

# Gendered Vulnerabilities in *Diaras*

## Struggling with Floods in the Gandak River Basin

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People living in *diara* villages within the embankments of the River Gandak in Bihar face high levels of vulnerability due to frequent flooding and droughts. Using anthropological surveys, gendered vulnerabilities in four diara villages in West Champaran are explored. Such vulnerability, in the context of a changing climate, combines social, political, and economic dimensions: the patriarchal creation of gender norms and biases; unequal access to water, sanitation, credit, and public distribution services; and limited employment opportunities. These elements influence the livelihood options of women and men differently, determining their capability in responding to risks posed by climatic and socio-economic stressors.

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The term *diara* derives from the word *diya*, which means an earthen oil lamp. *Diara* is a word coined for a land where a *diya* is never lit. In local parlance in parts of Bihar, it symbolises a village located inside the embankments of the floodplains of the River Gandak in Bihar. In a wider sense, the term indicates people living in abject poverty and who face multiple vulnerabilities, due to frequent flooding of the Gandak. The river meanders and people are never sure when it would change course.

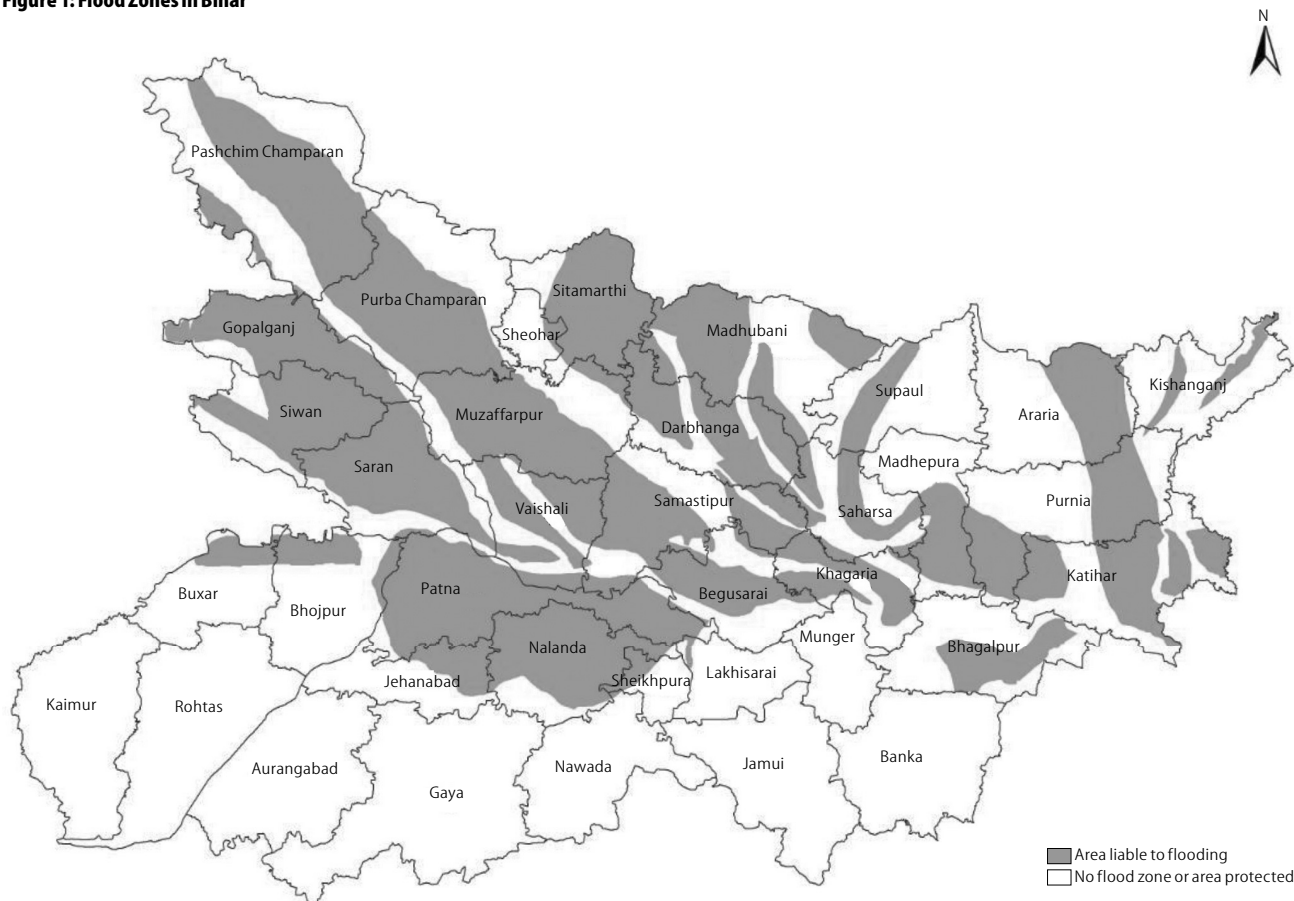
The Gandak enters India from Nepal (where it is known as Narayani or Gandaki). It flows south through seven districts of Bihar and two districts of Uttar Pradesh before joining the River Ganga at Hazipur in Bihar. More than 34 million people live in these nine districts (according to the 2011 Census), most of them in flood-prone areas.

People in diaras experience either too much or too little water in a changing climatic context, and understanding their vulnerabilities is crucial. Two major climatic parameters—floods in the monsoon and relative droughts in the summer—affect the livelihoods and well-being of people living in diaras. The impact of these stressors is varied for different social groups, mediated by gender, caste, and class. Different social groups differentiated by gender have dissimilar access to resources, leading to unequal strengths and capabilities in coping with stressors.

This paper takes the view that understanding the vulnerabilities of people from their own perspective helps provide a realistic picture. It uses participatory assessment tools to understand the climatic and socio-economic drivers and conditions that contribute to the vulnerability of people residing in diaras. Methods such as focus group discussions and interviews, participant observation, and transect walks were used for collecting primary data. Reflecting on physical and socio-economic aspects added value to the analysis of vulnerabilities. The fieldwork was conducted in Bihar's West Champaran district between February and July 2016 in four villages, each representing a context of recurrent floods, a new flood zone, flooding triggered by infrastructure development, and distant location from government agencies, respectively. All these villages are located inside embankments of the Gandak.

A study of vulnerabilities provides an opportunity to understand people's struggle to survive in difficult circumstances. This is crucial for an understanding of adaptation and survival strategies in response to various stressors (Gilson 2013). Consequently, our analysis of gender-based vulnerabilities of

Figure 1: Flood Zones in Bihar



Sources: 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>.

people living in diaras aims at contributing knowledge to ongoing developmental efforts, as well as to academic discourses on vulnerability. This paper analyses people's vulnerabilities with respect to social, economic, environmental, and political resources. It is also meant to inform government policies, plans for disaster management, and the promotion of adaptation strategies.

### A Land under Knee-deep Water

Bihar is prone to floods: 73% of its area and 76% of its population perpetually face the threat of flooding (Kumar et al 2013). Of its 38 districts, 28 are under risk of flooding (Figure 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 entirely natural. They are often caused by a breach in the embankments made 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 have been termed natural disasters, whereas the 2008 flood has been considered 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

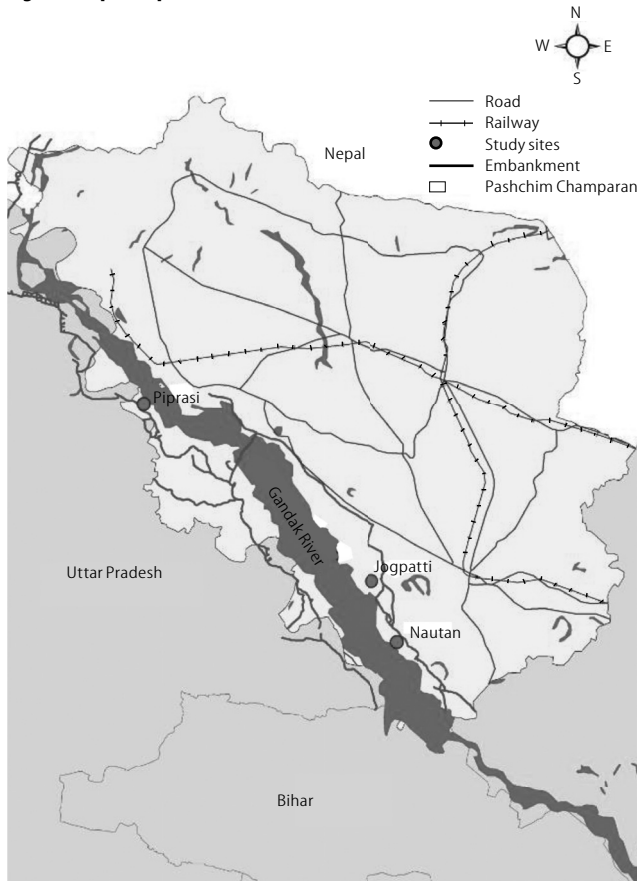
district alone, 42 people died and around 46,000 people were affected (Government of Bihar 2017).

Floods are a hurdle to growth in Bihar. The 2011 *India Human Development Report* ranks Bihar among the bottom five states in terms of the Human Development Index (GoI 2011a, 2011b). According to the report, the poverty level in Bihar in 2009–10 was about 54%, compared to about 30% for India as a whole (UNDP 2016). And, West Champaran is one of Bihar's poorest districts, with 77% people living in poverty in 2004–05 (Chaudhuri and Gupta 2009). In rural areas, 81% of the households were below the poverty line (Pankaj and Mishra 2008).

The flooding caused by the Gandak is one of the reasons for West Champaran's underdevelopment. The Gandak drains into India through West Champaran, carrying heavy silt and sediments, which changes the course of the river 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 (PAWC 2013). According to the 2011 Census, 118 villages in the district are uninhabited, and many of them have been abandoned, largely due to the river frequently changing course.

The floods are not only caused by localised rain, but are also the result of rainfall in 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

**Figure 2: Pipra–Piprasi Embankment, Gandak River**



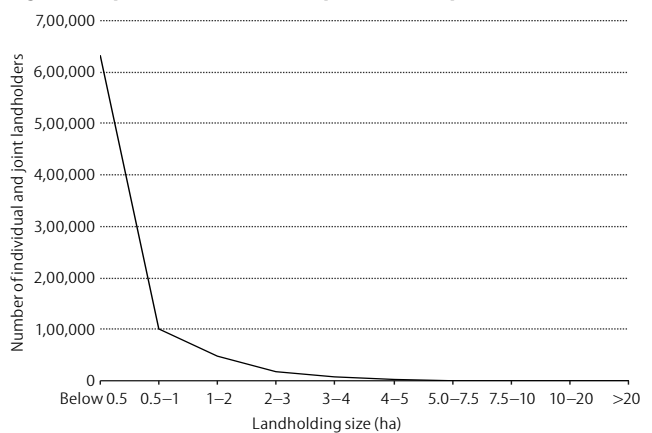
Study area plotted with estimation, with respect to GPS map in HI–AWARE (2017).  
Source: Adapted by authors from Government of Bihar (2015), HI–AWARE (2017).

prevent damage in the upstream areas and to the barrage structure. Consequently, there is a sudden increase in the volume of water in this stretch of the river, which causes floods. If news about the opening of the barrage is not communicated well in advance, it leads to damage of lives and properties. This happens many times when the water level in the barrage rises. Floods may also be the result of the deposition of sediment loads, which triggers a change in the course of the river, which, in turn, inundates habitats.

Floods here generally result more in a loss of property than of lives. This is because the floods in the Gandak are riverine floods of the slow onset type. People can anticipate the rise in the water level, and carry out a timely evacuation, except in areas that face flash floods. The major challenge here is that floodwater inundates the land throughout the summer monsoon season, for at least four months. This results in a loss of property and challenges in managing a mobile lifestyle during this period. People become refugees, taking shelter on public land such as embankments, highland areas, or on rented land.

The vulnerability faced by women, children, and the elderly is high during floods due to sociocultural norms such as *lajja* (shame), forced mobility, special needs of women in certain situations, and an increased workload to manage water and other local resources in order to take care of the family (Mehta 2007). On the other hand, due to the lack of local economic

**Figure 3: Disparities in Landownership in West Champaran**



opportunities, men migrate to find work, whereas children, women, and the elderly are left behind in the flood-affected areas throughout the year (DAWC 2013).

The woes of the people continue after the rainy season, when the floodwater drains. They face a severe problem of water scarcity and drought in the winter. The state has experienced prominent droughts in 2006, 2009, and 2010 (Government of Bihar 2016). Despite such hardships, people live in diaras because they do not have an alternative. For some, the lands they used to live on became diaras because the river changed its course. For others, their land area fell inside embankments, for example, the Pipra–Piprasi embankment (Figure 2). For many others, diaras are the only place left to live, because it is impossible to claim land rights elsewhere, given Bihar's feudal social structure, where access to land is skewed.

### Socio-economic Context

“Crime, caste, and cost (bribery) are push factors for poverty and vulnerabilities in Bihar,” is a local aphorism. Combined with climatic stressors, the vulnerabilities for some groups of people in West Champaran are rooted in a history of social discrimination and domination.

West Champaran shares a border with Nepal and has been an area with criminal activities, facilitated by an easy escape across the border. Landownership is skewed: 91% of households own plots of land of a hectare or less. A lot of the land is in the hands of a few landlords—who tend to be from the dominant castes—who have holdings above 20 hectares. According to the Agricultural Census of 2015–16, 3% of the population owns 26% of the land in West Champaran, whereas 97% of small and marginal landholders own 74% (Figure 3; GoI 2012). Historically, strong caste-based disparities, zamindari, and colonisation by the British of indigo plantations created a structure of domination and inequality in the area. Although the zamindari system was abolished and a land ceiling legislation came into force after independence, skewed land relations persist, indicative of continuing socio-economic inequality. Female landowners in Bihar constitute a lower proportion than the national average of about 11% (Rao 2011). A study by Landesa and Oxfam in two districts of Bihar found that only 7% of women own land (Golder 2017).

The National Health Survey in 2015–16 of West Champaran district shows the particularly low status of women in rural areas (GoI 2017). The literacy rate of women there is 40%, far lower than the male literacy rate of 70%. Only 12% of the women have had 10 years or more of schooling. Early marriage is rampant. In the rural areas, 23% of girls in the age group of 15–19 years were found to be either pregnant or already married with children. In addition, 42% of the children under the age of five were found to be underweight. Anaemia is widespread: 63% of children aged between 6 months and 5 years, 57% of women aged 15–49 years, and 27% of men aged 15–49 years appeared anaemic. Caste regulates all social practices related to birth, marriage, death, and various rituals, and caste discrimination continues to thrive in society. The preference for male children is commonplace, and reflected in the demographic composition of West Champaran. In rural areas of the district, the gender proportion is 936 females per thousand males. For girls born in the previous five years, it is 870 females per thousand males, as per the 2011 Census (GoI 2017).

It is in this context of persistent structural inequalities and deprivation that changing climatic conditions are beginning to affect West Champaran.

An analysis of monthly rainfall data of 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).<sup>1</sup> The climatic modelling data found a significant increase in temperature over the last 30 years.

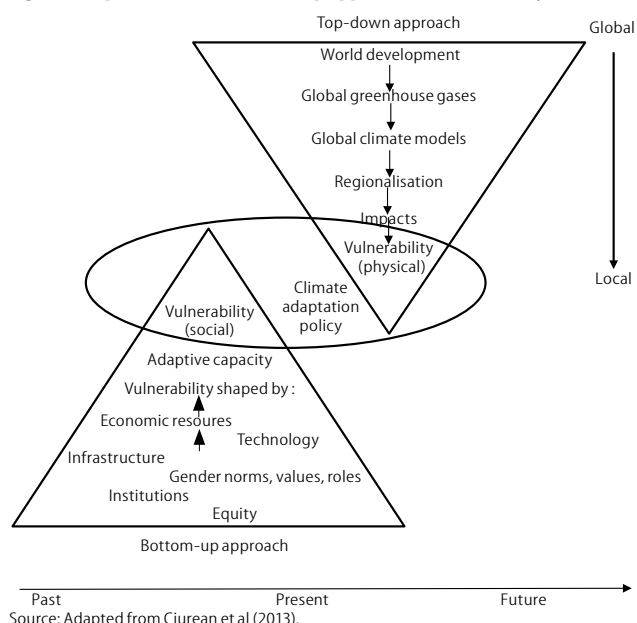
A scenario for 2050 reveals that regions downstream of the basin, including West Champaran, will be warmer. Currently, the minimum temperature in the Gandaki basin tends to be below 30° Celsius (C). Under the highest Representative Concentration Pathways (RCP) scenario calculated by the Intergovernmental 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)

**Figure 4: Top-down versus Bottom-up Approach to Vulnerability**



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 from vulnerabilities due to famine, and natural- and climate-related hazards, Adger emphasises the underlying causes of social vulnerability at the individual and collective levels. Ciurean et al (2013) locate social vulnerability in a bottom-up approach, in contrast to physical vulnerability approaches, which are top-down and focus more on future scenarios (Figure 4). The authors highlight adaptation policies that consider the assessment of social vulnerabilities through a bottom-up approach in relation to physical vulnerabilities, and which are effective.

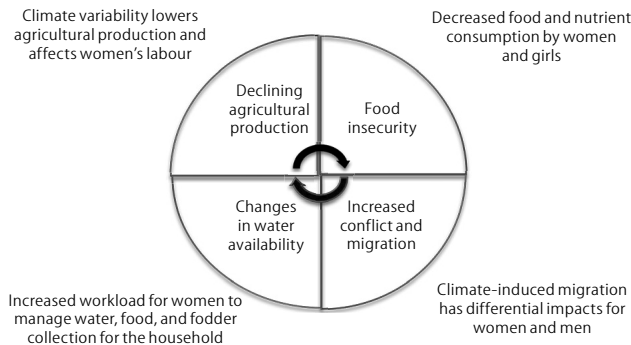
As a subset of social vulnerability, gender-based vulnerability is part of a process that creates differential vulnerabilities for people belonging to different, gender-based, social categories (Sugden et al 2014; Goodrich et al 2017). It is critical to understand that “gender” is not just an indicator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

Gendered life is defined as an organising principle of social life, creating and ordering relations between people in a hierarchical manner as well as a process of giving meaning and legitimisation with respect to performance, resource allocation, and social practices to certain sex-based groups belonging to specific social categories (Harding 1986). The way different social groups are organised shapes the gender-differentiated possibilities to respond to climatic stressors.

Denton (2002) explains that gender inequalities continue to exist in terms of access to land, control over resources, access to and ability to command paid labour, capacity and strategies for income diversification, and time spent on agricultural or forestry-based activities. Gender dimensions of vulnerability—in the context of a changing climate—derive from a differential access to social, economic, environmental, political,

and technological resources, and exclusion from decision-making processes that help cope with and/or adapt to such change (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 and control over them (Kabeer 1994; Sen 1999).

**Figure 5: Differential Gendered Agrarian Impacts of Climate Change**



Source: Compiled by the authors.

The literature on the gender-based impacts of climate change in an agrarian society highlights the impacts on water availability and associated resources. It also underlines the gender-based dynamics with respect to the division of roles, increased workloads, and resulting vulnerabilities (Dankelman 2010). Figure 5 summarises the differential gender impacts of climate change in an agrarian society. What we know less about is the gendered vulnerability and adaptation of people living in agrarian contexts like diaras, where land as the basic source of livelihood is destroyed or lost with recurrent flooding.

Floods and droughts have an adverse gendered impact on health (WHO 2014). In the South Asian context, the reduced food productivity and storage at home has a negative impact on women's and children's food intake (WHO 2014). In climate-vulnerable areas, migration, especially by men, has been an age-old practice for survival (Farbotko and Lazrus 2011). This has increased the workload for women (Jetley 1987; Paris et al 2005; Adhikari and Hobley 2012). At the same time, men working in unorganised labour markets face greater uncertainties as they venture into risky jobs or get paid meagre wages for the amount of work they put in.

### Gendered Vulnerabilities in West Champaran

For the purpose 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 2).

Environmental resources are fundamental for agrarian livelihoods; so it is for the people living in diaras. In the monsoon season, river water inundates the entire land, and in winter it

dries up, resulting in water scarcity. This has implications for the use of land, the basic resource for farming.

Within 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 on the left bank, in isolation. Some hamlets in this block become like islands as they get inundated for three–four months during the monsoon and post-monsoon seasons. One has to take a boat to reach these villages then.

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

The third village, in Nautan block, is a settlement on an old embankment, which is government land. A huge flood in 1980 had displaced people from their native village. After moving to 10 different places over the last 20 years, the villagers had settled in this old embankment without proper land entitlement. During our field study in 2016, these settlers told us that floods in 2009 and 2013 had been the most difficult. They also thought that the occurrence of flooding was becoming less frequent in the last 10 years. However, the severe floods in 2017 inundated the land for months again, forcing them to take shelter in a new embankment.

The fourth study village, further downstream in Nautan, faced several floods between 1974 and 2010. An increasing degree of flooding caused famine here. From 2010 onwards, after the construction of a road that practically acted as an embankment, the floodwater had stopped coming inside the village. However, in view of the pressure on the road from the river, the construction of a flush gate is planned, and this, most likely, will result in the village getting flooded again.

One prominent consequence of flooding in all these villages was that farming was affected by land degradation. Yet, those who had lost most of their land did not lease in land from others. A reason mentioned was, "Returns from farming are assured no more. The uncertainty of rainfall and dryness in winter leads to crop failure."

To cope with drought, irrigation through the use of a (rented) groundwater pump is imperative, but the poorest in the diaras cannot afford this. In Nautan, of the 106 households living in the old embankment, only two families owned land and only 17 had opted for sharecropping in 2016, while the remaining live on daily wages. 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. Women work inside the village mostly. This helps them look after their family's needs as well, such as cooking,

childcare and other household work. Men work outside the village. "Since we do not have another way out to arrange for our daily meal, wage labour provides a more secure income compared to the risks associated with farming," said one of the women belonging to a Mahadalit caste.

### 'We Need More Men in Our Homes!'

People living in diaras belong to the most marginalised social groups. For instance, a hamlet in Nautan block, located in an old embankment, consists of 49% Mahadalits, including Musahars, and a significant proportion of residents belonging to Dalit and Other Backward Class (OBC) caste groups. Other villages here have a similar caste composition. Skill-based, non-farming castes, such as Dhobis, often possess no land at all.

The society is deeply patriarchal and regressive social practices such as dowry are prevalent in all villages and among all caste groups. Having a daughter is perceived as a burden rather than a celebration. This is because having more men means one has more hands that can go out of the village to earn. Girls are considered a liability, for whom one has to provide dowry. Similarly, men in diaras have difficulty finding a bride from outside the diara; they are a less preferred choice for villagers outside. Marriages are compulsory, and take place when the couple is in their teens. Marriage carries the expectation that producing more children, especially sons, can bring in income for the family. It is common for a couple here to have as many as five children.

"Which household is the most vulnerable during a flood?" we asked people living in diaras. The answer revealed the gender biases in this society. "Households with more daughters are the most vulnerable." And, why were they the most vulnerable? The response was that such households have limited social and financial capital to respond to floods. Social and financial capital is crucial to cope with stressors (Adger et al 2003).

Looking for the most vulnerable households led us to a house where a widow lived with her five daughters. A second house was of a woman whose husband had migrated to Punjab for work. They had a disabled daughter. This migrant worker would visit his wife and disabled daughter once in two–three years, and provide limited support. A third household was of a widow with a sick son. All these women managed their family's day-to-day food requirements through wage labour within the village. The problem was that work was not available throughout the year, and even more so during the four months when agricultural land was under water. Most of these families borrow money from moneylenders to tide them over those four months of flooding, and repay them through the year. They face a perpetual cycle of borrowing and repaying.

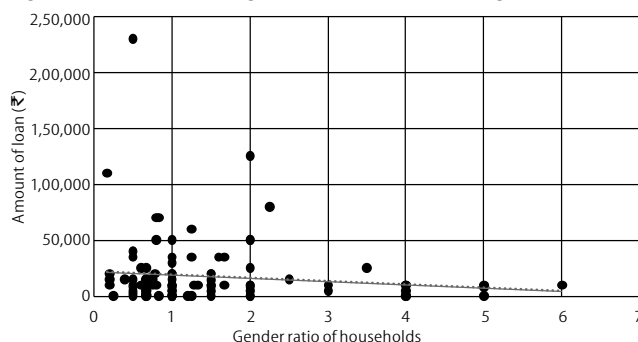
How do people protect themselves during the time when there is no major flood? They have made special bamboo houses that are collapsible and can be carried around if the family needs to move. To protect the bamboo home, men are required to raise tripods (known locally as *machhans*). The tripods support the cottage. Altogether, it costs around ₹10,000 to build. Preparing a machhan and guarding household goods are considered men's tasks. While this machhan is easily used by men also as a toilet, it does not provide the needed privacy for women. So, women who

try to guard their cottage and resources face more difficulties. In addition, gender-based norms discourage women from performing such tasks and, consequently, they hardly do so.

As a result, a household with more female members has to either rely on men from outside or accept losses. "When there are more male members in a family, shifting happens easily," remarked a woman in Nautan. It is a challenge to find male labour at times when floodwaters are dangerously close. Everyone wants to help their own family first. Women-headed households are most vulnerable during this time. There is meagre institutional support for such families, and they have to depend largely on the generosity of other men in the community.

The practice of dowry is another reason for women and households with more daughters to be more vulnerable in diaras. A linear trend analysis was made of baseline data<sup>2</sup> of 106 households living in an old embankment in Nautan, with respect to the amount of loan taken by a household against the male–female ratio of family members. It showed that the higher the number of daughters in a family, the more was family's loan burden. Households with a greater number of males had smaller loans, compared to those with more female members, or no loan at all (Figure 6). Of the 106 households, 18 had no loans at all, of which 13 had either more males than females, or an equal number. More in-depth analyses of 10 families who had taken loans, comprising Mahadalits and OBC households, revealed that these loans were used to pay for dowry. It was mentioned as the main reason for taking loans during group discussions as well.

**Figure 6: Loan Burden among Households in Chharke Village**



A value of 1 indicates an equal proportion of men and women in a household. Less than 1 indicates more women, and more than 1 indicates more men.

Source: (MPA 2016).

For people living in diaras, fewer males and proportionately more women in the household also means fewer members who could go work outside the village and earn an income for the family. Moreover, having more daughters means extra marriage expenses. If daughters remain unmarried, then the family has to bear the social stigma. These social factors have made households with more daughters more vulnerable to climatic stressors in diaras. With our intra-household study, we came to the conclusion that households with more female members get trapped in multiple vulnerabilities.

### Differential Vulnerabilities of Work

The annual livelihood strategies of community members in response to climate change were analysed. It was found that male members of all households in the diaras, from the age of

11 onwards, tended 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. Families consider this a forced trend though, brought about by food scarcity, rather than as a welcome livelihood strategy.

The women who stayed back observed that 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 unorganised sector like construction and mechanised 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 accidents and disabilities of those who were forced to return, and even deaths. A family identified as most vulnerable in Nautan had a son who had returned with a disability in his back, acquired while working in Amritsar. He had been bedridden for 15 years. Care was being provided by his wife and mother, which added to their workload. A woman in Bairi, where villagers of the Jogapatti block had taken shelter during the floods in 2016, said, "A mother of an 11-year-old boy who had gone to work in Nainital is still in shock after the death of her son while working." The lack of employment opportunities in the village itself and going out to work in the unorganised sector has increased the vulnerability of men. For the women who remain behind, male members leaving for work in uncertain circumstances brings worries and mental illness.

A 60-year-old man said,

We own two *kathas*<sup>3</sup> of land. Eighteen of our family members are dependent on this land. Our sources of living are sharecropping, four goats and one cow on a shared ownership, and earning from bamboo products. Most of our cash income comes from my son who does labour work in Haryana. My son left the village 12 years ago. He sends half of his earnings every month, which we use to spend on food, health, and clearing debts (₹75,000) from 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 a year [for him] to recover, for which we took a loan of ₹1 lakh for his medical expenses. He recovered and in the first week of July he 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 wage labour in the village and outside, where the earnings are higher. Ultimately, members of the same family find themselves living in two different places. Men who work in the unorganised sector are vulnerable due to the lack of health insurance. Women who remain behind are vulnerable due to gender biases. Women are forced to stay at home to look after children or do household work, which limits their access to work outside the home. For instance, women doing wage labour in a village hardly get work 10 days a month, with a daily wage of ₹50 for 10 hours' work. This is because the labour market in the village is limited. Food security is also a big 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 diaras who live on public land suffer from additional vulnerability because of their lack of landownership, which affects their motivation to invest in improving their home. A government-employed Mahadalit community worker observed,

"If we know we are allowed to stay in this land forever, we could start investing in improving the structure." Showing us her bamboo cottage with a thatched roof, she remarked ruefully: "This structure hardly withstands even a minor flood."

### Role of Institutions during Floods

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

During floods, shallow tube wells or dug wells are widely used for drinking. However, because these wells source water from the shallow water table, they become contaminated. Sanitation is a major issue because of open defecation. Due to the lack of sanitation facilities, waterborne diseases such as diarrhoea and dysentery are common during floods, which affect children, women with special needs, and the elderly (Prakash et al 2015). Government health centres provide free medicine to the 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. There was the case of a man who had come to the health centre in Piprasi in the morning, leaving behind his sick children with his wife. He waited the whole day to be taken back. When the boatman appeared late in the afternoon, he asked with urgency, "Are you going back to the village now?" The boatman answered, "No, waiting for more people to join as I can make only one trip to the village."

Being a man, it was at least possible for this person seeking the services of the government health centre to travel. For women in a similar situation, mobility would be restricted by their having to provide care at home and by social norms. Hence, women-headed households and families with a majority of women have to either depend on male members to access government services, or often cannot access them.

Floods adversely affect food storage in a household. The entire population of 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 referred to here as *raashan*. However, women-headed households and those with many women reported difficulties in collecting their *raashan*. There was a family in a recently flooded village in Nautan, in which the husband had decided to go for work outside the village, since all their farmland had been cut off by a branch of the Gandak. His wife had started to work on daily wages while also taking care of their five children, of whom one was disabled and four were girls.

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

Two cases regarding infrastructure development that increased the vulnerabilities of people in diaras came up during our field study. One case is related to road construction, which

increased the threat of flooding for one of the villages in Nautan block. Villagers observed, "The fear of floods from [a sudden opening of] the flush gate of the road is much higher than the river flood itself, as it could be more disastrous than a riverine flood." The key point is that any infrastructure development must consider how it affects the people in this context.

The other case was related to the promotion of a groundwater pump to access drinking water without adequate mechanisms or care to ensure safe water quality. The groundwater in a village in Nautan block has been identified as being contaminated with arsenic (Bhatia et al 2014: 2). Before the closed tube well system, dug wells were the source of drinking water in the village. Dug wells allow groundwater to be in contact with the air, which helps aeration. Following the promotion of tube wells over the last 10–20 years—widely adopted by households due to the convenience in extracting water in water-scarce situations—households began consuming water contaminated with arsenic, which has multiple and grave health hazards (Singh et al 2014). The director of the Mahavir Cancer Hospital in Patna mentioned that there has been an increase in the occurrence of cancer in rural Bihar, which could be due to the consumption of contaminated water. Men dying of cancer also increases the vulnerabilities of female members of the family. In one case, after the death of the husband from cancer, the wife was left alone to take care of the family. To aggravate matters, expenses to treat the ailment had increased the loan burden on the family, for which she would now be liable after the death of her husband. And, remarrying is not an option, since it is taboo in villages here.

### Surviving and Adapting to Change

The level of vulnerability of people living in diaras is high with respect to access to various resources and facilities, and is multiplied by differential gender-based norms and values. People have survived by adopting multiple strategies.

One is related to marriage and reproduction. Early marriage, when the girl is still in her teens, is commonly practised, and preference for a male child is widely prevalent. Early marriage adds to the labour force at home while the husband has migrated outside to earn.

Producing many children used to be a characteristic of agrarian communities in the post-industrial period all over the world, especially to meet labour requirements for farming (Levine and Levine 1985). For instance, in the case of people living in diaras in West Champaran, their expectation from a newborn child is that it will become not only potential farm labour, but any kind of labour to bring income in cash or kind, either by working in the village or outside.

A gendered division of roles—women as caretakers of the family and men as cash earners—is prominent in the area. After the 1980s, when road connectivity expanded, the expectation from sons was that they would work outside in the face of losses caused by floods. But, this has contributed to increased albeit differential vulnerabilities for both women and men: women are left behind in vulnerable areas for longer periods, while men venture out to working in the unorganised

labour market, often in initially unknown territories. They are forced to work as labourers as they do not have any skills that would fetch them a better job and income. Though the Government of India has some provisions for enhancing skills, more emphasis on skills-oriented training and the creation of work opportunities would improve the livelihood security of those living in diaras. Better incomes would enhance their resilience. In addition, the security of land tenure, housing, drinking water, and improved sanitation is crucial for resilient livelihoods. For people in diaras, all these facilities are as fluid as floodwater. Displacement due to frequent flooding has forced most vulnerable families to live on public lands—such as those on the old embankment in Nautan block—without any entitlement. The lack of landownership is a barrier to further investment in basic needs such as shelter, water, and sanitation.

A government policy to rehabilitate immediately displaced people and give them land security can reduce vulnerabilities, gendered vulnerability in particular. For instance, in July 2016, people living in the old embankment in Nautan received financial support to build houses under the Pradhan Mantri Gramin Awaas Yojana. This raised hopes of the ownership of homestead land after more than a decade. People spent more money than what they received from the government to construct permanent, cement-based houses, with an iron door. These households are of migrant families, who could save money. The investment on iron doors was made with the consideration that wooden doors would rot following repeated floods. And, a strongly built house can withstand gradually rising waters better than a thatched structure.

Further, the lack of clean drinking water and sanitation is a reason why women, children, and people in special situations are more vulnerable during floods, since their immunity system is low and they become ill quickly (WHO 2014). Organisations like Megh Payne Abhiyan had promoted rooftop water harvesting in Bihar, including at our study sites, in view of the generally abundant rains, with freshwater availability being crucial during flooding (Gopalakrishnan et al 2011). During our field study, people who practised rainwater harvesting spoke of it in positive terms, particularly the sick, elderly, and women.

However, the adoption of new practices was found to be limited. Those with limited access to cash explained their inability to purchase plastic sheets to harvest rooftop water. 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 a static, roof-based water harvesting technique. This is because people are forced to be mobile during floods. The promotion of such tools, particularly of emergency relief kits, can reduce the women's workload in accessing drinking water during floods.

Women from landless and marginal farmer households, 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 rearing was observed in all our study villages. The women explained, "Taking care of these animals gives 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 tubewell or river." Programmes that support female ownership of livestock in diaras, instead of sharecropping, could enhance their resilience coping with frequent floods.

Considering these findings, which are based on a grounded study exploring gendered vulnerability, could be a way forward to crafting gender-responsive policies and programmes in West Champaran district. Adaptation policies and programmes

that are responsive to bottom-up enquiries on gender-based dimensions of vulnerability would be more effective than only relying on a top-down approach. Without the consideration of the gender aspects of vulnerabilities and adaptation, climate change-related policies and programmes may end up creating larger gender gaps and having negative social impacts (Terry 2009). The state as the caretaker of its citizens has the responsibility to respond to the frailties of the most vulnerable and protect 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 This baseline data was collected by HI-AWARE's study partner, Megh Payne Abhiyan, in 2015.
- 3 A katha is a very tiny plot of land, much smaller than an acre in Bihar.

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