



Women-initiated measures to cope with environmental stresses and climate change in South Asia

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28 February 2018

Question

- *What is the global and South Asian evidence on women-initiated or women-led measures to cope with environmental stresses and climate change, with a focus on their social and ecological impacts?*
- *What evidence is there that social and economic empowerment of women leads to enhanced capacity to deal with such stresses?*

Contents

1. Overview
2. Women and climate change
3. Examples from South Asia
4. References

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1. Overview

In climate change studies, gender is mostly handled in a men-versus-women dichotomy, with a “feminisation of vulnerability” reinforcing a “victimisation” discourse. Little attention has been paid to power and social, and political relations (Djoudi et al, 2016: 248). A simple view of women as a homogenous group is shifting toward a more complex view of identities within gender. Presenting women as a passive victim of change may misinterpret the causes of vulnerability and obscure the role of women as proactive agents of adaptation. Multiple social, economic, and cultural characteristics interact with gender in influencing power inequities and explaining how and why people face and manage climate change and environmental stresses in different ways (Ravera et al, 2016: 336). This review gives a number of examples of women-initiated measures to cope with climate change and environmental stresses in South Asia (see Section 3). Many more examples exist and a strong literature base is developing. However, this is still relatively small and much of the literature lacks clear information and measurements of the impacts of these adaptations and their long-term effects. Many of these impacts are supposed but little empirical evidence was found.

Main findings:

- The complex and multidimensional nature of empowerment makes it difficult to measure (Akter et al, 2017). Despite this, women’s empowerment has been highlighted as a key step towards tackling the challenges of climate change and safeguarding the environment (Yadav and Lal, 2018: 12).
- The gender-adaptation interface is not straightforward. It requires a nuanced view of the interplay between gendered forms of knowledge, power, and decision-making practices in specific social, political, and environmental contexts and at multiple scales (Bhattarai et al, 2015: 130). Effective participation of women in decision-making processes is also important but is not straightforward (Das, 2014; Agarwal, 2010).
- The majority of examples of women-initiated measures to cope with environmental stresses and climate change are from India. Bangladesh and Nepal also have a number of examples, but other South Asian countries are less well researched (no examples were found for Afghanistan). Many of the examples are from the Himalaya regions of the countries.
- Many of the examples relate to agricultural adaptations and forestry movements. The examples are very site-specific; however, common strategies throughout rural areas in South Asia include out-migration (by men), agricultural intensification, and livelihood diversification.
- Some of these coping strategies by women are short term or episodic while others are institutionalised over time in the form of traditions and culture (Dey et al, 2018: 336).

The examples in this review have been taken from both peer reviewed and grey literature. A number of online databases exist that gather examples and “stories” of adaptation practices by women in developing countries. These include the [Honey Bee Network](#), [Momentum for Change](#) and [Women Speak: Stories, Case Studies And Solutions From The Frontlines Of Climate Change](#). Many of the stories from these databases come from media and news reports. This review is not exhaustive given the limited time. Other examples of women empowerment and movements also exist, but many have not been captured in peer-reviewed literature.

Major knowledge gaps remain in relation to the impact of multiple drivers of change on women in South Asia and women's role in adaptation to climate change and managing natural resources. Ravera et al (2016) suggest future research could benefit from more emphasis on a nuanced analysis of the intra-gender differences that shape adaptive capacity to climate change. Although autonomous adaptation is likely to become more common and widespread than planned adaptation globally, most research and policy dialogue have so far focused on the latter (Sterrett, 2011: 6). More research to understand the drivers of autonomous adaptation would benefit the South Asian region. As noted, this review also highlights the uneven coverage of in-depth research. Djoudi et al (2016: 258) in their review of gender and climate change papers found that most studies' conclusions on gender are mainly based on household surveys, with simplistic conclusions being drawn from snapshots of society and ignoring complex societies and systems, structural inequalities and gendered power relations. This review broadly reflects these findings.

2. Women and climate change

Women as agents of change

Djoudi et al (2016: 248) explore the gender-differentiated impacts of climate change and related adaptation strategies by reviewing how gender is framed in 41 papers on climate change adaptation through an intersectionality lens (i.e. that social categories are constructed and dynamic). They find that in climate change studies, gender is mostly handled in a men-versus-women dichotomy and little or no attention has been paid to power and social and political relations (also see Ravera et al, 2016: 336). These gaps depict a "feminisation of vulnerability" and reinforce a "victimisation" discourse within climate change studies. Djoudi et al (2016) further conclude that in the absence of a specific gender and climate change framework, it is very difficult for most studies to draw comparative conclusions on either the gendered aspects of vulnerability, or on the differentiated impacts and gendered outcomes of climate and environmental change.

There is a significant body of literature on gender and climate change, which shows that women and men perceive and experience climate change differently, and usually women are more vulnerable due to their dependence on natural resources and structural inequity in their access and control of such resources (Ravera et al, 2016: 336). The simple view of women as a homogenous group is shifting toward a more complex view of identities within gender. Multiple social, economic, and cultural characteristics interact with gender in influencing power inequities and explaining how and why people face and manage climate change and environmental stresses in different ways (Ravera et al, 2016: 336; Ogra and Badola 2015).

Yadav and Lal (2018: 4) undertook a literature review with the focus on the vulnerability of rural women in developing countries to climate change on the one hand and being pro-active in adapting to climate change on the other. They found that women are not only the passive victims of climate change but are also pro-active and agents of change for adaptation to and mitigation of abrupt climate change. Women utilise their experience and expertise to reduce the adverse impacts by adopting prudent strategies and are concerned about environmental issues. There are a number of examples and case studies of adaptations to climate change and environmental stresses initiated or undertaken by women in South Asia and a (limited) literature base is building up around this. Section 3 gives examples from South Asian countries on adaptation measures and environmental movements initiated by women.

Women's empowerment and adaptive capacity

In their literature review, Yadav and Lal (2018: 12) highlight that “the first step towards tackling the challenges of climate change is empowering women to safeguard the environment. [...] When economically empowered women raise healthier and better educated families, it increases their adaptive capacity” (also see Prowse et al., 2009; Solar, 2010; Beathge, 2011; Hill, 2011; OECD, 2011; Farming First, 2013; CARE International, 2013; Leichenko and Silva, 2014 all cited in Yadav and Lal, 2018: 12). The complex and multidimensional nature of empowerment makes it difficult to measure (Akter et al, 2017). Sraboni et al (2014: 12) highlight that the linkages between women's empowerment and food security have been difficult to quantify owing to this difficulty in measuring empowerment. Current efforts to define and measure empowerment have drawn heavily on Kabeer's (1999 in Sraboni et al, 2014) definition of empowerment as expanding people's ability to make strategic life choices, particularly in contexts in which this ability had been denied to them. In Kabeer's definition, the ability to exercise choice encompasses three dimensions: resources, agency, and achievements (well-being outcomes).

Bhattarai et al (2015: 130) show that the gender-adaptation link is not straightforward, requiring a nuanced view of the interplay between gendered forms of knowledge, power, and decision-making practices in specific social, political, and environmental contexts. Gender equity in adaptation cannot be achieved without taking into account other intersecting social differences based on class, ethnicity/race, and other cultural forms of marginalisation. They further emphasise that the interface of gender and climate adaptation occurs at multiple scales: household, community, national, and international levels; and adaptive capacity of households and communities is contingent upon how gender forms of knowledge and power are linked or disconnected across scales (Bhattarai et al, 2015: 130). Akter et al (2017: 270) emphasise that gender systems are diverse and complex, determined by community norms and values, hence the nature and extent of gender inequity and the conditions necessary to empower women vary across countries, communities and regions. They present empirical evidence of gender (in)equity from four Southeast Asian countries including Myanmar (Indonesia, Philippines and Thailand). They argue that the study of different gender systems is thus fundamental to capture cross-cultural variations in gender specific needs and constraints.

Participation and decision-making

Das (2014: 206) analyses community-managed water supply projects for the urban poor in Madhya Pradesh, India, to provide a better understanding of the gap between women's motivation to participate and their ability or agency to do so. He describes how most empirical studies on women's participation in water governance have focused on the programmatic outcomes of efficiency, effectiveness, and empowerment, linking participation with individual and household benefits. However, there is less evidence of how their participation attempts to force open spaces for change in discourses and practices through collective empowerment. A few studies on micro-credit programs have looked at this. For instance, Sanyal (2009 cited in Das, 2014: 206) finds that women's participation in micro-credit programs in West Bengal fostered their social capital and normative influence at the individual- and community-level. Such studies are scant in the water sector. The level and nature of participation is important in explaining the success or failure of water projects but many case studies do not discuss, in detail, the levels of participation achieved or factors that affect particular forms of participation.

Agarwal (2010) based on primary data collected during 2000–01 on gendered participation in community forestry institutions (CFIs) in India and Nepal, statistically tests if a group's gender

composition affects women's effective participation, and if there are any critical mass effects. The results support the popularly emphasised proportions of one-quarter to one-third, but women's economic class also matters, as do some factors other than women's numbers. Of note, is that where women have a personal stake in the outcomes of meetings, they are more likely to attend meetings and/or speak up at them. Agarwal (2010: 108) also finds that executive committees with a higher percentage of landless women have greater female attendance and voice, which indicates that being poor and female does not necessarily silence a person. Landless women are less constrained by social norms and status considerations than those from well-off households are, and have more stake in forest access, compelling them to attend and speak up. This suggests that prior equality is not necessary for women to assert themselves. In fact, women from disadvantaged households, especially if present in sufficient numbers or with prior exposure to women's empowerment programmes can be more outspoken in public forums than women from well-off households (Agarwal, 2010: 109).

3. Examples from South Asia

Bangladesh

Reduction of food consumption

Alston and Akhter (2016: 1450) look at food security issues in Asia. They draw on Sen's entitlement theory to argue that a shift in focus from national food production to intra-household food access enables a critical reflection on consumption smoothing strategies¹ adopted at this level. They present findings from their research in three rural areas of Bangladesh subject to environmental and climate vulnerabilities. In particular, they draw attention to the tendency for women and girls to eat less as an intra-household adaptation strategy to household food insecurity. This intra-household consumption smoothing is practiced to the detriment of women who, because of their low entitlement set, are expected (by themselves and their family members) to eat less when food is scarce (Alston and Akhter, 2016: 1461). Alston and Akhter's (2016) research also finds that weather changes are having a significant impact on production and that villagers are becoming much more reliant on the market for their food requirements. The necessity for income generation and/or loans to purchase food is evident and this trend is facilitating the growing numbers of rural villagers out-migrating to urban centres or to other countries for paid work, leading to a high dependence on remittance income (Alston and Akhter, 2016: 1458). Climate changes are affecting the utilisation of the available food within the household largely because of the time pressures on women who now spend longer periods collecting water and fuel, and undertaking more agricultural labour when male family members out-migrate. Further highlighting the ways that climate change is impacting food production at local village levels and is reshaping livelihood strategies (Alston and Akhter, 2016: 1461).

¹ At the household level, consumption smoothing is defined as "the ability of the household to maintain the normal level of food consumption in the face of an income shock" (IFAD, 2015 cited in Alston and Akhter, 2016) and this is critically dependent on both assets and the ability to utilise these to facilitate greater food security.

Dowry and forced marriage

Alston et al (2014: 137) outline the link between child and forced marriage, dowry and climate changes in Bangladesh. Drawing on a three year research study on the gendered impacts of climate change, they argue that climate crises are creating significant economic hardships leading to an increase in child and forced marriages because the dowry is cheaper. They draw on research conducted from 2011 to 2013 in three rural regions of Bangladesh, all of which are subject to extreme climate variability. They argue that although the impetus for child marriage and dowry is related to cultural expectations concerning honour and the escalating costs of dowry, these processes are exacerbated by the climate challenges being experienced by families in rural Bangladesh (Alston et al, 2014: 141).

Participation in agriculture

Agriculture is closely linked to food security, by providing a source of food and nutrients, a broad-based source of income, and by directly influencing food prices (Sraboni et al, 2014: 12). Women's role in Bangladeshi agriculture tends to be underappreciated, owing to the commonly held view that women are not involved in agricultural production, especially outside the homestead, because of cultural norms that value female seclusion and undervalue female labour (see Kabeer, 1994; Rahman, 2000 cited in Sraboni et al, 2014: 12). Nevertheless, participation of women in the agricultural sector has increased over time. Often men and boys (and increasingly young girls) are the ones who move away from rural villages in search of income either seasonally or permanently, leading to an increasing dependence on women's agricultural labour to produce food (Alston and Akhter, 2016). This has a number of consequences including increasing the pressures on women's time.

India

Chipko movement

During the 1970s, the Chipko movement mobilised popular opposition to large-scale commercial forestry in the Indian Himalaya (Uttarakhand) and fight for local employment. It has become famous globally for the tactic of embracing trees to prevent their felling by commercial loggers. As time passed, the movement also came to express a range of other concerns regarding the impact of commercial forestry, including disruptions caused to agriculture and local ecology. Brown (2014: 639) highlights how the legacy of this movement today remains contentious: for some it was a successful environmental movement, which led to the protection of natural resources; for others, it has stalled development in the region, preventing the creation of much-needed employment opportunities. Many writers in the 1970s and 1980s romanticised the movement, painting it as a nature-loving, "eco-feminist" phenomenon, e.g. Vandana Shiva (1989 cited in Brown, 2014). Brown (2014: 641) highlights how Shiva "argues that the movement was inspired by the perspectives of women, who, through their engagement with subsistence agriculture and their role in nurturing and protecting communities, were more aware of the ecological and social threat posed by commercial forestry". Since the late 1990s, however, a number of scholars have critiqued these representations of Chipko, arguing that this simplistic demonstration of "ecofeminist" principles for international environmentalist audiences neglects the wider context of rural poverty and distorts the actual objectives of the movement that called for social justice and development aspirations (Rangan, 2000 cited in Brown, 2014: 641). Some authors argue that this distortion of meaning within the Chipko movement had damaging effects

for the people of Uttarakhand. The imposition of a ban on logging in the region, heralded by some as Chipko's "success", was at odds with the initial demands of the movement for small-scale forest industries (Brown, 2014: 641).

Brown (2014) explores a case study of a Chipko-inspired seed conservation movement, the Beej Bachao Andolan (Save the Seeds Movement, BBA), which has attempted to sustain Gandhian and ecological values in the region by promoting ecologically sensitive, bottom-up village development. BBA is a Gandhian seed conservation initiative based in the Henwal Valley in District Tehri-Garhwal in the state of Uttarakhand. It began in the mid-1980s, as an initiative to preserve local varieties of seed and resist the encroachment of chemically intensive, commercial agriculture. During the late 1980s and early 1990s, BBA activists made use of existing organisational structures within villages, such as Mahila Mandal Dals (women's groups), to mobilise local people and organise meetings. Dogra (2000 cited in Brown, 2014) suggests that women were initially more receptive to BBA's ideas as they recognised the risks involved in losing control over seeds due to their more prominent role in subsistence farming. Brown (2014) highlights that while BBA has been effective in mobilising people against threats to subsistence agriculture, local people remain ambivalent about aspects of its core message, which are not seen to offer solutions to growing local challenges, such as climate change and out-migration. The successes and failures of BBA point to the complex and contradictory position of farmers in the Indian Himalaya and the extent to which Gandhian and ecological values remain relevant to them in the context of agrarian change.

Brown (2014: 644) draws attention to the division of labour within the family in Uttarakhand, particularly the role of women. The general pattern among households in Uttarakhand is for young men to migrate in search of seasonal employment, while women remain in villages to maintain subsistence agriculture. Consequently, compared to the plains, women in Uttarakhand's villages have more active roles in public life, most visibly through their participation in agriculture; however, that participation in agriculture does not translate into positive conditions for women in the region. Furthermore, despite their greater participation in the economic life of villages, hill women have limited roles in household decision-making and local politics. Nonetheless, women's involvement in agriculture gives them a great deal of knowledge of issues affecting the local community and environment. Agarwal (1994 cited in Brown, 2014: 645) argues that this explains the priorities that women displayed during the Chipko movement for protecting the environment and subsistence agriculture.

Participation in community forestry

The role of women's participation in community forestry has recently been investigated in a number of theoretical and empirical papers. Coleman and Mwangi (2013) draw on the research of Agarwal (2010): their analyses suggest that women's participation is likely when institutions exist that are less exclusionary, when households have more education, and when there is small economic inequality in general and across genders in particular. A history of women's participation, especially when women are seated on forest councils or attain leadership positions, is highly correlated with less disruptive conflict. Coleman and Mwangi (2013: 201) analysed 10 International Forestry Resources and Institutions (IFRI) forest associations, they found that the most consistent finding, in terms of what determines women's participation, is the role of wealth inequality and discrepancy in wages.

Adivasi Adhikar Samiti movement

Nearly half of Chhattisgarh state is covered with forests. The indigenous communities in Koriya are dependent on the forests for a large part of their livelihoods and culture. Tree felling has escalated in the past decades, with natural forests replaced by teak plantations. In 2005, the Forest Development Corporation of Chhattisgarh prepared and gained approval for Forest Improvement Working Plans relating to the three districts of Koriya, Sarguja, and Kawardha. The felling operations started in December 2005. Nandi and Garg (2017) describe the struggles of Adivasi Adhikar Samiti (AAS) (the Organisation for Rights of Indigenous People), an organisation of indigenous women, who took action in Koriya to protect the natural forest on which they and their families and communities depend. They fought for restoration of land and forest rights to the indigenous communities as well as for health rights, food rights, gender equity, employment and education rights, right to participate in local governance, right to information, and against domestic violence. Women have challenged the state using a range of strategies, including direct collective action, using songs in activism, garnering support from experts and advocates and taking legal recourse (Nandi and Garg, 2017). Nandi and Garg (2017) demonstrate the importance of people's organisations and their struggles for natural resource justice in India.

Nanda Devi Biosphere Reserve

Ogra and Badola (2015: 505) apply three broad clusters of livelihood strategies in the context of rural mountain communities in the Indian Himalaya to cope with environmental change: agricultural intensification, migration, and livelihood diversification. They present a case study from the Nanda Devi Biosphere Reserve (NDBR) (Uttarakhand, India) that both outlines the implications of climate change for women farmers in the area and highlights the potential for ecotourism (as a form of livelihood diversification) to strengthen both key livelihood assets of women and local communities' adaptive capacity more broadly. They find that a homestay-based model emerging in NDBR is creating conditions for participating women to feel in greater control of their incomes and to more broadly engage in community-level development issues, which in turn delivers benefits for their larger communities (Ogra and Badola, 2015: 506).

Diversification by poorer women farmers

Singh et al (2017: 41) describe how Adi farmers in Arunachal Pradesh perceive and adapt to climate variability, and how this is influenced by gender and wealth. Within this society, men and women have clearly defined roles. Women are primarily responsible for seeding and planting, weeding and tending fallow land, harvesting, processing of crop produce and preservation of crop seeds for next season, with older women often deeply knowledgeable of local agrobiodiversity. Men do the heavier work in the fields but also hunt for wild game in the forests. Men are also responsible for harvesting and marketing economically important trees, grasses and construction of huts in jhum fields. Singh et al (2017: 41) found that wealthy people were better placed to adapt to climate variability than poorer people because they could intensify their production systems. They switched to rainfed maize with improved varieties and horticultural cash crops that need more costly inputs. Wealthy people, particularly men, also received more advice and training than poorer people. Poorer farmers, particularly poor women, adapted predominantly by diversifying activities, such as using drought tolerant oil seeds and subsistence horticultural crops, accessing forest-based resources, rearing pigs and poultry, increasing fishing and the making of handicrafts. Storage, exchange and pooling of local resources were further strategies used by the poor. Singh et al (2017: 50) conclude that poorer farmers, particularly

women, are likely to become even more vulnerable as their adaptation strategies have been depending on rainfed systems and forest resources, both increasingly impacted by climate variability and extreme weather events. By contrast, wealthy farmers have so far been able to intensify their systems with improved varieties and irrigation, reducing future risks and becoming more resilient to future climate variability.

Technological, ecosystem-based and socio-cultural adaptation strategies

Based on results from contrasting research cases in Bihar and Uttarakhand, Ravera et al (2016: 335) examine climate change adaptation and gender issues through the application of a feminist intersectional approach. This approach permits the identification of diverse adaptation responses arising from the existence of multiple and fragmented dimensions of identity (including gender) that intersect with power relations to shape situation-specific interactions between farmers and ecosystems. Specifically, for Uttarakhand, Ravera et al (2016: 340) found that:

- Both men and women prioritised the strategy of household income diversification, i.e. wage labour in or nearby the village, sale of homemade products, petty trade, as a means of guaranteeing livelihood security. Due to male out-migration (affecting 15 % of families), other strategies were also identified, such as changing the roles and tasks within the household and in the calendar of work.
- Since women have a central role as users, conservers, knowledge holders and managers of agro-biodiversity, they highly prioritised and mainly adopted seed exchange.
- To guarantee food security in the face of climate change, both men and women prioritised the adoption of traditional crops and varieties with specific nutritional properties.
- Both men and women had a high preference for strategies of agro-biodiversity management to support sustainable ecological functions and processes.
- Technological strategies were not prioritised compared to ecosystem-based and socio-cultural strategies.

In Bihar:

- Two socio-economic strategies were mainly prioritised and adopted by men to generate additional income. These are associated with the renting out of land and out-migration. Some well-off women positively perceive and adopt income diversification; however this strategy is seen as undesirable by poor women because it entails more seasonal work in the field.
- Women mainly prioritised changing tasks within the family and receiving subsidised seeds and food. Planting crops and varieties with nutritional properties for markets was also stated as important by farmers for both men and women, although this was not widely adopted as a strategy.
- Very poor and low caste household members widely adopted decreasing consumption as a mechanism of change in food habits in the case of crisis, which deepens the patronage relationships within the village.
- Both men and women highly prioritised and adopted technological initiatives, such as the use of agrochemicals, adoption of irrigation and the use of improved seeds.

Ravera et al (2016: 348) offer interesting insights into the complex intersection of multiple factors, which differently influence farmers' choices on the range of adaptation options, and clarifies how roles, responsibilities and power dynamics are renegotiated within the household and the community, (un)empowering women. The empirical lessons from the more remote mountain region of Uttarakhand show the emergence of a collective agency of women to decrease common vulnerabilities to climatic variability and shocks through ecosystem-based and especially agro-biodiversity-based strategies associated with knowledge and ties management. However, the household's capabilities (i.e. access to land, assets and diversified income) as well as the age of farmers are the main barriers to the adoption of such a diversity of proactive strategies. In contrast, in Bihar in the middle plains of the Indian Gangetic region a complex interaction of gender and ability to accede to training and education - depending on the specific context, the caste and the rigidity of gender norms of seclusion - mainly influences the major adoption of a mixed range of agro-biodiversity-based and technological strategies. Their results thus make clear that adaptation is not a homogenous process agreed upon by all parties.

Role of individual women

A study by Dey et al (2018) looks at the role of individual women in coping with climatic risks, with special reference to managing agriculture, energy, and nutrition in a flood- and drought-prone paddy-growing region of eastern India (in eastern Uttar Pradesh). Dey et al (2018: 338-346) highlight a number of coping strategies embraced by the women:

- Women have developed rich knowledge systems ensuring nutrition security during lean months through both agriculture and other edible resources in the wild.
- Women play a role in energy conservation and optimum resource utilisation. Women, especially from the marginal communities, have learnt to be frugal and efficient in resource utilisation as an adaptation strategy to the reduced availability of fuel wood.
- Women lend to each other, often without charging interest but with generalised reciprocity. Generally, their husbands are not involved in such transactions. Another interesting practice in these villages is that they prefer to share the surplus production from the homestead gardens with other women rather than selling it in the market. In the study area there is also a culture of open sharing, beyond caste, class, or creed. This open sharing helps the knowledge system become more robust as it gives everyone the access to the resource pool and the value-added knowledge.
- Many women are simultaneously part of several institutions (such as social groups or networks) that help them to draw on collective support and solidarity. This reinforces their confidence and the capability to take decisions, i.e. agency. However, unequal power dynamics affect their autonomy even in reciprocal relationships, shaping the terms of exchanges.

Dey et al (2018: 338) emphasise that many adaptations are autonomous, done by the local communities/social groups/individuals on their own. These may complement the ex-ante government strategies for disasters, however, these become imperative where timely governmental intervention is difficult or absent. The paper also highlights how some of the coping strategies are culturally specific, such as in the songs sung by women at the time of transplantation or while pursuing other collective activities facilitating inter-generational transfer of knowledge. These measures further strengthen the agency of women.

Agro-ecological farming

Yadav and Lal (2018: 11) highlight how women are already adapting to climate change by diversifying their agriculture, food habits and devising long-term food storage techniques. For example, women in the deserts of Rajasthan have taken on many innovations such as growing improved crop varieties suited to the region, planting fruit trees to provide nutrition and income, constructing embankments to capture rainfall, prevent runoff and soil erosion, and planting grasses and trees to provide fodder for cattle (ICRISAT, 2015 cited in Yadav and Lal, 2018: 11).

Swayam Shikshan Prayog (Self Learning Experiment), a Pune (India) based non-profit organisation, has transformed the lives of nearly 72,000 women farmers through adopting sustainable and climate-resilient agro-ecological farming. This initiative has also created 5,500 self-help groups that support women to engage as farmers, entrepreneurs and leaders. Under the one-acre model, multiple crops are grown to boost nutritional security, soil fertility, agro-biodiversity, and income viability. Women in this region practice sustainable methods such as use of bio-pesticides, organic fertilisers and water conservation techniques like drip irrigation, sprinklers, farm ponds, recharging of bore wells and tree plantation to augment precious and scarce groundwater and to improve soil fertility (Yadav and Lal, 2018: 11).

Swayam Shikshan Prayog organisation

Swayam Shikshan Prayog² also trains rural women in entrepreneurship and builds their capacities for marketing clean-energy projects in their communities. Currently, an active network of 1,100 women entrepreneurs is working across eight districts in India. The women provide a complete “ecosystem” approach as clean-technology users, educators, providers and supporters in their communities, which helps make it easier for people to adopt energy-efficient technologies and products that address climate change. Since 2009, Swayam Shikshan Prayog has enabled more than 60,000 rural women entrepreneurs to start businesses in high-social-impact sectors such as clean energy, sustainable agriculture, health and nutrition and safe water and sanitation at the grassroots level (Swayam Shikshan Prayog, 2014).

Navdanya movement

This is a network of seed keepers and organic producers spread across 17 states in India. This Indian based NGO has helped set up 111 community seed banks across the country, trained over trained over 900,000 farmers in seed sovereignty, food sovereignty and sustainable agriculture over the past two decades, and helped setup the largest direct marketing, fair trade organic network in the country (Navdanya, 2016). The Grandmothers' University and Diverse Women for Diversity initiatives by Navdanya are aimed at both celebrating and validating the wisdom of grandmothers and for transmitting this knowledge to future generations to arrest the rapid erosion of skills, knowledge and values that women have evolved over millennia to live sustainably. Diverse Women for Diversity echoes women's voices from the local and grassroots level to global fora and international negotiations. Through these initiatives, Navdanya has connected over 5 million women from 22 states of India as one force for sustainability and women's empowerment (Shiva, 2015 cited in Yadav and Lal, 2018: 12).

² See <http://www.sspindia.org/>

Myanmar

UNEP's gender vulnerability assessments in Pinsalu Island

As part of the Myanmar Climate Change Alliance Initiative, UN Environment and UN-Habitat assisted the government to recognise the different adaptation perspectives of men and women through conducting gender vulnerability assessments in communities. In responding and adapting to climate change, rural women in Myanmar face multiple challenges, ranging from making ends meet, unequal pay for the same work and unequal access to natural resources to limited participation in decision-making. The UNEP gender assessment found that the women in Labutta, Pinsalu Island, are using innovative adaptive measures, securing additional income by running small businesses, growing vegetables and fruits, medicinal and other plants for sale, selling snacks and sewing clothes. However, these initiatives are affected by women's restricted ability to own land, borrow and invest money or start a business. In addition, more and more women in the villages are also taking up employment in factories located not far from their villages, while men work in the construction sector (UNEP, 2016).

Nepal

Out-migration, remittances and participation

Migration is a strategy already in place throughout the Himalaya region due to underlying pressures of livelihood insecurity. In addition to supplementing rural household incomes, remittances may provide additional social benefits that enhance overall assets and sense of empowerment to households. For example, researchers in Nepal have found that some groups of women left behind by male out-migrants from the hills of Nepal were able to participate more effectively in community-based forestry initiatives and benefitted from their status as de facto heads of household (Giri and Darnhofer, 2010 cited in Ogra and Badola, 2015: 509).

Gender and agrobiodiversity

Bhattarai et al (2015: 122) analyse the link between gender and agrobiodiversity management with a case study from Nepal, exploring how gender relations are influenced by wider socio-economic changes, and how alterations in gender relations shape responses to climate change. Combining feminist political ecology and critical socio-ecological systems thinking, they analyse how gender and adaptation interact as households abandon certain crops, adopt high-yielding varieties and shift to cash crops. They present three stories to demonstrate how agrobiodiversity management strategies are employed by the farmers to respond to climate variability and concurrent socio-economic changes. The first example is about crop abandonment and its favourable impact on women's workload but not necessarily a parallel gain in ecological diversity and food diversity in the local diet. In the second example, they demonstrate that the adoption of a drought-tolerant, high-yielding rice variety has increased yield but added to women's work. The third example involves an increased trend in the cultivation of cash crops such as the tomato, which has increased household incomes but has also increased women's farm management responsibilities, without a corresponding increase in access to income and knowledge to grow these cash crops. They conclude that understanding the gendered implications of climate change and agrobiodiversity management is crucial to understand the meaning of adaptation for the inhabitants of an agrarian community (Bhattarai et al, 2015: 123).

Shramjivi Women's Farmer Group

Shramjivi Women's Farmer Group (SWFG) operates in Kalchebesi, a small village of about 25 households situated in Patlekhet, a village development committee in Kavre District, Nepal (Ranabhat and Subedi, 2017). Most of the inhabitants are small-scale women farmers as most of the men have out-migrated to find work. Rising temperatures, drying water resources, and the increasing prevalence of agricultural pests present agricultural challenges. There was limited capacity to deal with these problems at the local level in the past. However, the Resilient Mountain Village (RMV) concept (climate smart village concept) was piloted by the International Centre for Integrated Mountain Development (ICIMOD) with the Centre for Environment and Agricultural Policy Research, Extension and Development (CEAPRED) in May 2014 in Kalchebesi. The SWFG includes 22 members that joined ICIMOD and CEAPRED in the pilot study, training farmers to use simple, affordable and replicable climate smart practices that feature climate, socio-economic and future resilience. This pilot works with 40 farmers' groups, which include representatives of 1,089 households across eight villages in Kavre district, under the Himalayan Climate Change Adaptation Programme (HICAP). Over 80% of the household representatives are women, and many among them are from marginalised communities (Ranabhat and Subedi, 2017). The SWFG also disseminated these practices within their village. Increase in crop yield, increase in income, reduction in cost of production, and reduction in workload has encouraged many women to get further involved in agriculture. Kalchebesi has become an exemplary village, successfully demonstrating that the participatory model which is central to the RMV concept works (Ranabhat and Subedi, 2017).

Pakistan

Help Foundation

Rajanpur area in Pakistan's Punjab province was badly affected by the extensive floods in 2010. Help Foundation, a local NGO, has been working for over a decade with communities in the area, encouraging villagers to form groups that help families to feed themselves (Khan, 2015). There are more than 30 such groups, each with an association to support farmers. The Help Foundation is a member of the Indus Consortium, a platform that builds community resilience. In 2014, the consortium launched a campaign in five riverine villages in the area, funded by Oxfam, aimed at putting more power in the hands of farmers, particularly women. People are adapting to the annual floods by building their mud homes on higher ground, artificially raised by bulldozers piling up earth, to protect their livestock and belongings. Women have also decided to form committees to start discussions with the government about obtaining their own land. The Help Foundation's training has boosted local women's knowledge and confidence. Examples of women's empowerment are rare in Pakistan as conservative elements, led by a powerful clergy, usually oppose such efforts in rural areas. Help Foundation is an established NGO founded back in the 1970s that has won people's trust (Khan, 2015).

Out-migration and changing roles of women

Nizami and Ali (2017: 662) explore climate change vulnerabilities in Chitral, Pakistan. As a coping strategy, the affected communities are compelled to send male members away from home in search of alternate sources of livelihoods. This compels women to take additional responsibilities at farm, household and the community levels. Most of the new responsibilities are related to managing natural resources, and are on top of their traditional engagements in

farming. Undertaking tasks traditionally performed by men can leave women in a more vulnerable position. One such task is dispute resolution in case of irrigation water distribution, which is changing with climate change. Dispute resolution, however, is challenging for women due to capacity issues. Nizami and Ali (2017) discuss how women organisations exist in almost all the villages but mandates for dispute resolution are often with male organisations - despite the fact that ground realities have changed due to most men being away from home. Women may still take on the spot decisions, but permanent decisions are left to the absent men. Nizami and Ali (2017: 669) conclude that despite the new role of women, with them being actual managers of the household and resources in the absence of their male counterparts, there is still little room for them to be more effective in decision-making.

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Acknowledgements

We thank the following expert who voluntarily provided suggestions for relevant literature or other advice to the author to support the preparation of this report. The content of the report does not necessarily reflect the opinions of any of the experts consulted.

- Professor Margaret Alston, Monash University

Suggested citation

Price, R.A. (2018). *Women-initiated measures to cope with environmental stresses and climate change in South Asia*. K4D Helpdesk Report. Brighton, UK: Institute of Development Studies.

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