the West Champaran district of Bihar, India. The chapter explored access to various resources and facilities and its intersection with differential gender-based norms and values. We found that in situations of perennial flooding, people have survived by adopting multiple adaptation strategies, which we discuss below.

Early marriage, when the girl is still in her teens, is commonly practised and son preference is widely prevalent. Early marriage adds to the labour force at home when the husband has migrated to earn money. Producing many children used to be a characteristic of agrarian communities in the pre-industrial period all over the world, especially to meet

labour requirements for farming (LeVine and LeVine 1985). The difference between typical farming families elsewhere and those living in the diaras of West Champaran is that here the expectation of a new-born child is that it will become not only potential farm labour, but any kind of labour to bring in income in cash or kind, either by working in the village or outside it.

The gender division of roles, with women as caretakers of the family and men as cash earners, is prominent in this area. After the 1980s, when road connectivity expanded, the expectation was that sons would work outside the village in the face of losses caused by flooding. But this has contributed to the increased, though differential, vulnerabilities for both women and men. The women are left behind in vulnerable areas for longer periods, while the men venture out to work in the unorganized labour market, often in initially unknown territories. They are forced to work as labourers as they do not have the skills to get a better, higher-paying job. Though the Government of India has some provision for enhancing skills, more emphasis on skill-oriented training and the creation of work opportunities would improve the livelihood security of those living in the diaras. Better incomes would enhance their resilience. In addition, security of land tenure, housing, safe drinking water and improved sanitation are crucial for resilient livelihoods. For people in the diaras all these facilities are as fluid as the floodwater. Displacement due to frequent floods has forced most vulnerable families to live on public land, like the old embankment in Nautan block, without any entitlement. Lack of land ownership is a barrier to further investment in basic needs such as shelter, water and sanitation.

Giving land security to displaced people can go a long way towards reducing gender vulnerabilities. For instance, in July 2016, people living on the old embankment in Nautan received financial support from the government to build houses under the *Pradhan Mantri Gramin Awas Yojana*. This raised hopes for ownership of the homestead land after more than a decade. People spent money in excess of the government grant to construct permanent flood-resistant brick houses with iron doors. These houses belong to migrant families, who could save money.

Lack of clean drinking water and sanitation is another reason why women, children and people with special needs become more vulnerable during floods; lowered immune systems cause them to become ill quickly (WHO 2014). Fresh water availability is crucial during floods (Gopalakrishnan and Cortesi 2011). Organizations like Megh Pyne Abhiyan promoted rain water harvesting in Bihar, including at our study sites, where people who were practising it spoke positively about it, particularly the sick, the elderly and women.

However, the adoption of new practices was found to be limited. Cash constraints often prevented families living in houses made of local materials and thatched rooves from buying plastic sheets to harvest rooftop rainwater. In discussions with women's groups, it was concluded that portable rainwater harvesting tools, such as a conical flask that could help collect water in a bucket, would be more useful than static, roof-based water-harvesting techniques.

This is because people are forced to be mobile during floods. Promotion of such tools and emergency relief kits could reduce women's workload, enabling them to manage drinking water during floods.

Women from landless and marginalized families, who remained behind after the men migrated, were found to be actively involved in shared animal care. This growing trend of shared cow and buffalo farming was observed in all our study villages. The women explained, "Looking after these animals provides nutritious milk for children and is also relatively less risky than farming. The fodder can be managed from the land left fallow after floods, and water from the tube well or river." Programmes that support women's ownership of livestock in the diaras, instead of sharecropping, could enhance their resilience in coping with frequent floods.

These findings, which are based on grounded study exploring gender-based vulnerability, could contribute to the formulation of gender-responsive policies and programmes in the West Champaran district. It also holds true not only for the other diaras in Bihar but for all such riverine bars in the Ganga-Brahmaputra Barak basin. Adaptation policies and programmes in response to bottom-up investigations of the gender-based dimensions of vulnerability would be more effective than relying on a top-down approach. If the gender aspects of vulnerabilities and adaptation are not considered, climate-related policies and programmes may end up creating larger gender gaps and negative social impacts (Terry 2009). The state as caretaker of its citizens has a responsibility to respond to the vulnerabilities of the most vulnerable and to safeguard them in a gender-responsive manner.

Notes

- 1 Threshold in this context refers to consecutive wet days and consecutive dry days at the annual and seasonal levels.
- 2 The baseline data was collected by HI-AWARE's study partner, Megh Pyne Abhiyan, in 2015.
- 3 Value one indicates equal ratio of men to women in a household; less than one indicates more women and more than one indicates more men. Source: Baseline data (MPA 2016).

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