

Exploring Sustainable Degrowth-Based Adaptation to Climate Change-Aggravated Water Scarcity in Parts of Rural India: A Gender Relations Approach

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ABSTRACT

This article reviews the theoretical concept of ‘sustainable adaptation’ to climate change and water scarcity using a gender-relations approach by answering the following questions: i) What is a sustainable adaptation to climate change? ii) Based on a literature review, how does gender interact with climate change adaptation to water scarcity and droughts in rural India? (iii) How do the concepts of sustainable adaptation, degrowth, and gender relations interact on the ground, pertaining to water justice?

The paper argues that climate change adaptation and development goals can harmonize only if they rectify root causes of vulnerabilities. For adaptation actions to yield sustainable outcomes, they need to be embedded in a just degrowth politics that transforms unequal power relations, including gender relations with water. In India, degrowth is about ecological, economic, and social justice that calls for transformation of the economy. This transformation looks into the life-cycle of goods - how goods are produced, composed, assembled, distributed, consumed, and regenerated today; further degrowth strategy explores alternate, just, non-extractive, decolonial, and democratically led trajectories that sustain the web of life. This paper discusses five interrelated principles of sustainable degrowth-based adaptation that center on community-based notions of water and gender justice.

1 INTRODUCTION

Approximately four billion people comprising around 71% of the world population, live under severe water-scarce conditions at least one month in a year, of which one billion live in India (Mekonnen and Hoekstra 2016).Unchecked over-extraction has increased the demand for groundwater in India beyond its availability, leading to water stress. Current stress

on surface and groundwater resources is being compounded by climate change, causing increased frequency, intensity, and geographical coverage of droughts in India (World Bank 2008, Panda 2010, IPCC 2014, Brown et al. 2007). The IPCC (2014), report says that an “increase in the number of monsoon break days and the decline in the number of monsoon depressions are consistent with the overall decrease in seasonal mean rainfall;” thus, increasing the risk of droughts.

In India, the agricultural sector largely depends on natural rainfall (precipitation, river runoff, and groundwater) for farming practices (Roy Chaudhuri, 2021). Water secures livelihood for rural households, whose daily food security depends on production from their own or off-farm sources (Hatai and Sen n.d., Wu et al. 2008). Water insecure conditions like droughts and scarcity can disrupt food security, increase malnutrition, and the risk of infectious diseases (IPCC 2014b; Mekonnen and Hoekstra 2016). The impacts of climate catastrophe will disproportionately affect the socially, economically, culturally, politically, and institutionally marginalized people due to their “heightened vulnerability” (IPCC 2014c).

Vulnerability is the “likelihood of injury, death, loss, disruption of livelihoods or harm resulting from social changes such as conflict or economic restructuring” (S. H. Eriksen & O’Brien, 2007). Vulnerability is typically intertwined with poverty, structural & relational disadvantages, and natural hazards (Tanner & Mitchell, 2009). Social and environmental processes increase risks and affect vulnerability because they limit or stimulate adaptive capacities. Poor access to safety mechanisms and financial services increases exposure to deprivation and poverty. It is relational and political because the relative security and power of some are directly linked to others’ vulnerabilities and disempowerment that is reproduced over time.

From a political ecology perspective, water governance in India is a part of broader processes of industrialization, economic growth, and agricultural modernization stimulated through the integration of Southern economies into the capitalist and neoliberal global economy (Roth et al., 2018).¹ These factors make historically marginalized communities like small farmers, agricultural laborers, and pastoralists in rural areas vulnerable to climate change. Their livelihoods directly depend on natural resources, and any minor changes in environmental conditions will expose them to climate risks (IPCC, 2014a).

Post-independence, India underwent a “groundwater revolution” that was anchored upon “scientific rationalism” to re-locate water towards urbanization and agricultural growth through the construction of dams, canals, reservoirs, and water pumps (Taylor, 2017). In addition, agricultural liberalization since the 1990s subsidized electricity for water extraction, leading to a proliferation of over two million private pumps and wells in 60% of India’s irrigated water (Roth et al., 2018; Taylor, 2017). This contributed to inequity among farmers because only those with land rights and who could afford private pumps and wells could access groundwater for agricultural purposes, leaving out marginal farmers.

Water meant for irrigation use has since been allocated for productive uses by industries and private companies for elite consumption, at the expense of water for use by smallholder farmers working in the agricultural sector & the urban poor (Roth et al., 2018). The groundwater revolution also converged with the green revolution that encouraged agricultural productivity and intensification. The usage of high-yielding variety (HYV) seeds, chemical fertilizers and pesticides arguably changed cropping patterns. Subsistence and food crops were replaced by commercial and water-intensive ones. All of the above have immense consequences on soil fertility and water quality/availability (Taylor, 2017, Chapter 7). Agricultural productivity, i.e., yield per hectare, increased fourfold since the green revolution in the 1970s, all with the aid of pumping groundwater (Chattopadhyay, 2021). The green revolution resulted in increased commercialization of and dispute over water and other resources. This further led to inequity between the “water-rich and the water-poor” (Roth et al., 2018) farming communities across gender, class, caste, tribe, and regions. This raises concerns about climate injustice because farming communities that contribute the least to the greenhouse gas emissions (GHGs) will suffer the consequences of water injustice even more.

However, water injustice cannot fully explain the fundamental problem without highlighting gender injustice in water and climate change. In India, literature on traditional or modern water governance is primarily written in heteronormative and gender-binary (men/women) language. For example, irrigation policies and interventions are also structured in binary terms that reinforce the ‘masculine hegemony’² by reducing water to a “technocentric” subject and constraining women’s meaningful participation & perspectives in every level of decision-making on water projects and policies (Kulkarni, 2016, p. 87).

In this paper, I admittedly speak in such a language by limiting analyses to the literature offered thus far. Taking my cue from feminist scholarship, water management organizations are hegemonically ‘masculine’ because (i) they invisibilize women’s labor (or value it less); (ii) provide less scope for women to meaningfully participate and take decisions in water user associations and other local institutions; or (iii) exclude non-positivist epistemologies of making sense of water & nature (Krishna & Kulkarni, 2018; Kulkarni, 2016; Paulson & Boose, 2019; Zwartveen, 2008). Inequitable spatial distribution of water raises gender concerns because only around 11-12% of women own land (Kulkarni, 2016). An estimated 45 percent of farmers in India’s agricultural sector are women. However, the proportion is debatable-

1 The global South is responsible for exporting “raw materials and light manufactures” through “unequal exchange” for meeting 50% of the consumption needs in the global North at the cost of ecosystem degradation in the South (Hickel, 2020, p. 5; Hickel et al., 2021). On virtual water, around 11% of non-renewable groundwater used for irrigation is integrated in international food trade of which two-thirds are exported from Pakistan, USA and India. India has the highest fraction by volume of groundwater that is “abstracted for irrigation use in excess of the natural recharge rate and irrigation return flow for producing wheat and rice” (Dalín et al., 2017, p. 701). While most of India’s over-abstracted groundwater is used towards domestic food consumption, 4% of such water is used for exporting rice and cotton. India is still the third largest exporter of over-abstracted water.

2 Hegemonic masculinity ideologizes gender binaries between socially constructed masculinity and femininity by perpetuating the logic of domination/mastery (over nature and women); and reinforcing & prioritizing the value of masculinity over femininity (Zwartveen, 2008, p. 113, 126).

sometimes going above 63 percent because women farmers' labor largely remains unrecognized, under-reported and therefore, invisible (Ghosh & Ghosh, 2014; OXFAM, 2013b). Gendered norms often nudge women and girls with the responsibility to fetch water (Figure 1), wherein each round trip to the nearest source of fresh water and back home takes around 41 minutes (Tandon, 2007; Udmale et al., 2015; Vidyasagar, 2007). Moreover, more than one trip may be required to fulfill household needs.



Figure 1: A rural woman fetching water in rural Odisha, India (Picture by author)

It is reported that (Oxfam, 2013b; Tandon, 2007), climate change impacts will cause women to travel farther to fetch water. Apart from walking for water, women will have to accomplish farming activities such as producing seedlings, sowing (Figure 2), weeding, transplanting, threshing and harvesting. Women are also responsible for care or reproductive work like fuelwood collection, food preparation, domestic chores, and taking care of children and the elderly.³ Therefore, vulnerabilities must be addressed to enable communities to adapt smoothly.

Gender and socio-economic inequities interlock and intersect to shape structural, unique, and multi-layered vulnerabilities that must be addressed to enable all genders to adapt to climate change. A gender-neutral/blind approach to adaptation will not work if gender and cultural norms that perpetuate unequal power relations among and within female, male and other groups are not considered.

³ Read more about the link between gender and "multiple uses of water" in rural India in order to understand how women's priority for meeting reproductive chores is influenced by availability of domestic water from irrigation canals in (Kulkarni, 2016, p. 82).



Figure 2: Illustration of women farmers sowing in rice farm; Picture by Nandalal Sarkar from Pixabay

In this context, I aim to carve out gender just pathways for promoting sustainable climate change adaptation to water scarcity and droughts. The goal is to address the root causes of vulnerabilities towards water justice for female, male and other groups in times of climate change.

2 METHODS

This paper uses a literature review approach to critically explore the concept of sustainable climate change adaptation to water scarcity and droughts and identify the gender barriers that interfere with sustainable adaptation processes & actions among small and marginal farmers in rural India.

First, I review the concept of sustainable adaptation to climate change. I use a degrowth approach (that suits India's post-colonial, local & multicultural contexts) to deconstruct the concept of sustainable development (SD). The aim is to offer a just development paradigm into which adaptation strategies may be incorporated towards water and gender justice for structurally vulnerable communities. The concept of degrowth presents an opportunity for post colonial Southern economies to decolonize themselves from the shackles of material extractivism, "imperial forms of appropriation" & neoliberal capitalist growth while simultaneously promoting local "sovereignty, self-sufficiency, and human well-being" (Hickel, 2020, pp. 5–6, 2021; Hickel et al., 2021). Therefore, degrowth offers a transformational vision of SD, especially in the context of the Anthropocene, a period in Earth's history in which human activities are driving ecosystem destruction at a planetary scale.

Second, I (partially) review literature from nine purposively chosen case studies in the southern, western, northern, and eastern parts of India published between 2013-2019, based on the criteria that the authors therein engaged with climate change adaptation to water scarcity through an in-depth gender angle. Here, I aim to identify the nature of gendered vulnerabilities and subjectivities in relation to water.

Third, I advance five interrelated elements of sustainable degrowth-based adaptation that are gender just i.e., rectify gender unequal power relations and promote fairness, equality & participation among female, male and other sexes, relative to multiple socio-economic and ecological contexts.

3 WHAT IS A SUSTAINABLE ADAPTATION TO CLIMATE CHANGE?

3.1 Adaptation as technological and superficial fixes

Adaptation is a “process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm, or utilize beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects” (IPCC, 2014a). This apolitical definition of adaptation, albeit vital, is only based on modeling future climate changes and their impacts on the biophysical environment. Such top-down and technology-based adaptation approaches are usually embedded in business-as-usual politics, without addressing the qualitative (such as oppressive power inequalities, psychological & emotional factors, and social norms) sources of vulnerability in post-colonial countries (Klein et al., 2007). Moreover, we are headed to a global mean temperature rise of 3°C this century in the business-as-usual scenario (UNEP, 2020).

The relationship between gender and water within the discourse of SD gained global attention by way of the 1992 International Conference on Water and Environment that adopted the ‘Dublin statement on water and SD’. The statement not only recognized water as a scarce economic good but also linked women’s central role in safeguarding it (Krishna & Kulkarni, 2018). The importance of embedding adaptation (to water scarcity in this case) actions into SD arose when empirical studies showed that adaptation measures did not necessarily yield socially & environmentally just outcomes or were maladaptive (S. H. Eriksen & O’Brien, 2007; Eriksen et al., 2011).

However, the fundamental challenge in development policies is in the nature of SD. Neither do adaptation actions automatically reduce poverty, nor do poverty alleviation measures automatically enable communities to adapt to climate change aggravated water scarcity. This is because poverty alleviation and adaptation measures are coopted into conventional SD goals (SDGs) that center endless economic growth (expressed in ‘Gross Domestic Product’ or GDP) as an end in itself and reduce deprivation to economic parameters only.

The GDP only measures the “market value of the final goods and services that are produced in an economy in a period, but it does not measure the way in which it is produced”, thereby dangerously overlooking nature’s ‘invisible’, ‘silent’ and

‘mobile’ properties that sustain life on this planet (Dasgupta, 2016, 2021). In her paper, Calzadilla (2021) shows how populist governments misuse ‘territorial sovereignty’ and the SDG 8 on economic growth to continue committing climate injustices (deforestation, local water pollution, eviction of rural people, and others) within national borders.

Any adaptation and community-based development projects integrated with SDGs will, therefore, very likely commoditize women’s empowerment and water to serve the interests of neoliberal states and patriarchy (Krishna & Kulkarni, 2018; O’Reilly, 2006). Concerns are being raised that many adaptation plans fail because they are ‘retrofitted’ into or ‘re-branded’ as development agendas (Eriksen et al., 2021). Adaptation and development can synchronize only if they have the same goals of dismantling root causes of vulnerabilities. Otherwise, economic growth-centered SD will continue to produce inequitable and ecologically destructive outcomes and vulnerabilities which would be aggravated by climate change. Additionally, such adaptation outcomes, in turn elevate pre-existing inequities, unequal power relations, ecological fractures, and vulnerabilities. The following section discusses an alternate politics towards just adaptation that is radically beyond “mere adjustment of current practices and development paths” (Eriksen et al., 2011).

3.2 Sustainable adaptation as transformative politics

The concept of sustainable adaptation was theorized to address: i) linkages between vulnerability and poverty (example, adaptive actions reducing income poverty may not necessarily address the agency of women in developing countries); ii) spatial and temporal consequences of adaptive actions (example, consequences of adaptation actions benefiting a particular sector, group or both at the cost of stability/security of another sector/group/both); and iii) feedbacks and linkages between local and global processes over space and time, e.g. adaptation actions impacting water quality in one location may have negative feedbacks elsewhere (Eriksen et al., 2011).

Given that vulnerability is intertwined with poverty, structural and relational disadvantages, sustainable adaptation looks into “transforming power relations rather than addressing their symptoms” towards long-term social change (Taylor, 2013a). Moreover, since climate change is also an anthropogenic phenomenon, there is a need to re-politicize capitalism (neoliberal, neoclassical, neoliberalism, authoritarian populism, and all facets of the “colonial global economy”⁴), and industrialism. Endless growth requires “endless primary resources and increases the pressure on a finite planet” while hardly addressing distributional justice, anthropocentrism and hegemonic masculinity that led us to the Anthropocene in the first place (Calzadilla, 2021; Lélé, 1991; Harris, 2000; Kennet, 2006; van Aalst, Cannon, & Burton, 2008; French, 2018). In this line of thinking, sustainable adaptation is a

4 On the stages of global capitalism, see (Bhambra, 2020).

“broader mindfulness” (Mcneeley, 2012) of extractive and hegemonic processes towards transformative politics that addresses unequal power relations (Wissman-Weber & Levy, 2018).

3.3 Water justice for sustainable adaptation

Towards a sustainable climate change adaptation to water scarcity and droughts, we need a non-universal framework of ‘water justice’ that sits at the intersection of economic and political power that shapes decisions about: i) unequal distribution of water (giving rise to unequally distributed benefits and burdens); ii) unequal access to and control over water; and iii) contested water rights, knowledge, and culture (Boelens et al. 2021). Water justice should operate along with principles of “fairness, equity, participation” (Sultana, 2018, p. 487), sustainability and democracy (Roth et al., 2018, p. 47). It should also deviate from the nature/human binary that privileges anthropocentrism and mastery over non-human nature. Finally, it should be relational, context specific, and situated. It is non-universal in that the notion of justice is based on plural, lived, and everyday realities, which are constituted through dynamic social and customary practices.

3.4 Can degrowth offer a pedestal for sustainable adaptation?

Degrowth is a movement that arose from dissatisfaction with linear progress, modern and imperialistic modes of production, and lifestyle because of its negative planetary consequences. Some of these negative consequences include species extinction, biodiversity loss, climate change, extreme global inequality, the expulsion of people from their traditional lands & livelihoods due to extractive urbanization, mining (of iron ore, bauxite, coal, chromite), diversion of water resources through dam constructions, and many others (D’Alisa Giacomo, Demaria Federico, & Kallis Giorgios, 2014; Lang, 2017; Shrivastava & Kothari, 2014). These planetary crises raise questions about the assumptions we took for granted that sustain life on this planet.

Degrowth is ‘primarily’⁵ aimed at scaling down material and energy ‘throughput’⁶ in high-income countries. However, it does not apply to societies that are “not characterized by excess resource and energy use” (Hickel, 2020, p. 5). At a global scale, degrowth liberates Southern economies from offering cheap exports and labor to the global North. Degrowth (not economic contraction/recession) in the global South calls for ecological, economic, and social justice transforming the economy in how goods are produced, composed, assembled, distributed, consumed, and regenerated today.

The transformation mentioned earlier is possible by exploring alternate, equitable, non-extractive, decolonial, and democratically led trajectories that sustain the web of life (Vincent, 2021). At sub-national scales, degrowth aims to build anti-exploitative economies based on sovereignty, self-reliance⁷, self-sufficiency, and well-being of those living in the margins (Hickel, 2020). This can take effect through a radical redistribution of power & wealth and letting the marginalized take control of the conditions that make their lives sustainable through a facilitative role for the state (Kothari, 2014; Kothari, Demaria, & Acosta, 2014). It is also an invitation to decolonize the economic growth imaginary by going back to history and learning from past civilizations in the global South that were destroyed, and considered ‘inferior’ or ‘primitive’ through colonization/colonial narratives. However, learnings from the past must not contradict values of ‘care’⁸, diversity within solidarity, the commons, feminism, non-violence, conviviality and open (cultural & lin-guistic exchange) relocalization (of economies, production and exchange). Degrowth in the South is not an uncritical revisitation to the past, or unfair burdening of low impact societies but a call for plural notions of justice and a good life.

Economic growth has often been used in the global South to justify rising inequalities & consumption among the margins and elites in rural and urban areas (Liegey, 2021; Roy Chaudhuri, 2021). India, with its 600,000 villages is perhaps best placed to remedy the centuries old imbalance between cities and villages towards an ecological way of life that does not physically and psychologically devour over village resources (Shrivastava & Kothari, 2014). Degrowth may offer a just development paradigm that can transform unequal power relations that produce multidimensional vulnerabilities. This strategy enables just adaptation actions to flourish in a planet because resources cannot regenerate and keep up with the increasing rate of capitalist extraction & waste generation. However, before envisioning the possibility of degrowth having the potential to transform gender relations, it is essential to identify adaptation actions presently used by the farming communities across India. It is also vital to determine the nature of gendered vulnerabilities and subjectivities in relation to water as discussed in the next section. Based on a literature review, how does gender interact with climate change adaptation to water scarcity and droughts in rural India?

5 Quoted because, “the North is responsible for 92% of global CO2 emissions in excess of the safe planetary boundary”; and relies on a “large net appropriation of resources from the rest of the world (equivalent to 50% of their total consumption)”. See (Hickel, 2020, p. 5).

6 Throughput is the flow of energy and materials throughout a given system.

7 This is also framed as ‘Ecological Swaraj’ or Radical Ecological Democracy based on M.K. Gandhi’s notion of Swaraj with respect to decolonizing India. See (Kothari, 2014; Kothari et al., 2014; Kothari & Joy, 2017; Shrivastava & Kothari, 2014).

8 Care ethic: i) dismantles human chauvinism & hegemonic masculinity, and fosters the symbiosis of human and non-human “life that makes up the planet” (Grzybowski, 2019, p. 103); ii) is based on relational and regenerative logics wherein the only thing rational is the interconnectedness and circularity in the “ecological processes” (Demaria Federico, 2019, p. xxxii); and ii) allows sharing earth’s resources and women’s additional reproductive labor with men towards women’s liberation.

4 HOW DOES GENDER INTERACT WITH CLIMATE CHANGE ADAPTATION TO WATER SCARCITY AND DROUGHTS IN RURAL INDIA?

This section reviews adaptation strategies (along with five themes) undertaken by farming communities and their underlying barriers from nine published case studies pan India on gender-based climate change adaptation to water scarcity and droughts. Then, the strategies focusing on gender relations and vulnerabilities are analyzed.

4.1 Access to tangible (land, local institutions) and intangible (rights, social networks, collective action) assets

Gender is a crucial category of inquiry in the Indian context because of the patriarchal pattern of access and ownership to resources such as land, water, labor, social capital, and networks (Aryal, Farnworth, Khurana, Ray, & Sapkota, n.d.). In several rural societies in India, women are not considered as ‘farmers’ despite their high time contribution in agricultural activities, including plantation of seeds, transplantation of rice, and weeding, in contrast with men who are generally involved in the plowing of land (Figure 3) using oxen and tractors (Aryal et al., n.d.; J. Ghosh, 2016; Raney T. et al., 2011; Rao, 2011). This is in addition to doing non-economic and therefore unpaid care activities within (domestic work) and for (fetching water and fuelwood) households – also referred as women’s ‘double burden’ (Elson, 1990; J. Ghosh, 2016). Furthermore, legal provisions allowing equal inheritance rights for women and men, do not translate into women practically acquiring land because of cultural norms, and lack of legal awareness. Lack of formal land ownership disables women from accessing agricultural implements. On the other hand, legal ownership of land does not translate into decision-making power over its use due to community norms (Kelkar Govind, 2013). A mixed-method study (Xenarios et al., 2017) conducted among rice farmers in drought-prone villages in Southern India revealed that despite women and men having equal legal rights to inherit land from their parents in the state of Andhra Pradesh, women are rarely allowed to inherit and manage their own housing property and agricultural land. Non-recognition of women as actual landowners excludes them from accessing agricultural extension offices, water user associations, financial credit agencies, and other schemes, which may help them improve farming practices (Xenarios et al., 2017; Singh, 2019).



Figure 3: A picture of a man plowing land with the help of ox in rural Odisha (picture by author)

However, access to informal and formal village institutions such as women’s self-help groups and agricultural associations helped them raise their revenues; and access information on social & professional issues and cropping decisions (Xenarios et al., 2017). Both men and women agreed that these institutions helped them make better decisions on livestock and cropping patterns that are better aligned with local weather conditions. For example, in the case of extended drought, farmers either opt for drought-resistant crops, shift to livestock activities or both (Xenarios et al., 2017). Such decisions are helpful in determining adaptation strategies because it is essential that the crops suit local ecosystems and climatic conditions with institutional support.

4.2 Income & food insecurities and the secure/insecure nature of crisis help

Climate variability in the form of unreliable water supply during droughts is concerning to both women and men. In a study, the participants blamed the over-abstraction of water in the upper streams and the canal systems as a cause of insufficient water downstream (Xenarios et al., 2017). Tubewell and electric pump owners expressed hardships due to over-abstraction and frequent power cuts, respectively. Meanwhile, small and marginal male farmers were worried about employment security and indebtedness from prior loans. In contrast, female farmers were worried about family members’ food security. Lending practices were gendered e.g. men borrowed from informal moneylenders while women took financial help from extended family members. Similarly, in another study male farmers showed willingness to take loans at very high interest rates from local money lenders to dig bore wells, the risks of which came at the

cost of high dowry-demands from women (to repay loans); and wives repaying debts through domestic work, sexual exploitation, and among others (Rao et al., 2019).

Economic distress is noticeable in the rising number of suicides in the state of Andhra Pradesh because of their “exposure to irrevocable debts” (Xenarios et al., 2017). Further, women highlighted increased domestic violence stemming from men’s depression from economic losses (Xenarios et al., 2017). Extreme drought conditions generate new insecurities in which male farmers fail to repay their loans, leading to confiscation of their household and farm assets. As the authors argue, such unsustainable lending practices are bound to aggravate during extreme weather conditions, thus exerting additional pressures on household gender relations (Xenarios et al., 2017). In terms of solutions to economic losses, men prefer loan-waiver during drought conditions.

4.3 When migration brings inter and intra-generational risks and opportunities for women, men, and children

Migration comes with a host of new livelihood opportunities and risks, which may contribute to intra-generational conflict with host communities and inter-generational consequences on the well-being of children. However, the gendered nature of this coping strategy highlights risks, which are unique to both women and men. Migration is primarily of male population, leaving behind poor women in conditions such as increased workload, loss of support, limited resources, and enhanced vulnerability (Rao et al., 2019). This trend was also observed in a study conducted in the state of Bihar, which showed short-term distress migration as a survival strategy to enhance households’ income profile and further invest in climate-resilient strategies (Bhatta, Aggarwal, Poudel, & Belgrave, 2015). Households that use migration as a survival strategy are poor and have subsistence-oriented farming with/without marginal farmlands undergoing frequent food deficit months in a year (Bhatta et al., 2015).

Men in India migrate to nearby towns/cities to take up low-moderate-no skilled jobs (Singh, 2019). They often move to precarious situations in urban areas where they expose themselves to new forms of risks arising from moving into a temporary/illegal house, entering into informal and dangerous jobs, lacking social networks, illnesses, psychological “pressure to perform”, and among others (Singh, 2019). Men’s preference in diversifying their income through renting out land or migrating out was observed in another study conducted in the state of Bihar (Ravera, Martín-López, Pascual, & Drucker, 2016). While relatively well-off women supported migration as an income diversification strategy, poorer women perceive them as undesirable because it increases their agricultural workload in addition to their caregiving role. Migration may lead to a “multi-local” and gendered framing of households (Figure 4) where members live and operate across different geographies contributing to a range of livelihood activities (Singh, 2019).



Figure 4: Depiction of everyday gendered activities; a woman washing dishes in Tamil Nadu, India (Photo by Shruti Parthasarathy from Unsplash)

Male out-migration during extreme events tends to increase women’s workload, especially the ones who are pregnant and lactating. When men migrated, women took up supplementary livelihoods like opening a temporary shop, which came with financial (such as, paying bribes to the police for illegally opening shops), physical (example, added household labor), and psychosocial hardships (like, discouragement in participating in village councils) (Singh, 2019). Therefore, women left behind are not ‘vulnerable’ or helpless as commonly reported (Singh, 2019). However, male-outmigration puts women and children at additional risk of malnutrition due to decreased food consumption and an increased dropout rate from school. While women may become de facto heads of the household under these circumstances, children may be forced to embark upon an early entry into exploitative work to compensate for the loss in agricultural income, or household/farm activities (Bhatta et al., 2015). However, this depends on circumstances because migrant or non-migrant status within households responds to dynamic external shocks/stresses resulting in a constant shift in households deploying their labor for different purposes (Singh, 2019).

Nomadic pastoral communities in Gujarat such as *Maldharis* (‘mal’ means livestock and ‘dhari’ means keepers in Hindi) also observe migration as an adaptation strategy to cope with prolonged droughts and its consequences on water & fodder scarcity for livestock (Venkatasubramanian & Ramnarain, 2018). Pastoralists’ ability to find fodder for their livestock determined seasonal migration across villages. Customarily, pastoralists would travel to fertile lands in Southern Gujarat in search for fodder for their livestock. Non-pastoralist farmers would allow pastoralists’ livestock to graze on their fields in exchange for manure and milk products from pastoralists’ livestock. The non-monetary relationship between non-pastoralists and pastoralists allowed the latter to live self-sufficiently while sustaining their low impact livelihoods. However, the study revealed that blockage of traditional migration routes, destruction of coastal mangroves, agricultural intensification⁹ and privatization of

⁹ Such as employing HYV seeds, chemical fertilizers, and multiple cropping cycles in a year.

common grazing/wastelands for agriculture and industry reduced the availability of common resources such as fodder and water. Lack of fodder for livestock caused conflict over resources between them and local communities and prompted them to go back to their villages, rendering migration as a precarious strategy.

Women were explicitly averse to migration because they were responsible for bringing fuelwood and water. Ecosystem degradation further jeopardized the conditions of pastoralist women as they would have to travel to farther and unfamiliar places in search for fuelwood & water and local distribution centers to sell milk. These responsibilities also came at the cost of leaving their children unattended while being away on the hunt for basic amenities (Venkatasubramanian & Ramnarain, 2018). The authors argue that the state's development policies need to be more favorable to pastoralists, in addition to sedentary populations. Development approaches favoring industrialization, agricultural transformation are arguably making pastoralists structurally vulnerable by preventing them from accessing the commons with further negative impacts on the pastoralist women.

4.4 Change in livestock-profile

A study of indigenous pastoral communities' (*Bharwad* and *Rabari*) response to climate variability and extremes in the state of Gujarat, in western India, shows that one adaptation strategy to counter drought conditions was a shift in livestock profile from small to large stock (Venkatasubramanian & Ramnarain, 2018). The authors suggest that this may be attributed to the economic environment driving pastoral communities to depend on Gujarat's dairy cooperatives, which constitute the largest buyer of milk only from cattle and buffalo (not goats/sheep). Even though smaller stocks such as goats, sheep and chickens provide income stability through quick sales and are easier to maintain (easier to migrate and more resilient to diseases) and feed (requiring lesser water and fodder) during times of distress-migration, institutional preference for cattle/buffalo milk make smaller stocks less economically viable as compared to larger stocks (Venkata-subramanian & Ramnarain, 2018). Additionally, pastoralists lack the freedom to sell cattle meat due to staunch politicoreligious (Hindu) ideals prohibiting the killing, selling and consumption of beef.

Grazing of smaller ruminants was the task of pastoralist men mostly done in common lands. At the same time, stall-feeding of larger stock, foraging for fuelwood and fodder, and providing them with water were women's responsibility. The shift to a larger stock increased the

stock with smaller ones as an adaptation strategy. Here, we see markets and politics as barriers to a sustainable shift in livestock profile.

4.5 Change in food and agricultural practices

A qualitative study (Rao et al., 2019) conducted in the Bhavani basin in Southern India shows that agriculture in the region shifted from subsistence, rainfed farming to intensively irrigated cash crop cultivation. Perverse incentives met out by the state enable this shift in the type of agriculture. Incentives include fully subsidized electricity for groundwater pumping and the absence of regulatory policy/institutions.¹⁰ Increased dependence on groundwater and decreased rainfall is a dual process that is causing a shift in control of water resources from communities to individuals. This shift in control is increasing existing inequities based on caste, class and gender. Furthermore, Singh (2018) showed that a (water) supply-oriented mindset (without attempting behavioral changes in reducing demand) promoted by watershed development program in drought-prone villages in western India facilitated maladaptive behavioral practices of farmers which include continued digging of wells to extract groundwater for irrigation, and a shift towards growing water-intensive crops such as garlic as opposed to traditionally grown black gram (Singh, 2018).

In terms of socio-economic and cultural adaptation strategies in Uttarakhand, men prioritized the adoption of changes in "food habits" and receipt of subsidized seed and food, while women prioritized safeguarding traditional knowledge and culture in food preparation and the adoption of seed exchange to cope with food insecurity. Men and women preferred ecosystem-based adaptation strategies such as intercropping and crop rotation; and adoption of traditional crop varieties and modes of weather forecasting (changing trends in wings of ants, birds, moon, and winds) (Ravera et al., 2016).

The northern state of Bihar however, showed contrasting evidence in that only men preferred agro-biodiversity, including intercropping and crop rotation systems, planting short-cycle crop species, and traditional seed varieties (Ravera et al., 2016). Men and women preferred technological adaptation strategies (agrochemicals, irrigation and improved seeds) over ecosystem-based solutions. Contradictory adaptation preference disputes ecofeminist argument of ideologizing women's connectedness with nature in determining their adaptation strategies (Agarwal, 1992). Among women in Bihar, those from socially perceived lower caste hierarchy preferred decreasing their consumption as a mechanism of change in food habit. Studies show higher willingness in adopting alternative livelihood strategies such as caring for small ruminants and cattle, piece-rated and home-based work dur-

¹⁰ A particular study analyzing panel data of electricity pricing regime, well density (number of wells), groundwater levels and groundwater irrigated area shows that an increase in well density and shift in electricity pricing from pro-rata regime to fully subsidized pricing regime leads to significant negative impact on water table and area irrigated per well. The study argues that pro-rata pricing of electricity and regulation of well drilling will help mitigate unsustainable decline in water table (Mohanasundari and Balasubramanian 2015). But such a reasoning puts a lot of burden on farmers (who are structurally unable to control production-related factors such as agricultural policies and market-based demands) to change their water-extractive habits without adequately holding the neoliberal regimes into account that commodified water for profit in the first place.

ng the drought years, and to participate in government/non-government led training and extension programs on adaptation processes, among the underprivileged caste groups (relative to privileged ones) in southern India and Bihar (Rao et al., 2019; Ravera et al., 2016). Preferences also varied across younger and older women owing to mobility. Finally, both women and men in the southern states of Andhra Pradesh and Telangana show preference for drought-resistant crops, and livestock farming as alternative to crop failure from extreme weather conditions (Xenarios et al., 2017, p. 163). Therefore, gendered preferences in the adoption of adaptation strategies are determined by intersecting categories of geography, class, gender and wealth (Ravera et al., 2016).

4.6 Analyses on vulnerabilities and gender relations

4.6.1 Intersectionality, women's uneven agencies and gendered vulnerabilities to water scarcity:

For female and male farmers, water and food security are crucial for livelihood security; these are dependent on tra-

ditional commons & regenerative agriculture, all of which are shrinking due to modernization. Gender is thus, among many other dimensions of vulnerability - socio-economic inequality, economic globalization, poverty, and disability-all of which interlock to create a bundle of unique vulnerabilities to climate change. Gender identities and adaptation needs are also intersectional across social groups (migrants/non-migrants, pastoralists/sedentary populations, dalits/privileged castes, adivasis/non-tribals, big farmers, small farmers, landowners/sharecroppers etc.).

Women's structural vulnerability is rooted in androcentric "patterns of practices, processes and power relations that render some groups or persons more disadvantaged than others" (Jerneck, 2018, p. 7). These translate into men's and women's differential access to critical information on cropping patterns and weather alerts; and land, information, capital and credit, and other inputs (Doss, Meinzen-Dick, Quisumbing, & Theis, 2018.; Jerneck, 2018). Further, adaptation needs/preferences are also gendered because of gendered subjectivities that connect with gender roles or di-

Table 1- Summary of climate change adaptation actions and their underlying vulnerabilities, linked with sustainable degrowth-based adaptation principles

Sources	Adaptation actions	Gendered vulnerabilities and subjectivities	Factors contributing to vulnerability	Sustainable degrowth-based principles as way forward
Aryal et al. (n.d.); Bhatta, G. et al. (2015); Kelkar Govind. (2013); Rao, N., Lawson, E. T., Raditloeng, W. N., Solomon, D., & Angula, M. N. (2019); Ravera, F. et al. (2016); Singh, C. (2018); Singh, C. (2019); Venkatasubramanian, K., & Ramnarain, S. (2018); Xenarios, S., Kakumanu, K. R., Nagothu, U. S., & Kotapati, G. R. (2017);	Access to tangible (land, local institutions such as self-help groups for women, etc.) and intangible (rights, social networks, collective action) assets	Non-recognition of women as actual landowners excludes them from accessing agricultural extension offices, water user associations, financial credit agencies, and other schemes	Patriarchal and androcentric laws, institutions and culture based on heteronormative gender binary and hegemonic masculinity	i) Identification of root causes of vulnerability (patriarchy, political ecology, unequal power relations, inequality, coloniality of power at global and national levels, modernization, industrialization, capitalism, economic growth in terms of GDP, commodification of ecosystems and women, commodified water, top-down paternalistic development, exclusion of gendered subjectivities, exclusion of community knowledge and alternate onto-epistemologies, anthropocentrism;); ii) Recognition of competing interests (intersectional feminism and intersectional masculinities across different social groups, unequal power relations, plural notions of gender); iii) Integration of traditional and local community knowledge with other forms of knowledge; iv) Accountability of adaptation actions through direct democracy (M.K. Gandhi's notion of <i>Swaraj, political & economic democracy, face-to-face meetings</i>); and v) Recognition of feedback loops across scales (planetary boundaries, climate change mitigation goals of 1.5°C target, care for humans and non-humans)
	Income & food insecurities, and the secure/insecure nature of crisis help	Some men borrow from risky sources like informal money lenders during extreme weather conditions to dig bore wells; some women borrow from extended family members and self-help groups; additional threat of gender-based violence against women during economic distress; some wives repay debts through domestic work, sexual exploitation, and among others; indebtedness comes at the cost of high dowry-demands from women	Hegemonic masculinities, pressure on men for being the breadwinner and stigma around asking for help, patriarchal relations of women's subordination, commodification of women's bodies by patriarchal markets	
	When migration brings generational (intra- and inter-) risks and opportunities for women, men and children	Distress migration by poor men for seeking low-skilled and precarious jobs in urban areas; during migration, wives of migrants who are left behind look for supplementary livelihoods like opening a temporary shop which come with patriarchal barriers; relatively well-off women support migration as an income diversification strategy, poorer women perceive them as undesirable because it increases their agricultural workload in addition to their caregiving role; increased school dropout rate among and take-up of exploitative works by poor migrant children; intensification of agriculture involving the use of subsidized chemical fertilizers and high-yielding crop varieties reduced the availability of grazing land & commons for pastoral communities who otherwise live sustainably, raising conflict over resources with non-pastoral communities	Women's additional reproductive or caregiving role, wealth inequality among women, gendered division of labour based on patriarchal relations at village level, agricultural intensification and increased irrigation demands, chemical fertilizers, ecosystem degeneration, competing interests among pastoral and non-pastoral communities, disincentives for pastoral communities to sustain their traditional & sustainable ways of living	
	Change in livestock-profile	Shift in livestock profile from small to large stock during droughts due to their economic viability (among Maldhari pastoral communities in Gujarat) increased the workload for women because livestock had to be milked twice a day for sale to dairy cooperatives and finding common lands was difficult. Also, sale of cattle meat for money is politically prohibited on religious grounds; Grazing of smaller and larger stock are men's and women's roles respectively	Capitalist expansion, modernization, industrialization and ecosystem degradation, cooperative/industrial market-based dairy demand from larger livestock only or market-based demand barriers, politico-religious market preferences breeding unsustainable preferences, market-driven change in livestock profile over communities' traditional preference for sustainable livestock profile	
	Change in food and agricultural practices	Shift from subsistence, rainfed farming to intensively irrigated cash-crop cultivation due to fully subsidized electricity for groundwater pumping and absence of regulatory policy/institutions in Southern India; gendered preferences in the adoption of adaptation strategies are determined by intersecting categories of geography, class, gender and wealth - in Uttarakhand some men prioritized changes in food habits and some women preferred preservation of traditional food practices; both men and women preferred agro-ecological practices to adapt in Uttarakhand; in Bihar men preferred agrobiodiversity strategies practices over women. Adoption of drought-resistant crops by men and women in Andhra Pradesh & Telangana	Agricultural intensification and increased irrigation demands, capitalist neoliberal policies/laws to incentivize food productivity and unsustainable water abstraction, gendered and cultural preferences over adaptation strategies	

verging gendered epistemologies (not going into the debate whether epistemological differences are sex-based, socially constructed or both).

Social construction of the nexus between women's vulnerability and crisis response should not be synonymously interpreted with 'weakness' or 'victimhood' as typecasted in most literature on disaster (Enarson, 1998). Because women are not "passive" (Mohanty, 1988) subjects of development but active agents of change and decision-making processes, albeit facing contextual barriers even within a single country (in this case, India). Rural women can resist negative power or sources of oppression such as structures of domination including patriarchy, social hierarchy, and market forces towards empowerment but may fail to achieve changes when they lack access to requisite resources (Guenther, 2015; Kabeer, 2005). Informal institutions such as women's self-help groups display the potential of collective action by improving gender relations on decision-making, so called productive and reproductive labor, financial matters (Xenarios et al., 2017, p. 7) and ownership patterns of land.

4.6.2 Plural notions of masculinity and men's contextual vulnerability to water scarcity and climate change

Notions of masculinity may shape men's unique vulnerability to climate change in terms of pressure to handle the responsibility of being key decision-makers in households and stigma around asking for help among close friends/relatives, and migrating to precarious sites for jobs (Demetriades & Esplen, 2008, p. 25). Such notions may polarize distinctions between men's and women's expected roles (Paulson & Boose, 2019, p. 4). For example, while women in Andhra Pradesh (Xenarios et al., 2017) displayed greater social cohesion as a coping mechanism to financial distress by asking for help among family members, men displayed risky behavior towards taking loans from unreliable sources (money-lenders). Men's vulnerabilities are also linked with women's because their loss of income & perceived dignity often cause domestic violence against women or put additional pressure of financial insecurity on them. At the same time, notions of masculinity are intersectional and plural because they vary across geography & wealth groups as we see from the case study wherein some men preferred agro-ecological and some preferred technological pathways to adapt. This example debunks over generalization of the hegemonic notion of masculinity which is hinged upon the logic of domination over nature.

4.6.3 Structural barriers, everyday gender relations and subjectivities

The case studies illuminate the non-universal nature of knowledge possessed by, and adaptation strategies adopted by male and female farmers cutting across various social identities. A gender relations approach to climate change adaptation helps to understand how vulnerability interacts with plural gendered notions of 'being a poor man', 'being a poor woman', or 'being a farmer from a certain social

group in rural contexts. In addition, the nature of poverty being relational makes it important to understand how gender identities interact with other sources of inequalities and discrimination to generate unique forms of deprivation. Across all the case studies, division of labor & priorities based on gender has been the "primary axis of social organization; women's domestic responsibilities, productive labor and community roles", and fairly consistent within the international development literature (Enarson, 1998, p. 159).

Men and women respond differently to water scarcity because their material relationship with water varies on the basis of their everyday gendered division of labor. Women's/men's strategic interests in activities that require water are negotiated on an everyday basis within and outside households. This makes the meanings of water subjective, gendered, intersectional, contextual, and thus plural. Structural barriers like capitalist economic system (shrinking commons and incentives towards agricultural intensification and intensive cropping) deepen gender inequities by reducing women & water to commodities, and human nature to rational egoism. Ultimately, they lead to maladaptive outcomes. Water being a source of everyday life, its scarcity invariably negatively affects livelihood & household food security, and well-being especially of women on an everyday basis, due to their 'double burden' (Elson, 1990; Guenther, 2015, p. 34; Sallan, 2020, p. 504) of undertaking care responsibilities in addition to fulfilling agricultural works.

Water is life, water is political, and securities around water & food are linked to unequal power relations, all of which render the notion of scarcity artificial, relational and contested. In a warming & uncertain planet, these complexities across geographies require an intersectional approach to justice that is not only anti-patriarchal but looks at power relations among and between women and men in plural and contextual contexts; and links local water, ecological & life struggles/subjectivities to larger historical and global power structures such as anthropocentric, colonial, capitalist, and other local/regional/global relations of domination and exploitation, in order to dismantle & transform them (Krishna & Kulkarni, 2018, pp. 242–247). Therefore, sustainable adaptation to water scarcity needs a framework that incorporates gender justice in relation to water justice. The next section explores this possibility.

5 HOW DO THE CONCEPTS OF SUSTAINABLE ADAPTATION, DEGROWTH AND GENDER INTERACT ON THE GROUND, IN RELATION TO WATER JUSTICE?

De-growth is a movement that arose from dissatisfaction with linear progress, modern & imperialistic modes of production and lifestyle because of its negative planetary conse-

-quences such as species extinction, climate change, and extreme global inequality. By trying the concepts of sustainable adaptation laid down by Hallstrom Eriksen et al. (2011, pp. 11–15) and degrowth (in the global South), the following interrelated elements or principles of sustainable de-growth-based adaptation, which are gender just are advanced (see Figure 5 for conceptual framework and Table 1 for how the framework may be operationalized).

The principles are explained with the help of findings from the case studies. The framework is not aimed to be universal and generalizable being conscious of the fact that adaptation strategies are local and situated in multiple and diverging contexts globally and even within India’s plural, historical, cultural and political settings. The aim is to re-politicize sustainable adaptation as transformative politics; and initiate debates about placing community-based notions of sustainability, fairness, equity, participation and democracy at the heart of adaptation and development policies so that climate vulnerable agricultural populations across genders can be the true agents of their own water just futures. The aim is also to prevent sustainable adaptation from falling into the business-as-usual politics of sustainable development that sees vulnerable populations and women only as objects of economic growth and capital accumulation (Brown, 2011, p. 29; Krishna & Kulkarni, 2018).

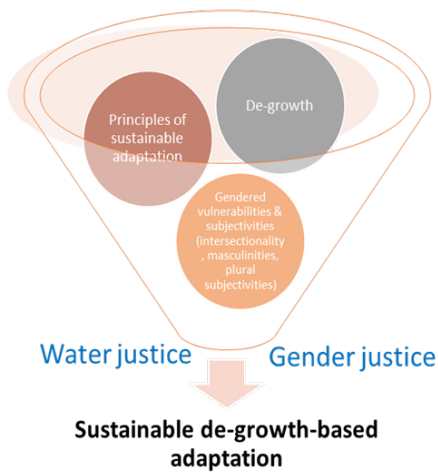


Figure 5: Conceptual framework for sustainable degrowth-based climate change adaptation principles

5.1 Identification of historical, structural and contextual factors, which creates vulnerability such as poverty, hegemonic masculinity, coloniality, patriarchy, caste, and unequal terms of trade. All of the above influence the outcomes of adaptation measures and center the needs of the most vulnerable groups as a way forward to reduce structural inequality. Leigey (2021) calls reduction of inequality as the first principle of degrowth in the global South. He propos-

es a de-commodified mix of unconditional and free access to basic needs and income (in local currencies or through reciprocity) to secure accommodation, food, water, energy, clothes, education, health, basic tools in combination with a cap on maximum income. The pursuit of economic growth and high agricultural productivity for its own sake come with ecological costs (shrinking commons, degraded top soil, water pollution, etc.). They should be abolished and replaced with communities’ notion of well-being that maximize sustainability of ecosystems & nutrition, for current and future generation of farmers.

In India, it is estimated that if Gini coefficient, a measurement of inequality of income, wealth and other assets is reduced by 10 points, then its “equivalent of a 36 percent reduction, could almost eliminate extreme poverty altogether, by lifting up a further 83 million people”(Oxfam, 2013a).¹¹ Gender inequality arises within this structural context, leaving a gap between one’s doings/ actions and capabilities, or between choice/aspirations and doings/actions; both stem from gendered power relations across class, caste and ethnicity (Agarwal et al., 2003, p. 8). Assets such as land & water rights, agricultural technologies, livestock, knowledge, and social capital facilitate one’s adaptation actions and hence must be accessible by all genders without barriers. Patriarchal relations must be corrected within the context of broader “gender regimes” and politico-economic system.¹² Gendered barriers must be addressed at household/family, market, community, and state levels by transforming relations of inequality and oppression into relations of care (Agarwal, 1995).

5.2 Recognition of competing interests and values prioritized by different social groups affects the outcomes of adaptation measures particularly for the most vulnerable. Powerful and vested interest in specific adaptation strategies may benefit/harm some among and across genders. The case studies show that competing interests vary among genders and among rural women, which can be visualized through an. Universal and top-down laws/policies around assets will not enable transformative adaptation and social equity because adaptation preferences & gendered barriers are intersubjective, intersectional, and operate through community norms. Vulnerabilities of the most marginalized groups should be addressed and efforts should be made for bringing powerful groups on board towards solidarity, in order to prevent conflict among groups. There needs to be a “balance between collective interests and individual freedoms” to ensure peace and harmony (Kothari et al. 2014).

5.3 Integration of traditional, local, and community knowledge with other sources of knowledge on adaptation strategies: Top-down technology-based¹³

11 In 2013, India’s Gini coefficient was 0.34 that increased after the Covid-19 pandemic (Oxfam, 2022). Gini Coefficient was measured by considering “poverty headcounts and the mean income/consumption figures for 2010” and then establishing “what Gini coefficient is compatible with those two numbers if income/consumption has a lognormal distribution in the country”. See (Oxfam, 2013a).

12 Here, gender regimes refer to “institutions that determine how resources are accessed, distributed and consumed, how labor is coded, recoded and divided into both productive and reproductive tasks and how social practices and responsibilities are discursively defined and fulfilled” (Jerneck, 2018, p. 1). Also, see (Rao et al., 2019) on gender-coded labor.

13 This is not to say that all technologies are bad but I argue for more mindfulness around its sustainability, cultural acceptance, and politics more broadly.

climate change adaptation strategies are often incapable of mitigating slow onset climatic events such as droughts. This is because they are either unaware of local ecological conditions or lack sensitivity towards deep-rooted local norms thereby reducing communities' flexibility in opting from a reservoir of adaptive actions (Mcneely, 2012). Adaptation planning should thus, be done with farmers and not through distant imaginations.

While being sensitive to local culture, adaptation strategies should also account for local social "processes and politics" (e.g.: corruption, elite capture), which, if not considered, may nullify the goals of sustainability (Singh, 2018). From a gender relations perspective, attention should be paid to community politics because farm, off-farm, and household labor are gender coded. Community knowledge varies across social groups (*Adivasis/tribals, Dalits/scheduled castes, privileged caste groups*), and gender relations therein will also vary. Indian women's traditional farming knowledge was systematically sidelined by allowing multinational companies to modernize agriculture through imposition of patents on seed varieties and industrialization (Shiva, 2016). Several Dalit women in rural Andhra Pradesh in Southern India have resisted by not buying their seeds (Guenther, 2015). We also saw how subsistence ways of living for pastoralist communities was threatened. Such local and global neocolonial forces in the name of development threaten subsistence economies; and should be dismantled by reviving women's and men's traditional knowledge and allowing their agencies to transform developmental thinking. Finally, there is a danger of adaptation interventions being "overly local" because migration is contributing to multi-local households across geographies (Singh, 2019).

5.4 Promotion of accountability in adaptation process-es through direct democracy where communities participate in active decision-making in face-to-face administrative settings. Accountability should be encouraged through political and economic democracy (Kothari, 2014; Kothari et al., 2014). While political democracy recognizes community control over decision-making respecting ecological and cultural boundaries, the latter notion recognizes community control over local means of production, distribution, exchange, and markets for basic needs. Such radical democratic principles will help nurture communal sovereignty and dismantle self-interested economic rationality in relation to their de-commodified basic needs, and in this case water. Accountability can be accomplished through direct participation by communities in face-to-face settings for strengthening transparency. These values should also consider the gendered differences in power, voice, and agency that may impact the quality of participation in face-to-face settings. Participation is distinct from merely informing people about a project or 'tokenism', which involves superficial consultation with local beneficiaries (Singh, 2018).

Singh (2018) argues that the watershed guidelines in India

rightly include "community involvement, ownership, and empowerment" but are ambiguous enough to pass off as tokenism. Tokenist measures like, merely increasing women's representation in local institutions are mere quantitative indicators that hardly tell anything about the quality of procedural justice and the extent to which women's 'water knowledges' (Kulkarni, 2016) are meaningfully integrated.

5.5 Recognition of positive and negative feedback from local adaptation measures on planetary processes in order to avoid any negative socio-economic-biophysical impacts (Bennett, Blythe, Tyler, & Ban, 2016, pp.) For instance, over-abstraction of water in the upper streams along the canal systems can cause insufficient water downstream (Xenarios et al., 2017). Adaptation actions could also fail its sustainability goals if embedded within a larger extractive economic system, which promotes rational self-interest in the face of water scarcity (Singh, 2018). This principle should go hand in hand with consciously removing anthropocentric values in adaptation strategies by promoting interconnectedness between human and non-human natures. Notions of liberal feminism and emancipation incompatible with planetary limits need to be de-prioritized to center ethics of care, and solidarity with those living in the margins, which include continued digging of wells to extract groundwater for irrigation, and a shift towards growing water-intensive crops such as garlic as opposed to traditionally grown black gram (Singh, 2018, p. 54).

6 CONCLUDING THOUGHTS

Findings from the case studies show that climate change adaptation strategies can not be generalized because local climate impacts are grounded in context specific political, cultural, hydrological, and geographical settings. Yet, barriers to adaptation strategies converge at places that question unequal power. Flowing from this thought, I show that notions of gender identity are in multitude (plural), and no singular feminist ideology neatly theorizes the relationship between gender, water, sustainability, and social well-being. Plural concepts of gender identity, well-being, justice, and sustainability across various social groups intersect to produce situated, historical, context specific, and power laden barriers to sustainable adaptation.

In the context of climate change, it is important to pluralize and politicize the concept of SD, while dismantling oppressive and context specific hierarchies (Taylor, 2013b). Adaptation pathways integrated with SD policies cannot yield equitable outcomes because the latter aligns with capitalist economic growth as an end in itself that creates new forms of deprivation and ecological unsustainability (Adams, 2009; Klein et al., 2007). They are not gender-just because capitalist economic determinism (i.e., the assumption that capitalist economic norms such as rationality, profitability and individualism lay the foundations of socio-political arrangements across all -

societies) does not consider non-material conditions and culture specific norms that sustain natural resource based livelihoods. Capitalist economic determinism relies upon a colonial notion of good life that construes subsistence and rural way of life as inferior, and is ordered upon patriarchal division of labor within which rural women and men cannot fully exercise their agency in equitably accessing de-commodified water and commons towards liberating their time and energy.

We need a politics of intersectional feminism and local community sovereignty embedded into a just economic paradigm. Adaptation actions should be linked with climate change mitigation goals of 1.5°C target that can be achieved through degrowth in the North (Keyßer & Lenzen, 2021) and South (socio-economic-ecological justice in the Indian context). This way, the root causes of vulnerability may be transformed because farmers across genders would be able to exercise sovereignty over resources (beyond water) and achieve self-reliance to live sustainable & meaningful lives that ‘they’ (not policy-makers/states) have a reason to value.

Water policies need to be integrated into just development paradigms. These policies need to be looked at more broadly across scales (because of water’s biophysical characteristics) and the spectrum of resource struggles (against commodification) through which it flows to promote climate justice for vulnerable populations. While gender is an important analytic tool to understand how water is contested every day along with gender regimes, it is one among several intersecting socio-economic advantages and disadvantages that determine the relational vulnerability of livelihoods (Ahlers & Zwarteveen, 2009, p. 419). Policies should not frame struggles over water as struggles of women or binary gender identities (such as traditional/modern, victims/agents, masculine/feminine) (Ahlers & Zwarteveen, 2009, p. 419; Kulkarni, 2016, p. 87). Policies should also not look at women’s labor as doorways to capital accumulation and modernization (Krishna & Kulkarni, 2018, p. 245). Instead, they should focus on gender relations; and aim at behavioral changes that transform patriarchal, rationalist, anthropocentric, and other relations of domination over humans and non-humans across every adaptation pathway and process. States should revive local meanings & knowledge of de-commodified water (Kulkarni, 2016, p. 87), and situate women’s meaningful participation (beyond representation) within grassroots regimes of justice and struggles/movements.

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8 CONFLICT OF INTERESTS

Nairita Roy Chaudhuri is the principal author of this review article and declares no conflict of interests.

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