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Women and climate change in the Sahel

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WOMEN AND CLIMATE CHANGE IN THE SAHEL

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Abstract

The purpose of this paper is to explore the gendered impacts of climate change in the Sahel. In particular, it explores the ways in which gender inequality is a critical factor in understanding vulnerability and resilience efforts concerning climate change. It shows that the current climate crisis is affecting livelihoods throughout the Sahel in pronounced ways. In a region highly dependent upon subsistence agriculture and pastoralist livelihoods, climate variability and environmental degradation have made such livelihoods difficult to sustain, the effects of which have broad ranging impacts on social and economic systems. Consequently, migration, livelihood adaptation, social unrest, and political instability emerge from the ecological challenges the Sahel is facing. Those with the resources to respond to and prepare for future climate events will be better equipped to navigate the climate crisis. Unfortunately, those resources are rarely equally distributed at the household, community, and state levels. In particular, gender inequalities within the Sahel pose a very real challenge for adaptation and resilience strategies as states and global institutions make interventions to support at risk populations. The paper then explores what development and state institutions are doing to resolve gender inequity through climate resilience policy, and where these efforts are falling short. The paper concludes with some strategies to improve opportunities for gender equity and climate resilience based on field research within the Sahel.

Key words: gender, women, climate change, Sahel, West Africa

JEL classification: Q54, J16, O55

About the author

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Note to readers

This Note is published as part of the partnership between SWAC/OECD and the Sahel Research Group of the University of Florida. The collaboration aims to: 1) Reinforce ties between research and policies for sustainable development that can help better anticipate changes within the Sahel and West Africa region. 2) Promote West African expertise by reinforcing links with African researchers and research centres through the Sahel Research Group network.

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The Sahel and West Africa Club (SWAC) is an independent, international platform. Its Secretariat is hosted at the Organisation for Economic Co-operation and Development (OECD).

Its mission is to promote regional policies that will improve the economic and social well-being of people in the Sahel and West Africa. Its objectives are to improve the regional governance of food and nutrition security and improve the understanding of ongoing transformations in the region and their policy implications. SWAC Members and partners are Austria, Belgium, Canada, CILSS, the ECOWAS Commission, the European Commission, France, Luxembourg, the Netherlands, Norway, Switzerland, the UEMOA Commission and the United States. SWAC also has a memorandum of understanding with the University of Florida (Sahel Research Group).

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Executive summary

Because of its semi-arid agrosystem and high economic dependence on agriculture and pastoralism, the Sahel is particularly vulnerable to climate variability. Social and political factors such as migration, political instability, and food insecurity present foundational stressors on the region that may intensify due to climate change. Among those most vulnerable to the threats of climate change are socially marginalised groups such as youth, the elderly, the disabled, and women.

This paper explores the gendered effects of climate change and some ways in which development institutions are working to mitigate that risk in the West African Sahel. A literature review illustrates that inequitable access to assets present obstacles for women in the Sahel region to invest in the types of resources necessary to recover from and plan for future climate events. These obstacles are often the result of structural and normative restrictions which perpetuate gender inequities both within the household and at the community level. Addressing these restrictive barriers at their foundation, rather than merely treating symptoms of gender inequality, is critical to the process of building climate resilience in the Sahel.

The paper argues that in order to build strong resilient systems, it is crucial that social structures and norms currently working to prevent equitable access to assets and resources be transformed. Arguing for a gender transformative approach, the paper explores two development projects that have sought to improve women's access to climate information in order to build resilience in the Sahel. The first presents observations of two case studies from the Climate Change, Agriculture and Food Security (CCAFS) development projects based in Senegal. The second observation is from a development project within the Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED) consortia in Burkina Faso. The case studies evaluate some of the challenges met while implementing gender programming within climate services and provide some lessons about how to improve efforts through a gender transformative approach.

Three policy recommendations emerge from the case study reviews.

- The first recommendation is that gendered experiences of climate change are often differentiated by the nature of roles and responsibilities, and that these differences matter in how men and women respond and adapt to climate threats. As such, women's and men's climate services and resilience support needs are likely very different. Furthermore, men

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and women may need different types of support in order to access and use the same resources, such as literacy skills or technological devices.

- The second recommendation is that differential experiences between men and women inform differing types of knowledge systems that are critical to adaptation processes and the diffusion of information. Where development institutions recognise and incorporate these differing knowledge systems and approaches, they are better equipped to provide sustainable interventions for development programming.

- Finally, goals of gender equity seek to reform deeply entrenched structures and norms that have long excluded or restricted women from full participation in public spaces. At times, goals of transformation do not account for the time required for social change to occur. While some gender equity indicators can be used to measure improvements in women's access to resources and ability to respond to climate change, the type of change required in transformative approaches is complex and requires time. Changes may be observable within shorter periods, but many structural and normative changes take generations to occur. Therefore, it is critical to design development programmes with flexibility to accommodate these processes associated with long-term change.

Introduction

Climate change is the most pressing global challenge of our times. While, ultimately, all nations will be affected by the impacts of climate change in different ways, some regions of the world are particularly susceptible to effects that will challenge current ways of life, from food systems, to livelihoods, to political stability. In regions where those systems are already fragile, climate instability poses a severe risk to intensify weaknesses within those systems (CNA, 2007).

The Sahel has been identified as particularly vulnerable to both social and ecological impacts of climate change. The latest Intergovernmental Panel on Climate Change (IPCC) Report identified the region as a "climate change hot spot" that is, countries where human security is threatened due to projected climate change impacts (IPCC, 2019: 197; Diffenbaugh and Giorgi, 2012, de Sherbinin, 2014). With the food economy making up 66% of total employment in West Africa, the regional economic system is reliant upon climate stability (Allen et al., 2018). In countries such as Burkina Faso, Chad, Niger and Mali, where the food economy contributes to over 80% of employment, climate variability puts both national and local economies in a vulnerable state (FAO, 2014). The uncertainty of weather and climate forecasting, as well as associated challenges of pests and diseases, have made such livelihoods difficult to sustain, especially for those who live in extreme poverty.

Out of necessity, those with the resources to do so shift livelihood strategies and adapt to changing socio-economic pressures. Those without such resources are left vulnerable to these changes and less equipped to respond to current and future climate crises. Among those most vulnerable to the effects of climate change are women. Women in the Sahel overwhelmingly rely on the agricultural and food economies, with women contributing to 40% of agricultural production, 80% of agricultural processing, and 70% of agricultural distribution labour regionally (Allen et al., 2018).

Additional responsibilities in the reproductive economy are also often resigned to women. Responsibilities such as maintenance of kitchen gardens, homebuilding, cooking, cleaning, and washing require natural resources like timber and water. As such, dependence on availability of natural resources is especially evident in women's daily livelihood and household responsibilities and activities (Dankleman and Jansen, 2010). When climate variability makes these scarce, it can affect the assets (such as time, security, and money) required for women to perform these tasks. At the same time, women are often the less equipped with the resources necessary to respond to shocks brought on by climate variability.

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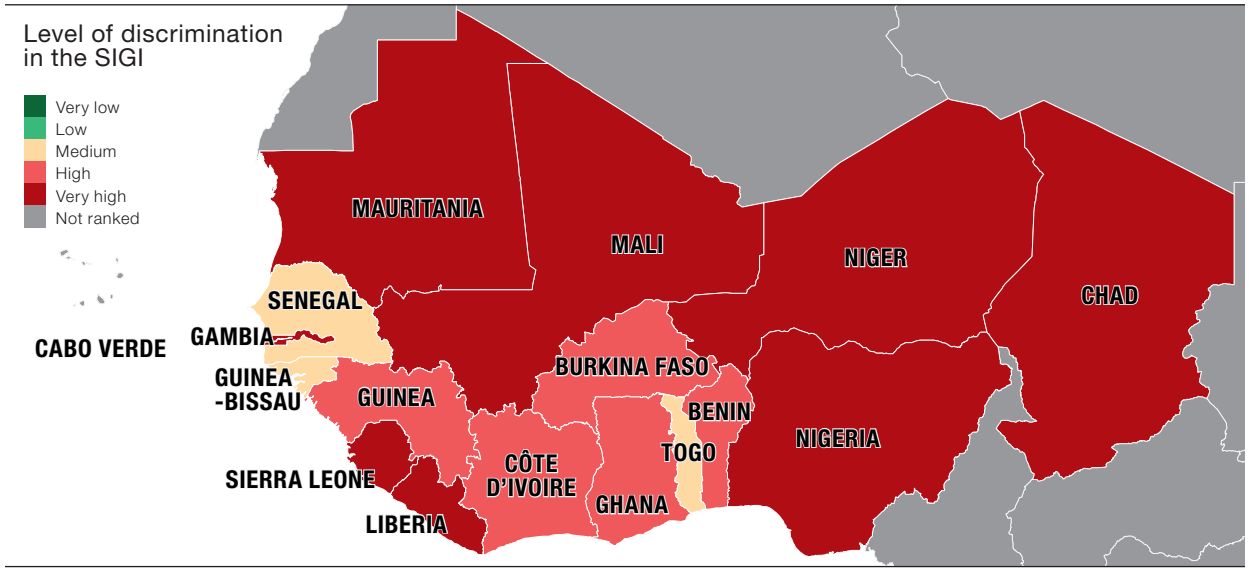
Map 1

Social Institutions and Gender Index (SIGI) ranking for West African countries



Source: Bouchama et al. 2018.

As a result, gender inequity within the Sahel is particularly pronounced (Map 1). Using the Social Institutions and Gender Index (SIGI), research has indicated that women in Chad, Mali, Mauritania and Niger experience high levels of discrimination based on marriage rights and family code, bodily autonomy and violence against women, and access to resources (Bouchama et al., 2018).

The purpose of this paper is to explore the gendered impacts of climate change. In particular, it will explore the ways in which gender inequality is a critical factor in understanding vulnerability and resilience efforts concerning climate change. Development programs and policies targeted toward improving gender equality within the Sahel have become a central focus within international development. One such example is the United Kingdom's Department for International Development (DFID) project within the BRACED consortia which has worked closely with country partners in Burkina Faso and Ethiopia to establish gender sensitive programming attuned to climate change risks and challenges. Scholars and practitioners understand resilience and social transformation as being interrelated and, as such, have worked to implement transformative approaches into climate resilience strategies. Still, gaps remain about how to best implement this approach in order to ensure gender equitable outcomes. This paper will conclude by exploring some approaches that seem to be promising in improving gender equity and, ultimately, resilience to climate change in the Sahel.

Ecological impacts of climate change in the Sahel

While global concern is currently mounting following the release of the latest IPCC Report (IPCC, 2019) and its projections regarding increased global temperatures beyond 2.0 degrees Celsius warming, areas of the Sahel have already reached this threshold of warming. Indeed, if the world does not begin to reduce carbon emissions, it is expected that areas of Africa will experience temperature increases between 3 and 6 degrees above preindustrial times (Englebrecht et al., 2015). West Africa is projected to experience higher warming temperatures by the end of the century, particularly across the western portion of the Sahel (Heinrigs, 2010), with some predicting temperature rise between 3-4 degrees above preindustrial times (Englebrecht et al., 2015; UNEP, 2011).

The West African Sahel has experienced periods of long-term decline in rainfall that was intensified by shorter periods of severe drought over the last half century (Biasutti, 2019). The most well-known food crises occurred from 1969-74 and in the mid-1980s, most notably in Burkina Faso, Chad, Mali, Mauritania and Niger. In addition to the high human toll, this series of droughts contributed to a decrease in species diversification, tree density and plant coverage throughout the region (Epule et al., 2014; Gautier et al., 2016). These droughts also contributed to the drying of riverbeds feeding from Lake Chad and the decrease of its fish populations.

Since then, others food crises have occurred, for example in 2005 in Niger, where drought and insects destroyed the harvest and ultimately resulted in 47,000 deaths (Devereux, 2019). Rainfall shortcomings in 2017 in Mauritania, as well as areas of Burkina Faso, Chad, Niger, and Senegal, also resulted in longer lean seasons and necessitated changes in the migratory practices of pastoralists. Extreme rainfall events have also caused instances of flooding which threaten crop yields and can be devastating to populations dependent upon subsistence agriculture, ultimately leading to the displacement of people. Flooding often leads to soil erosion, which is responsible for approximately 70% of economic losses in West Africa (Egbebiyi et al., 2019). In one recent example, the flooding of Lake Chad and its tributaries in October of 2019 caused the displacement of thousands along the Chad and Cameroon border.

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Climate models have yet to reach consensus on what climate change will mean for rainfall projections in the Sahel (Park et al., 2016). The reality is that climate change is producing differentiated outcomes globally, regionally, and within countries. When compared with the entirety of sub-Saharan Africa, the West African Sahel has the highest recorded instances of climate stressors, that is, drought, wind, and flooding (Epule et al., 2018). These differentiated experiences intersect with the social, economic, and political conditions in those countries in order to affect human lives in diverse ways. Overall, projections suggest that countries located further to the east (Chad and Niger) will experience more rainfall than those countries located further west (Senegal and Burkina Faso). Across the West African Sahel, projections reflect more recent trends which have produced longer rain seasons, with more extreme rainfall events during this period (Park et al., 2016).

Still this rainfall is dependent upon the West African Monsoon system, "which is a recurrent low latitude large-scale circulation pattern arising from the meridional boundary layer gradient of dry and moist static energy between the warm sub-Saharan continent and the tropical Atlantic Ocean" (OECD/SWAC, 2010: 4). The monsoon system is subject to variation due to rising temperatures and brings rains that are often sporadic, high in intensity, and tends to arrive at the end of the season, requiring adaptive farming techniques to respond to this change in rainfall patterns (Biasutti, 2019).

Climate change is expected to affect crop yields markedly, in both positive and negative ways (Dunning et al., 2018). The increase in rainfall in the Eastern Sahel means that some crops that have historically grown less efficiently, such as maize, will now be able to grow more abundantly. At the same time, other crops that have historically done well in the region may not adjust well to a wetter climate (Egbebiyi et al., 2019). The decrease in rainfall in other regions will necessitate to find crops that are better adapted to increased average temperatures and an overall increase in the frequency of warmer days and nights. Adaptation, and the sufficient resources to do so, is required in order to accommodate these changing needs for farmers and national economies dependent upon agriculture. Critical to this transition, then, is an understanding of livelihoods, vulnerability, and access to climate services, of which gender is a central lens for analysis.

Understanding climate change impacts through a gender lens

Climate change exposes vulnerabilities and exacerbates inequalities (Carr and Thompson, 2014). Globally, gender inequality continues to be pervasive in household and community level activities. Income inequality resonates not only in the global South, but in western industrialised countries as well. Division of labour within the household continues to fall overwhelmingly on women, from childrearing to cooking and cleaning, as women tend to take on 'triple roles', that of productive, reproductive, and community based responsibilities.

NATURAL RESOURCES

These inequalities have important implications for how states and development practitioners approach climate resilience initiatives. Men and women have different access to financial, social, or political resources. They also often hold different roles and responsibilities within the household. Women tend to balance reproductive roles such as cooking, cleaning, and childrearing in addition to agricultural responsibilities. It is common for women to maintain kitchen gardens for household consumption, while men often maintain cash crops (Twyman, et al., 2014). Finally, because of gender inequalities with regards to financial assets, women tend to be responsible for poultry and small ruminants while men tend to care for larger and more financially advantageous livestock such as cattle. Consequently, because of these differences, men and women tend to experience the effects of climate change differently (McLeman and Hunter, 2010). Recognising how these experiences differ, and how access to and utilisation of resources matter in climate adaptation strategies are critical to resilience building initiatives necessary within the Sahel. This section explores ways in which gendered access to resources can cause gendered differentiated effects and responses to climate change.

Rural women's livelihoods, particularly in developing countries, rely upon access to natural resources (Dankelman and Jansen, 2010). Their productive and reproductive roles, and responsibilities as women are closely tied to these natural resources, whether it be through the collection of firewood and water for drinking, cooking, and washing, or acquiring animals

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and plants for the provision of food (Nagel, 2015). At the same time, this gendered dependence on natural resources can place increased pressure on their availability in unsustainable ways, contributing to deforestation and land degradation within the region. While clean cooking solutions do exist, for example, they are not always easily accessible. Consequently, some countries have put forth initiatives to improve access and awareness around solar stoves and clean cooking methods. Senegal is one such case where national campaigns to introduce and encourage adoption of solar stove usage has been underway. The results of this effort seem to be less than promising, with only a 19% adoption rate (Hooper et al., 2018). Among the reasons that these stoves were not adopted is that they ultimately did not generate enough heat to meet the cooking needs of the average household.

Variability of climate makes reliance upon natural resources for sustenance a challenge, particularly when there are few alternative livelihood options in rural areas. Insufficient water sources can require women and girls to travel farther to collect water. The increased walking distance in and of itself is potentially harmful to those women collecting water. Travelling farther for water also puts women and young girls at risk for violence, and the social repercussions resulting from sexual assault (Sorenson et al., 2011). Health concerns including dehydration, back and spinal injuries, fatigue, dehydration, and reproductive complications can result from carrying heavy water containers over many years and many kilometres (Nagel, 2016).

This extra work also requires time that detracts from time that women would otherwise spend on productive activities, sometimes decreasing agricultural productivity, household food security, and overall household income (Dankelman and Jansen, 2010). This problem is termed 'time poverty' and highlights the ways women experience less free time available than men as they are often involved in very time-consuming non-remunerated household work on top of outside work to supplement their household income. This means that they may have less flexibility to diversify their activities far from the home or participate in projects designed to improve their resilience (Blackden and Wodon, 2006). To compensate for this time allocation problem with regards to water collection, some households require girl children to take the responsibility of collecting water, requiring them to leave school and instead contribute to household reproductive labour, which only further serves to entrench components of social inequity among the next generation (Dankelman and Jansen, 2010).

LAND

Another central natural resource that rural women rely upon for their livelihoods is land. In the Sahel, agricultural production, feeding livestock and building homes depend essentially upon land, fodder and timber availability. While women are dependent upon these natural resources for

survival, they often do not have equitable ownership rights (FAO, 2011; Fletschner and Kenney, 2011). Instead, they depend on male household members as intermediaries in gaining access to these resources, particularly land. This greatly reduces the likelihood that women will be able to negotiate or even participate in household decisions regarding agriculture and strategies for resilience.

Land also serves as a form of financial capital, defined as the financial means, the tools and the inputs that can be put into labour respectively (Meinzen-Dick et al., 2014). Women are often at a disadvantage in this realm as well. When households experience shocks such as family illness or death, it is often women's assets (e.g., dowry) which are first depleted to compensate for immediate costs from the incident (Quisumbing et al., 2011). Because men overwhelmingly hold ownership of the land and livestock in developing countries, women are rarely in a position to negotiate on household decisions to adopt new tools and technologies in order to build resilient livelihoods.

PHYSICAL CAPITAL

There is evidence that, when given access to wage labour or microcredit, some women were able to improve their negotiating power within the home and regarding household productive activities (Kabeer, 2005). In some cases, women were also able to improve their social capital and political participation. Moreover, a broader critique of the notion that women's empowerment is a function of economic opportunity challenges the utility of development interventions that prioritise this approach (Batliwala, 2007; Sharma, 2008). The complex legacy of gender inequality, reinforced through social norms, is not easily resolved by infusing financial capital into women's assets. Instead, it is increasingly understood that empowerment is a much more complex concept that requires many pathways to challenging norms, policies, and structures that work to disempower women in diverse contexts (Cornwall, 2016). Still, providing economic opportunities for women through microfinance, through alternative livelihood trainings and coops, or through livestock ownership, can be one of many steps necessary in improving women's livelihoods and resilience.

Improving women's access to financial capital may also help them to invest in the manufactured tools and inputs used for productive activities necessary to respond to climate shocks as well as to prepare for future crisis events. Such investments may include new types of seed or livestock variety, and new farming equipment. Access to information and communication technologies (ICT) is another sector which has been largely gendered (Gurumurthy, 2004). With rapid developments in technology and internet infrastructure within developing countries in the past twenty years, development institutions have sought to increase outreach through mobile

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devices. These tools can be critical conduits of information sharing with regards to climate information, but also a mechanism for money transfers in households where members are migrating to urban areas for work. Still, economic inequalities make it difficult for many rural women to access, let alone own, mobile phones (Wong, 2012). Where women are able to access and utilise mobile devices to obtain information, this does not ensure that the information will be easily comprehended or utilised if delivered through SMS or text messaging. In developing countries, lack of education opportunities for women compared to men ultimately results in high levels of illiteracy and innumeracy.

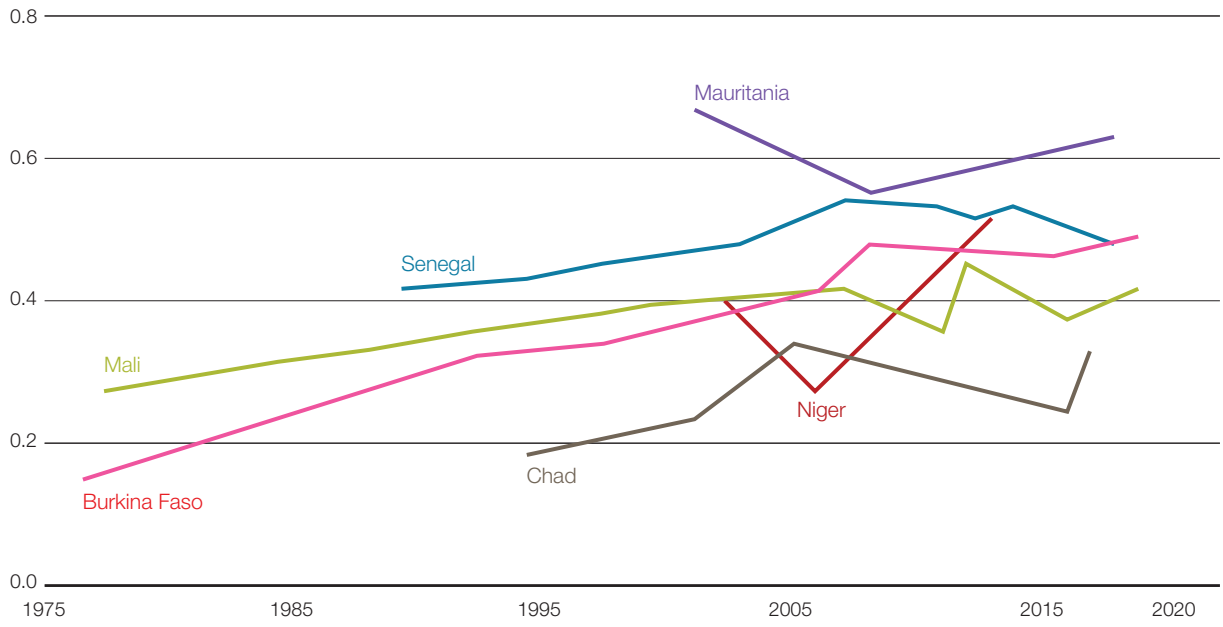
While this does not mean that tools like mobile phones are not useful in building resilience for women, it does mean that development institutions, meteorological offices, and extension officers must address the legacy of gender inequity in their outreach efforts. Instead of using written information, for example, video can be a useful medium for demonstrating or communicating warnings, forecasts, new technologies or agricultural practices. Furthermore, it is critical to understand that the dissemination of that information does not necessarily translate to improved economic outcomes for women and other marginalised populations; there may be more at the root of that income inequality barrier beyond just information access. A randomised study in Niger found, for example, that while providing climate information through mobile phones to women did improve crop variety and production overall, it did not help with sales of that production (Aker and Ksoll, 2016). The authors concluded that more deeply embedded structures of inequality in market systems, including gendered negotiation powers and the access women have to information about market mechanisms, needed to be addressed in a transformative way.

HUMAN CAPITAL

The health, skills, and knowledge that contribute to one's ability to work are also impacted by gender inequality. Because men and women have different roles and responsibilities within the home, they have different types of knowledge. This becomes an issue of gender equity when certain types of knowledge are privileged over others. For example, when climate information is communicated to farmers in a particular language it may be inaccessible to women who are less likely to complete primary levels of education. Exclusion from institutional resources, such as governance institutions and educational institutions, has long lasting impacts on the tools women have at their disposal when climate crises arise.

Despite the many development efforts, women continue to be less likely than their male counterparts to attend school and are more likely to be illiterate and innumerate. This pattern holds true in the Sahel where girl children are significantly less likely to be educated (Bouchama, 2018).

Figure 1
Gender Parity Index for the literacy rate of the population aged 25-64, 1975-2020



Source: UNESCO 2019.

World Bank (2018) data suggests that about 35% in Mali, 30% in Chad, and 22% in Niger of girls aged 15-18 attend primary school. This is below the 53% rate experienced in West and Central Africa more broadly. The gender parity index shows that for every 100 literate men between the ages of 25 and 64, there are 50 literate women in Burkina Faso and 34 in Chad (Figure 1) (UNESCO, 2019).

Women are often left excluded from the system when climate change resources prioritise information diffusion through methods that accomodate men's abilities and needs. Despite this problem of privileging male knowledge systems over female knowledge systems, an emerging literature on women's adaptation strategies, such as the use of new technologies and climate smart agriculture practices and strategies for collective action and information sharing, illuminates the importance of honouring women's knowledge and preferred ways of knowing across diverse contexts as well (McKune et al., 2018; Ravera et al., 2016; Sultana, 2013). Development agencies have begun to incorporate this consideration into their programming initiatives.

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The gender, social instability, and climate change nexus

The ecological changes that have occurred within the Sahel over the last several decades have had marginal to profound effects on social structures and systems within the region. The recent IPCC (2019) report highlighted the risk for increased vulnerability for those countries already struggling with high rates of poverty and political instability. The report states that "average global temperatures that extend beyond 1.5° C are projected to increase poverty and disadvantage in many populations globally… By the mid-to late 21st century, climate change is projected to be a poverty multiplier that makes poor people poorer and increases poverty head count" (IPCC, 2019: 245).

GENDER AND LIVELIHOODS

Agriculture remains one of the predominant livelihood strategies in the Sahel, making the economy within the region vulnerable to climate shocks. At the same time, the Sahel region has struggled with food insecurity and severe issues of malnutrition; the region has among the highest rates of childhood malnutrition and stunting in the world. As of fall 2019, 9.5 million people were facing malnutrition crises across 16 countries in the West African region, a number that was expected to increase in the next year to as high as 14.4 million, with the majority of those at risk coming from the Lake Chad basin area (RPCA, 2019). In Niger and Burkina Faso, 1.5 and 1.2 million people were in need of immediate food assistance respectively.

Extended dry periods have ultimately shortened the growing seasons for those dependent upon agricultural livelihoods. With rainfed agriculture being dominant in Sahel countries, climate variability threatens economic stability within the region. Agricultural activities typically occur within the four-month rainy period between June and September. However, sporadic rainfall as well as delayed onset of rains can hinder the productivity within this limited period. In particular, cereal crops are predicted to be especially vulnerable to climate volatility and production of these cereals is expected to change with climate conditions. Egbibiyi et al. (2019) project a decrease in some cereals like millet, while other crops like maize are projected to have more suitable conditions in the Sahel agroecological zone (located between 12°-20° N latitude).

Box 1
Women pastoralists

Women are critical actors in livestock-based economies. They make up approximately two thirds of the 600 million poor livestock keepers in the world (Kristjanson et al., 2010). As such, it is critical to understand the ways in which this sector of society is experiencing and responding to climate change. Conditions of social vulnerability among women pastoralists in particular, including inequitable access to financial assets and markets as well as lack of representation and political voice, become especially relevant as climate conditions continue to present challenges to pastoral livelihoods.

Pastoralist livelihoods in West Africa tend to be highly gendered in terms of roles and responsibilities. While men are often responsible for managing herds and migration, women tend to be responsible for milking and dairy processing tasks. In some cases, women are involved in the selling of dairy products and they can be involved in decision-making around how that income is spent. Such is the case in Burkina Faso and Niger, where women are often responsible for the processing and marketing of dairy products such as curdled milk, butter, and cheeses (Doka et al., 2014). This income from dairy products are therefore a critical resource that allows women to negotiate as contributors to household income. In some Islamic societies, however, social norms prevent women from attending markets and, in such cases, they are unable to participate in the selling of dairy products (Homewood, 2018). These types of social norms can present barriers to women's financial agency, autonomy, and overall empowerment.

Another predominant livelihood strategy within the Sahel is pastoralism (Box 1). About a quarter of the 100 million people who live in the Sahel rely on pastoralist livelihoods, 70 per cent of which are living in poverty (De Haan et al., 2016). Climate change has made this livelihood strategy difficult, as access to water and foraging resources have greatly reduced with the increase in warming and dry weather. This, coupled with social vulnerabilities including political and social marginalisation, ecological and social systems present challenges for climate adaptation for pastoralists worldwide (McKune and Silva, 2013). Social inequities of poverty and limited access to land assets and ownership can enhance these vulnerabilities to climate variability and make adaptation more difficult, particularly among marginalised groups.

Globally, women are heavily involved in pastoralist and agricultural activities, making up about two-thirds of the world's poor livestock keepers (FAO, 2012). In West Africa, approximately 70% of women's labour is in the food economy, with the majority of that work being off-farm sectors (Pepper, 2019). These off-farm sectors are particularly gendered: women make up 88% of food-away-from-home (e.g., restaurant service), 83% of food processing, and 72% of food marketing labour (Allen et al., 2018). Yet, although women

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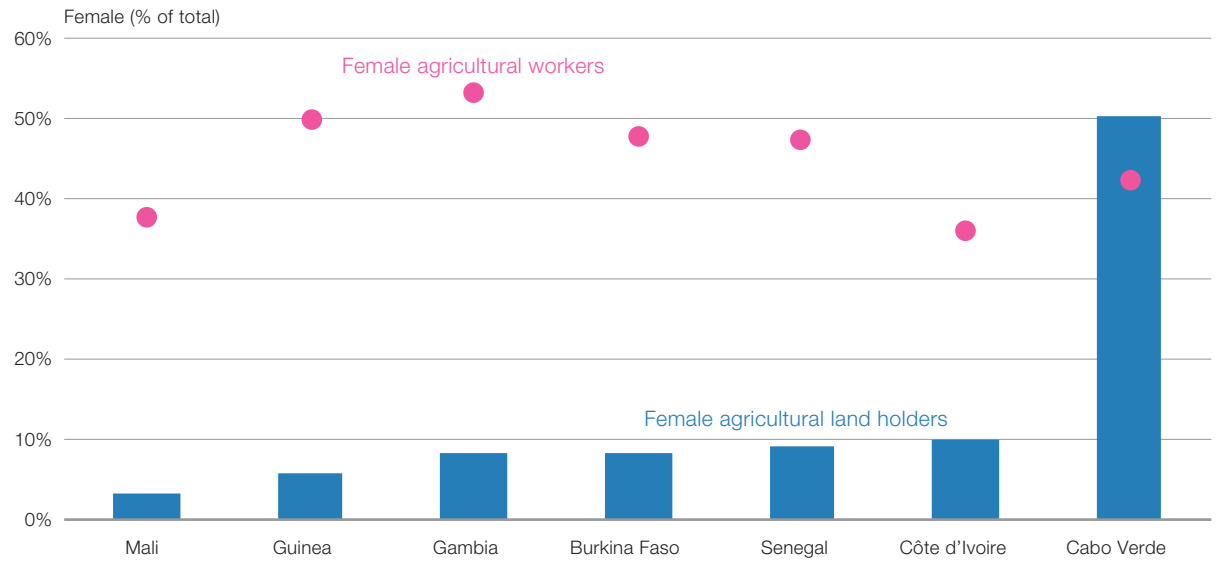
are active in household agricultural and pastoralist activities, their participation in that labour is often overlooked or unaccounted. This is because women's work often takes place in the reproductive economic domain whereas men's work is often accounted for through economic indicators in the 'productive' economic domain (FAO, 2012). This, in the past, has led to the mistaken assumption that women are not the primary target of agricultural and pastoral extension outreach because they may not be as involved in agro-pastoral activities.

This perception is changing, as development and state programmes seek to improve gender equity within their initiatives. The development of the Women's Empowerment in Agriculture Index (WEAI, see Alkire et al., 2013) and the Women's Empowerment in Livestock Index (WELI, see Price et al., 2018) are examples of tools currently being used to identify ways in which women's empowerment can be improved through gender equity in agricultural and pastoralist economic activities. These tools also seek to account for women's productive *and* reproductive contributions to household livelihoods.

Climate variability has meant that agricultural and pastoralist households have had to adapt. In some cases, this means changing crops or primary livestock sources and breeds. In other cases, this has meant diversifying livelihood strategies altogether. Male out-migration is a common adaptive strategy that has allowed households to build livelihoods around alternative sources in urban areas. Still, when this male migration occurs, women tend to maintain subsistence agriculture within the household. With women remaining in the village, many become *de facto* heads of household and are left with the responsibility of ensuring agricultural activities continue (McKune et al., 2015). This requires a change in roles and responsibilities within the household, and may challenge traditional gender roles within the village.

While gender roles inside the household might be strengthened under such circumstances, structures and norms outside the home may continue to exclude women from participation in traditionally male roles and spaces. This means that, while women may be taking on more of the agricultural responsibilities within the household under times of severe climate stress, they may not necessarily connect to the critical resources or information required to respond to a changing climate. Research has found that women were more likely to receive climate information from extension agents within their local networks or information communication technologies, such as mobile phones (McKune et al., 2018). Without the resources and networks to make informed decisions about growing crops in a changing climate, women are less equipped than their male counterparts to adequately plan for a climate resilient future.

Figure 2
Women's share as agricultural landholders and workers



Source: Bouchama et al. 2018.

Although women are working in agriculture and pastoralist livelihoods, it is not necessarily true that they are making decisions about how the household allocates resources or adapts to climate change. Social norms often restrict women's decision-making roles. Even when women are contributing to household incomes, it does not necessarily mean that they are retaining ownership of that income or control over how that income is used.

While some social norms regulating gendered behaviour may shift due to changing needs, this does not mean that there are structures in place to support those changes. These factors include inequities of land tenure policy, infrastructure development, access to markets, and trade policy (UNEP, 2011). For example, women are less likely to own land throughout Africa, but this gender discrepancy is particularly pronounced in Sahelian countries, where only 8% of women own agricultural land (Bouchama et al., 2018, see Figure 2). In another example, because women tend to take responsibility for both productive and reproductive work in the household, there is little time to learn about raising new breeds of livestock.

Ultimately, this means that women usually rely on inherited traditional breeds of livestock with which they are more familiar. This is a problem as these traditional breeds may not be able to withstand the ecological changes that the region is facing. Men tend to have better access to the types of networks, financial capital, time, and informational resources in order to acquire and more successfully raise improved breeds.

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Such inequalities can make it difficult for women to have equitable participation in markets, and thus present obstacles to their accumulation of assets and the building of social networks, all critical to building resilient livelihoods in the context of climate change. If women's roles in agricultural production remain undervalued it can place them at a disadvantageous position in terms of market negotiation and their ability to wield power within the value chain of the economy they are engaged with vis-à-vis men. As OECD/SWAC (2019: 22) argues, "if women play a peripheral role in agricultural value chains, it is difficult for them to realise equal benefits as men because they don't have access to the central positions that generate the most wealth". Such structural factors affects women's ability to respond to climate change effectively.

The combination of social inequities and weak institutional support create conditions by which shocks to the system can threaten the livelihoods of vulnerable populations, including sustained and intermittent environmental shocks brought on by climate change.

GENDER AND MIGRATION

West Africa has a long history of migration, with a large population of pastoralists and traders developing generations of social networks to facilitate mobility within and across borders. However, conditions that once facilitated migration have changed in recent years due to environmental, political, and political instability (De Bruijin et al., 2016).

While it is often suspected that climate change is forcing migration, research has shown that there are many drivers of migratory behaviour (Neumann and Hermans, 2017). The population and regional diversity within the Sahel makes it difficult to point to any single factor that would be driving migration within the region. Still, the Sahel experienced an increase of one million displaced people over the course of 2018 (FAO, 2019a). The primary driver of this displacement is violence, occurring mainly in Nigeria, Mali and Burkina Faso. Conflict within the regions of Gao, Ménaka, Mopti, Segou and Timbuktu within Mali has produced 187 140 internally displaced people, with approximately 10 000 people becoming newly displaced each month (FAO, 2019b).

The displacement of this large population is the leading cause of food insecurity within the region. This violence has disrupted agricultural activity and pastoralist grazing zones alike, making it necessary for households to relocate and putting pressure on the food and nutrition security of the region. In Burkina Faso, rates of displacement have been greatly affected by violence, with nearly 500 000 people displaced since 2018 (FAO, 2019c). Here, too, there is severe pressure on food resources as violence has greatly reduced agricultural productivity; in Burkina Faso, conflict areas have experienced 20-70% decrease in agricultural activity (FAO, 2019c).

Climate change has also affected this displacement. In a region so highly dependent upon agricultural and pastoralist livelihoods, fluctuations and unpredictability of climate conditions makes these livelihoods less viable. In areas that have experienced drought and/or flooding, decreases in crop yields have required that some households adopt alternative livelihoods. This has been true among agro-pastoralist households in Burkina Faso, where climate variability is threatening an economy based largely on rainfed agriculture (Kima et al., 2015). This study showed that largely male household-heads turned to off-farm livelihoods including mining, construction and transportation. Elderly and youth populations were less likely to adopt these alternative livelihoods due to lack of capital and spatial mobility.

Migration is a gendered issue as women and men do not always have equal opportunities for mobility. In some ways, this is directly linked to asset inequalities. Those with modes of transportation or the financial assets to utilise transportation services are better able to migrate. Women often do not have equitable access to these types of resources. Constraints over household responsibilities, including reproductive division of labour means that women often have less mobility options outside of the village. This limits women's options for livelihood adaptation in the context of climate change. Research in Burkina Faso shows that investments in short-term migration to urban or other rural areas is a preferred adaptation strategy by agro-pastoralist households (Deshingkar, 2012), however, women were less likely to migrate over short-term periods (Kima et al., 2015).

GENDER AND POLITICAL INSTABILITY

Political instability has been a growing concern within the Sahel, with compounding and interacting effects of weak state and institutional capacity, militant and terrorist violence, and humanitarian crises (OECD/SWAC, 2020). Studies have shown that while climate change in and of itself is not necessarily a direct driver of increased political and social conflict, it intensifies systemic 'hazards, exposures, and vulnerabilities' that are already evident (IPCC, 2019: 178). Within the Sahel, several social conditions have provided destabilising conditions and in some cases, climate change stands to make these challenges more pronounced.

Because women are often in marginalised positions of political representation, they are especially vulnerable to repression and violence during periods of political instability. In cases such as Chad where political stability has been challenged by armed groups, repression of civil society including women's groups has occurred (Eizenga, 2018). Where repression has been less of a viable political option, there is a growing trend among dominant parties within sub-Saharan Africa to co-opt women's groups to promote more authoritarian political agendas (Donno and Kreft, 2019).

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This co-optation allows for some leniency on women's rights but ultimately works to consolidate power around more authoritarian leaders and diminishes liberal democracy, a trade-off that further disempowers marginalised groups, of which women are certainly a part.

There has been a tendency to conflate climate change as a driving force of conflict, particularly among herder-farming communities. According to these theories of ecological security, scarcity of resources drives populations into competition (Homer-Dixon 1994). A number of studies question the 'materialism' underlying this notion of resource scarcity and competition, noting that issues of ethics, legal precedent, and governance can underlie more superficial symptoms of discordance between groups (Turner 2004, Williams 2016). They argues that it is not climate change that *causes* political instability, but rather the presence of weak governance and instability to begin with which is then exacerbated by the impacts of climate change (Raleigh, 2010). In Mali, for example, a number of factors including increased agricultural-herder competition for land, increasingly disorganised state power within the region of violence, and government corruption are driving these conflicts (Benjaminsen et al., 2012).

There is some evidence that women, at least in some contexts, may respond to scarcity differently than a more Malthusian economic theory may expect them to behave. While resource scarcity may increase the likelihood of competition, some research has shown that women may respond in a different way. Gendered experiences of social exclusion and marginalisation create situations in which women are more likely to cooperate, rather than compete, when presented with conditions of scarcity (Patt et al., 2009). While this cannot be generalised to all women's experiences, it can be said that because women are often restricted to operate outside formal institutions due to access barriers, many women are conditioned to cooperation rather than competition in order to achieve their goals.

Towards a gender transformative approach

Climate change is not only an ecologically destabilising phenomenon, it is also potentially socially destabilising. This destabilisation can be felt at the macro and micro levels.

RESILIENCE THROUGH TRANSFORMATION

Where states experience structural and systemic weakness, economic uncertainty, or significant demographic change, climate change can intensify the pressures associated with these risks (Seter et al., 2018). Where states can identify systemic areas and populations of vulnerability, they may be in a position to intervene and provide necessary support in case of severe climate events. However, broader and deeply entrenched structural weaknesses, such as fragile state capacity, require more transformative change in order to remedy the roots of unrest that may be exacerbated by the effects of climate change.

More recently, discussions among scholars and practitioners have shifted from addressing climate vulnerability through mitigation and adaptation and instead have adopted an approach towards resilience (Pelling et al., 2015; McOmber et al., 2019). Mitigation is the process by which societies decrease their negative environmental impacts, for example, through reforestation initiatives or carbon reduction policies. Adaptation refers to the process by which societies change their ways of living as necessary in order to accommodate climatic changes. Finally, resilience refers to the process by which societies not only adapt to climate changes but also are able to prepare to respond to future climate events.

The approach adopts a more sustainable intervention to social change that will equip vulnerable populations with the resources to respond to severe climate events over time. The argument is that adaptation interventions provide a reactive response to climate shocks that can reinforce the status quo of power hierarchies, which allow marginalised populations to remain in a cycle of vulnerability to climate change. Resilience, on the other hand, requires a social transformation that provides a proactive response to such crises by addressing the underlying inequalities that shape social vulnerability (Pelling and Manuel-Navarette, 2011).

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A resilient livelihoods approach requires structural transformation to promote equity among at risk populations. For example, populations vulnerable to climate shocks may not have equal access to the types of climate services and investment resources that socially privileged groups may have. This presents severe obstacles to responding to a particular climate event, recovering from that event, and preparing for what may come in the future. Those with limited access to resources may experience compounding inequalities as poverty gaps may deepen, or access to state and institutional resources may be more difficult to attain.

In such cases, providing economic assistance in response to crop failure due to drought, for example, can help those in need to respond to a single climate event at hand. Providing long-term and sustained support, however, through climate smart agriculture training, diffusion of climate information, and resources like insurance for famers can help to prepare the most vulnerable farmers for future climate events. This can be achieved by increasing social and institutional support systems and challenging structures and norms that had previously excluded them from equitable access to climate services.

A GENDERED APPROACH TO RESILIENCE-BUILDING

Development institutions and policymakers alike have turned their focus to improving gender equity as a central intervention point towards building climate resilience in the Sahel. Drawing from the ideas about resilience presented above, a gendered approach to resilience building focuses on the underlying structural inequalities that make women more vulnerable to climate crises. This is because social inequities have long barred women's access to adaptive resources that could help them to prepare for severe climate events. These obstacles to access and utilisation of climate resilience resources can be physical, economic, or cognitive.

Because deeply embedded structural and normative codes of exclusion shape gender inequalities, development institutions are beginning to adopt an approach called gender transformation (Cole et al., 2015). The goal of this approach is to implement policy that does not merely treat the symptom of gender inequality but instead focuses on challenging those structures that reinforce exclusion at their root. For example, a gender transformative approach would not merely seek to improve women's literacy rates, but seek to remedy inequalities by challenging the underlying reasons girl children are not attending school to begin with, such as school fees, needed labour in the household, or norms restricting female mobility.

In Senegal and Mali, it was found that education was an important driver in decisions to migrate as an alternative livelihood in the wake of climate crises; those who had more education had more options for alternative

livelihood adaptations (van der Land and Hummel, 2013). In both countries, men and boys were overwhelmingly more likely to be educated than women. The implication of this is that structural barriers to female education also present obstacles to women's abilities to change their livelihoods away from those built around natural resources at the time of increasingly unstable climate. A gender transformative approach would identify education equity as an important entry point for development interventions, allowing more equitable access to climate resilient livelihoods for men *and* women. A more thorough gender transformative approach would identify those other structural and normative barriers preventing women's migration, be it childcare responsibilities, restrictions of gendered space on public transportation, lack of access to social networks outside the village, and work to challenge those systems of inequality.

The sections below detail two projects that have sought to implement a gender approaches to climate resilience and adaptation in the Sahel. It reveals important lessons on the processes of transformation within climate services programming.

THE CLIMATE CHANGE, AGRICULTURE AND FOOD SECURITY (CCAFS) PROJECT

The CCAFS project led by CGIAR Centers, Research Programs and Platforms worked in rural agricultural communities in Senegal in order to understand and improve gendered access to climate information and transferring that information into use so that households and communities could be better prepared for environmental shocks and climate crises. While the projects did not initially apply a gender transformative approach, they were always concerned with improving gender equity within project implementation and activities. Gender transformative approaches were later adopted, explored, and implemented in some project activities outside of the preview of the two cases explored below. Still, the findings identified in these two Senegal case studies illustrate entry points for gender transformative approaches within the delivery of climate information services.

First, while men and women communicated different needs and support for climate information concerning climate smart agriculture, it was overwhelmingly men who decided how resources were allocated and what agricultural practices the household would adopt. For example, in the community of Malem Thierign, women explained that they needed more information and support around improved storage strategies. Women expressed this concern because they were responsible for allocating and preparing food for the household and were therefore more aware of issues around food storage. Men, who are often responsible for cash crops which do not require storage but instead go directly to the market for sale, did not prioritise improved storage as an information need. Because men were

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responsible for making household decisions, this need was therefore not necessarily addressed or acknowledged (McKune et al., 2018).

An earlier review of gendered access and use of climate information services was conducted in 2013 in Kaffrine, Senegal. Here, women tended to rely on a 'chatterbox' system of information sharing (Tall et al., 2014). In this system, one woman trained in using and understanding climate information messaging would receive an update from extension services or the meteorological office. This message might detail updated information about the weather and planting schedules, or simply suggestions about climate smart agriculture practices. The woman would then wait outside the fields where women would gather to work each day and share this information with those who passed.

This strategy for information sharing built on systems of communication that women generally used in other contexts. The women trusted the source of the information, a woman in their community who was trained to share with others. They also felt more comfortable sharing information through a dialogue process that was multidirectional, rather than just one-way communication as a text-message might be. Women could ask questions to each other and seek clarification if a piece of information seemed confusing or unclear. Finally, this approach ensured that communication was translated into a local language that women farmers in the community used. Because it was communicated orally, those who were illiterate were not excluded from receiving the information.

Key to gender transformation, then, is listening to and responding to the needs of the local context. Promoting equity in this case was dependent upon the recognition that women and men access information differently. Therefore, women's knowledge systems and preferences for communication needed to be considered when constructing a system of information sharing that would be helpful and ultimately adopted by women farmers in the region.

THE BUILDING RESILIENCE AND ADAPTATION TO CLIMATE EXTREMES AND DISASTERS (BRACED) PROJECT

The BRACED project funded by DFID also worked to improve resilience through climate information services. This project took place, in part, in Burkina Faso between 2015-17. From the beginning, gender transformation was a key goal of the project as a strategy for improving gender equity within resilience initiatives. However, mechanisms within the project itself did not serve these goals very well. One of the first challenges was that within the development project itself, cooperating stakeholders did not have a strong understanding of what a gender transformative approach was or how it should be implemented. Therefore, effectively addressing structural change was not adequately prioritised uniformly from the beginning of the project.

Secondly, it was not until much later in the project that opportunities for sharing and learning about gender transformative approaches and their relevance to the project goals and approaches that progress was made on this front. Practitioners were able to collaborate across institutional boundaries to redefine what transformation looked like in Burkina Faso, with small local institutions informing state and international level institutions about local norms, customs, and practices that may hinder efforts towards gender equity. The project showed that, from a practitioner approach, development programming of gender transformative approaches to promote gender equity within climate resilience initiatives was necessarily an iterative process (McOmber et al., 2019).

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Policy recommendations

Climate resilience requires a transformation of structures that inhibit adaptation, and centrally important in this process is gender transformation. Understanding how social vulnerability and marginalisation can shape resilience outcomes is critical to the implementation of development interventions with a specific focus on gender. Lessons from the case studies above illustrate the following in order to be successful:

1. Women and men have different experiences with climate change and this has implications for resilience-building needs. While men and women may both require the same information, it may be necessary that this information is transmitted differently to different audiences depending on educational and cognitive abilities, language abilities, as well as access to technology, all of which are greatly shaped by gendered barriers around equitable access to education and tools. Awareness of these differences is deeply dependent upon contextual awareness. Understanding the structural and normative barriers to women's equitable access to resources is the first step in challenging and transforming systems of inequity. Therefore, from a policy perspective, while it is possible to scale processes of investigation about women's needs and interests in climate resilience programming, those needs and interests may not travel across cultures and regions.

2. Understanding and valuing different knowledge systems matters. Understanding how Sahelians perceive the risk of climate change and the associated problems and solutions is critical to ensuring that women and men are both full participants in the development project and implementation. Considering social inequity within this process is critical to ensuring that climate information remains relevant and usable for men and women. Development initiatives should also take into account the fact that knowledge systems are informed by factors such as access to education, communication tools, and social relationships, which themselves may not be equitably shared between genders. This may mean that several outreach strategies are necessary in order to include the most vulnerable stakeholders within a community.

3. The BRACED case study exemplifies the need for flexibility in programming and Monitoring & Evaluation (M&E) procedures as essential to responding to transforming structures. Many forms of gender exclusion are the result of a legacy of patriarchal norms shaped by a number of factors including religion, culture, institutions, and historical legacies

of colonialism. These practices and beliefs, in some cases, have existed for generations and are not easily changed. It is essential that development processes are responsive to the changing needs of the community as they themselves 'transform' through this process of structural change. Ultimately, transformation is a social learning process where communities and development institutions must learn about the roots of oppression, acceptance of change, and pathways for achieving it. Development programming that accounts for processes of reflexivity and iterative processes of learning, while acknowledging that transformational 'progress' may not always be a linear trajectory, will be better equipped to support this type of systemic change and build resilience through gender equity. This requires setting flexible goals and benchmarks within M&E processes, as well as longer timelines for observable change — which may take generations to ultimately achieve.

Finally, the recent COP25 decision on gender and climate change prioritises the incorporation of local knowledge into its Gender Action Plan for the Lima Work Programme on Gender. The section D.3 of the United Nations Framework Convention on Climate Change (UNFCCC) Gender Action Plan stresses the need to integrate "gender-responsive budgeting into climate finance" (UNFCCC, 2016: 6). Such programs present an opportunity to incorporate social learning processes, flexibility, and transformation into its climate change action efforts. These approaches, if mainstreamed, can help development institutions to be more responsive to the norms and the gender inequities hindering women's abilities to build resilient livelihoods in the context of a changing climate.

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West African Papers

Women and climate change in the Sahel

The purpose of this paper is to explore the gendered impacts of climate change in the Sahel. In particular, it explores the ways in which gender inequality is a critical factor in understanding vulnerability and resilience efforts concerning climate change. It shows that the current climate crisis is affecting livelihoods throughout the Sahel in pronounced ways. In a region highly dependent upon subsistence agriculture and pastoralist livelihoods, climate variability and environmental degradation have made such livelihoods difficult to sustain, the effects of which have broad ranging impacts on social and economic systems. Consequently, migration, livelihood adaptation, social unrest, and political instability emerge from the ecological challenges the Sahel is facing. Those with the resources to respond to and prepare for future climate events will be better equipped to navigate the climate crisis. Unfortunately, those resources are rarely equally distributed at the household, community, and state levels. In particular, gender inequalities within the Sahel pose a very real challenge for adaptation and resilience strategies as states and global institutions make interventions to support at risk populations. The paper then explores what development and state institutions are doing to resolve gender inequity through climate resilience policy, and where these efforts are falling short. The paper concludes with some strategies to improve opportunities for gender equity and climate resilience based on field research within the Sahel.

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