SOCIOLOGY | REVIEW ARTICLE

A review of gender inclusivity in agriculture and natural resources management under the changing climate in sub-Saharan Africa

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Abstract: This paper aims to review the status of gender inclusivity in agriculture and natural resources management in sub-Saharan Africa under the changing climate. Gender inclusivity is a critical dimension in mitigating and adapting to the impacts of the changing climate since climate change is not gender-neutral. It has been widely documented that gender-differentiated roles, knowledge and preferences among various gender groups differ. Therefore, harnessing the differences in response to the changing climate is pivotal in mitigating and adapting to the adverse impacts. However, gender inclusivity in agriculture and natural resources management in the region has not been reviewed. The paper, consequently, reviews and provides useful insights on the status among smallholder farmers and informs future efforts aimed at harnessing gender inclusivity in the face of climate change. It serves as an informative and reliable reference for developing effectual mitigation and adaptation strategies in agriculture and natural resource management.

Subjects: Anthropology - Soc Sci; Gender Studies - Soc Sci; Sociology & Social Policy

Keywords: Gender; inclusivity; climate; agriculture; sub-Saharan Africa

ABOUT THE AUTHOR

The authors of the article are members of the Agriculture Climate Innovation Work Group under the One Planet Fellowship Program (OPFP), from the 2019 inaugural cohort of OPFP Laureate Candidates-Climate Change. The group was constituted during the Science Week organized by the OPFP and that was held in Casablanca, Morocco from November 25 to 1 December 2019. The article contributes to the broader Climate Change Mitigation and Adaptation Agenda advanced by the OPFP through the African Women in Agricultural Research and Development (AWARD). The article explores the gender inclusivity dimension in climate change mitigation and adaptation to show the need to mobilize and leverage diversity within communities for the enhancement of their adaptive capacity. It functions as an educational and dependable reference for building efficient plans for improving the ability of communities to handle the adverse effects of climate change in farming.

PUBLIC INTEREST STATEMENT

The article provides insights about the current state of the level of participation by women, men, the youth and elderly in farming and stewardship of provisions from nature in sub-Saharan Africa under the changing climate. Reports mention that different gender and age groups have specific roles, different perceptions and inclinations. So, utilizing the differences in response to the changing climate is crucial in moderating and improving the ability of communities to deal with the adverse effects of climate change. Yet, the current state of their level of participation in the region has not been appraised. The article, therefore, examines and provides useful insights on the state among smallholder farmers in the region and enlightens upcoming efforts aimed at utilizing the differences. It functions as an educational and dependable reference for building plans for improving the capacity of communities to handle the adverse effects of climate change.
1. Introduction

Under the changing climate, agriculture and natural resources management is central in mitigating and adapting to the adverse impacts of climate change. It is critical therefore to include or harness knowledge, skills and capabilities of different gender groups within societies to manage effectively natural resources and responsibly engage in agricultural production activities. Gender has been defined as “the arrangement of roles, responsibilities, and relations between men and women of different social groups, ages, educational and marital status. Both perceptions of risks and actual vulnerabilities are shaped by these roles, responsibilities, and relations, and hence may vary across place, time and social position/location” (Rao et al., 2019). Men’s duties in agricultural operations are regarded to be directed and unambiguous in most countries (Belay & Jimma, 2016). Women’s contribution in agriculture, on the other hand, is underappreciated (Belay & Jimma, 2016). Consequentially, a precise image of women’s agricultural engagement and inclusivity, especially in sub-Saharan Africa (SSA) under the changing climate is required (Belay & Jimma, 2016). In the 21st century, climate change has become a reality influencing every part of the world from North to South. Climate change has overly increased the vulnerability of the poorest and the most marginalized segments of society (Habtezion, 2016). Vulnerability with regard to climate change is “the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity” (IPCC, 2007). Poverty, social, legal and socio-economic marginalization of women are the core of gender-based vulnerabilities (Habtezion, 2016). The division of labor in Africa results in allocating agricultural and informal activities to women, men, boys and girls (IFAD, 2016; Mutumne, 2005). Female labor force participation percentages in for example, range from less than 40% in Ethiopia, Kenya, Malawi, and Uganda to more than 80% in Burkina Faso, Burundi, The Gambia, Ghana, Guinea, and Sierra Leone (World Bank, 2007). Women’s traditional engagement in subsistence agriculture and production for sale may explain the high female participation rates in some African nations when compared to other areas of the world (World Bank, 2007).

Women are powerful agents of change and continue to make increasing and significant contributions to sustainable development, despite existing structural and socio-cultural barriers (Markham, 2013). They make substantial contributions to livelihoods, family welfare, natural resource management, biodiversity conservation, health and food security, which are all important assets that policymakers should draw upon to inform climate change responses (Habtezion, 2016).

Climate change is not gender neutral since it does not affect men and women in the same way, principally owing to their gender-differentiated relative powers, roles, and responsibilities at the household and community levels (UNDP, 2016). Usually, women are weighed down with household chores and looking after children, the sick and the elderly. Moreover, cultural and religious customs on respective gender roles at times constrain women’s aptitude to effect swift decisions in times of disaster and, in certain instances, their dressing and the responsibility of looking after children could hinder their movement during crisis situations (Wong, 2016). Differences in economic opportunities and access to productive resources also leave women more exposed to climate change because usually they are poorer, less educated, and are excluded in political, community and household decision-making processes that have a direct bearing on their lives. Women often have not many possessions and rely more on natural resources for their means of support (Mearns and Norton, 2010). The law in most countries favors the disparity (World Bank, FAO and IFAD, 2015). For instance, women do not for all time have the equal rights as men to land, a vital resource for poverty reduction, food security and rural development despite the fact that women comprise more than 40% of the total agricultural labor force in developing countries (FAO, 2011). Effectually, therefore, poverty, alongside socio-economic and political marginalization, place women in a perilous position in terms of coping with the unfavorable impacts of climate change.
Agriculture is the main source of livelihood on the continent with more than half of the workforce engaged across the value chain. Meanwhile, the sector is the most vulnerable to climate change as climate plays a great role in biophysical and the socio-economic environments of SSA (Parker et al., 2019). Gender predefined roles in rural and urban areas along with sociocultural constraints make children, women and young people especially vulnerable to the changing climate (Terry, 2009). To effectively respond to the impacts of climate change in agriculture there is need therefore to design interventions that address the needs of the respective gender groups. We, consequently, in relation to gender inclusivity, explore land ownership and gender differences in the impacts of climate change in agriculture, gender differences in accessing weather and climate information to inform decision making and gender differentials in sub-Saharan Africa’s crop production. In addition, we explore the gender dimension in the mitigation and adaptation to climate change in crop production, in livestock production under the changing climate and in the current status of gender inclusivity in forestry and natural resources management. Finally, we discussed the potential impacts of gender inclusivity in forestry and natural resources management, the socio-economic implications of gender inclusivity in agriculture under the changing climate and some initiatives and policy development efforts promoting gender inclusivity on continental and/or regional scales. The aim is to benchmark the status of gender inclusivity in SSA through the review of a body of literature focusing on the same under smallholder farming systems. The paper, hence, serves as an informative and reliable reference for developing effectual climate change mitigation and adaptation strategies in agriculture and natural resource management.

2. Literature review
African women have a vital role in agriculture. They account for up to 52% of the people in the sector and roughly 50% of farming labor on farms in SSA (Njove & Kaaria). According to reports, women devote around 60% of their time on farming activities in various African nations, while above 60% of salaried women in SSA are employed in agriculture (Brenton et al., 2011). In addition, African women in the region from some countries contribute from 60% to 80% of the continent’s food. Nonetheless, while being a well-known issue, women face the greatest challenges in accessing productive resources (Njove & Kaaria). Low production and yields are two of the continent’s most pressing agricultural challenges. It is on record by the FAO that women’s restricted access to production means and incapability to leverage prospects in agriculture is to blame for the sector’s poor performance in developing nations (Njove & Kaaria). Restricted access in this respect, is faced more exceedingly by women than the men, indicating a strong “gender gap”. As a result, the continent’s production is harmed, and women’s fair and profitable involvement in intra-African agrarian commerce, regional, and international agricultural value chains is hampered (Njove & Kaaria).

Despite their distinctive role in productive, generative, and communal management actions, women continue to have a minor representation in of decision-making positions in many public and commercial establishments, plus with those managing the environment. In a 2006 survey on gender mainstreaming done across 17 Ministries of Environment in various developing nations, it was discovered that women compose up to 41% of the ministry’s personnel, but just 27% were in management roles (UNDESA, 2010). Whereas the gender hurdle is complicated, part of the reason for women’s poor involvement is their restricted access to formal education (UNDESA, 2010). Women accounted for only 27% of environmental science college graduates in Nigeria in 2005, and 25% of students joined the advanced diploma and certificate programs at the Kenya Water Institute between 2000 and 2004 (UNDESA, 2010).

Their participation in the climate effort both at the global and national levels is also very limited (Dankelman, 2010). Climate change can thwart progress towards gender equality by exacerbating poverty, reinforcing traditional patterns of discrimination, and directly disturbing gender-defined livelihoods. Their involvement in the global and national efforts to combat climate change is also quite restricted (Dankelman, 2010). Climate change can stymie advancement concerning gender
equality by aggravating poverty, fortifying discriminatory tendencies, and disturbing gender-defined means of support directly. Gender disparity, on the other hand, can thwart the efficiency of climate change actions (UNDP, 2007, 2011b). Gender inclusion in development policies and programs can help to mitigate these consequences.

2.1. Theoretical background
The article uses inclusivity as a theoretical anchor. Inclusivity is defined as “the fact or policy of not excluding members or participants on the grounds of gender, race, class, sexuality, disability” (Collins, 2021). Inclusivity is about the degree to which procedures tackle the issues and reservations of the deprived and disregarded in societies, plus the degree to which these groups benefit from involvement, either directly or indirectly through their presence in structures, marketplaces, or assistance channels from which formerly they were barred (Altenburg, 2009; George & Prabhu, 2012). The goal is to give those who have never had the opportunity to participate in processes affecting their livelihoods the capacity to do so in order to encourage shared action and decision-making (Cornwall, 2016; Kabeer, 2016). The paper therefore labors to apprise the status of gender inclusivity in SSA under a changing climate in agriculture in order to inform and guide practitioners in the design of interventions in the region aimed at capacitating communities to adapt to the adverse impacts of climate change.

3. Methodology
This review utilized literature review approach as a research method in reviewing gender inclusivity in agriculture and natural resources management under the changing climate in sub-Saharan Africa. It is widely known and accepted fact that integrating a range of research findings through a review has the potential to synthesize research challenges with a power that no single study has. The review was cognizant of the fact most traditional approaches do not exhibit thoroughness and rigor that have in most cases led to low quality of such reviews. Modern review methodologies comprise systematic, semi-systematic, and integrative reviews.

Guidelines for undertaking this review was informed by previous studies on modern literature reviews, for instance, integrative reviews (e.g., Torraco, 2005), systematic reviews (e.g., Liberati et al., 2009, ; Moher et al., 2009)

This study utilized integrative approach that involves critical reviews and ensures combination of gender inclusivity aspects with the intention of creating new theoretical models. The objective is to critique, assess, and synthesize available literature on gender inclusivity aspects in a manner that permits new hypothetical contexts and viewpoints to emerge (Torraco, 2005). In integrative review, the main aim is to combine views and insights from a range of fields or research perspectives and not to exhaust all published articles. The methodology involved four steps as follows:

Step 1: design; the following questions were addressed: “Who are the audience? What are the research question; what is its significance? What is the most appropriate review method? What is the exploration strategy?” (Databases, inclusion and exclusion criteria, search terms, etc.)

Step 2: conduct; the following questions were addressed: “How effective is the search plan established in step 1? How should article selection be undertaken? How will it be documented? How will the quality be assessed?”

Step 3: analysis; the following questions were addressed: What information is required? How will the quality of review be guaranteed? How should it be documented?

Step 4: organizing and writing; the following questions were addressed: “What is the strategy of communicating the necessity and inspiration of this review? What are the information to be included? Is the review adequate for audience to judge its quality transparently? Are the results presented and interpreted in a clear and understandable manner? Is the review’s contribution clearly communicated?
3.1. Study identification
To retrieve relevant articles and publications related to gender inclusivity in agriculture, a systematic search was performed on Google search engine, Google Scholar, Scopus and Web of sciences databases using several predefined keywords. The keywords used were: “gender”, “agriculture”, “and climate change”, “sub-Saharan Africa”, “livestock”, “forestry”, “natural resources”, “socio-economic” and “agricultural policy”. These keywords were combined in various combinations of 2 to 5 as search queries in the previously mentioned search engines and databases. The search was performed in January 2020. A total of 1247 articles and research papers were retrieved.

3.2. Selection, inclusion and exclusion
To be included in the review, the research papers had to fulfill the following criteria: (1) the study discussed explicitly of the gender issues in agriculture, climate change and/or the management of natural resources; (2) the study highlighted extensively the implication or perspectives gender related issues in agriculture; (3) the study was published in an English-language and the document is easily accessible. In most of the retrieved research papers, the discussions were not explicitly oriented on the gender inclusivity in agriculture. Hence, 789 irrelevant papers and articles and 17 books were excluded based on the direct link between their titles and gender issues in agriculture and climate change. At this stage, a total of 441 research papers including peer-reviewed articles, conferences papers, and reviews, reports of international organizations such as the World Bank, African Union and African Bank of Development among others were retained for further analysis. Subsequently, 263 research papers were excluded after reading their abstract and 12 were dropped after reading the full articles. A total of 166 research papers were finally retained and included in the systematic review. Subsequently, various types of information were extracted from them. The intent was to highlight the current status of gender inclusivity in agriculture and to bring out substantial information to support our analysis and discussion.

4. Results

4.1. Land ownership and gender differences in the impacts of climate change in agriculture
Land is the basic factor of production in agriculture. It is important to note that in Africa, the land is mostly owned by men thereby rendering women to have little or no access, control and ownership, yet they are the ones who toil in the family farms (Alkire et al., 2013). Generally, in Africa 10% of the land among households is owned by women compared to 16–23% among men (Deere & Doss, 2006) while in Kenya, only 5% of registered landowners are women (Agarwal, 2011). Other corroborations from an FAO survey in 20 countries indicate that generally male headed households control larger farms than households headed by women (Agarwal, 2011). Most of these few women landowners don’t have the legal documents for the same, hence it limits them in making long-term decisions about land use including long-term agricultural activities like forestry and cultivation of permanent crops like tea and coffee (Slavchevska et al., 2020). Since a woman is married into a family, it is less likely for her to own land or even control how it is used. Environmental and land degradation as a result of climate variability coupled with the failure to incorporate climate information in planning increases the workload of the already burdened women as the scarce arable land diminishes further (Mandelsohn & Dinar, 1999).

Several studies showed that in general in SSA it is difficult for women to become landowners or cannot generally own or become heir to family land (Doss et al., 2012; Perez et al., 2015). Land tenure systems in the region encumbrance women with heavy repression that relegates their effort to adapt to climate change into oblivion. Mali, for instance, is a country where half of the population engaged in agriculture is female. The lack of access to land discourages women from investing in crop production (WFP, 2016). Traditionally, women cannot own land in Mali. They can cultivate or use land temporarily, but land can be taken back from them at any time (WFP, 2016). It is usually at the discretion of the household head to decide which ones they will be allotted in each production cycle, which adds a level of uncertainty to their long term
cropping planning (WFP, 2016). Besides, women’s access to credit is adversely affected by their ability to secure land tenure, which is often used as collateral (Antwi et al., 2015; Fleitschner & Kenney, 2014). Additionally, women also work as unpaid family laborers and have limited access to capital. Largely in SSA, the likelihood of women to have the know-how and finances required for the enhancement of farming is low (Beuchelt, 2013; Ragasa, 2012). This reduces their roles in decision-making regarding farm management in the face of the changing climate (Falk & Bessonova, 2018).

Since land is mainly held by men in many communities in this region and Africa at large, generally, women tend to find refuge in ownership of small stock like chickens and goats. However, malnutrition in livestock as a result of poor pastures and lack of water leads to low productivity in this sub-sector thus further pushing women into poverty as compared to men, who may have much more access and control to land and even the livestock, coupled with other economic activities that depend less on climate. Furthermore, the impacts of climate change are worse in arid areas where most women depend on subsistence farming and keeping livestock yet they have the least access to climate information (Cherotich et al., 2012). Flooding and more recently locust invasion rob these farmers of their livestock more often than not as it was widely reported in many dry areas of Kenya, Somalia, Ethiopia and Uganda (FEWS NET, 2019; ICRC, 2020). Incidences of both crop and animal pests further disenfranchise women since they have little access to financial resources to procure the relevant pest control drugs as compared to their male counterparts (Sheahan & Barrett, 2017). This is compounded by the fact that women use their money to fend for their families as opposed to men who will have much more disposable income to enable them better mitigate the effects of weather and climate variability in agriculture (AfDB, 2016). Generally, in SSA, women-run farms use fewer inputs than male-run farms due to financial inequality between men and women (Mukasa & Salami, 2015). This means that women will have less produce from their farms and almost nothing in the event of adverse weather patterns. The recent development in biotechnology has led to the introduction of climate-resilient and high producing varieties of seeds but these too require high investment. For example, the Kenyan Government has allowed the cultivation of biotechnology cotton variety to improve yields even in poor weather (Crop Biotech, 2019). However, many poor cotton farmers, mostly women, cannot afford this seed variety. This ultimately pushes women in agriculture to the brink. Crop and livestock insurance uptake are still minimal in this region and the majority of policyholders are male farmers due to income inequalities (Njue et al., 2018). In recent years there have been high incidences of heavy rainfall during the harvesting period (Serdczny et al., 2017) resulting in post-harvest losses. Men generally have better storage facilities compared to women including traditional grain stores. Cases have been reported of men running away from home during drought to avoid responsibilities of feeding children thus leaving women with this difficult task in the family (Stapleton et al., 2017). The drought that has been recorded in large swathes of Eastern and Southern Africa (Carty, 2017), has forced women to walk for long distances in search of pastures and water for their animals and their domestic use. Flood incidences tend to increase malaria prevalence and other water-borne diseases especially amongst children and women who are the primary caregivers. Timely weather and climate information can reduce the negative shocks that come as a result of changes in weather patterns (Amegnaglo et al., 2017). Some African societies such as in most places in Senegal and larger parts of West Africa have household food hierarchies where males rank higher than females thus in the event of poor agricultural productivity, women are most likely to miss out on proper nutrition thus making them vulnerable to hunger and diseases (Blaikie et al., 1994). On a positive front, increased rainfall even in normally dry months means availability of water and thus women in generally dry areas in SSA have an easy time as far as looking for water for their livestock and domestic use. More importantly, smallholder farmers can use post-flood waters for irrigation if the water is well harvested thus bettering their farming (Mulenga & Ngoma, 2015).
4.2. Gender differences in accessing weather and climate information to inform decision making

In many cultures in most of Africa, men access information more easily than women and other marginalized groups and this also applies to weather and climate information services (Nyasimí et al., 2018). This is due to their higher level of natural capital, education, mobility and ownership of assets including mobile phones, radio, and TV sets and the ability to purchase daily newspapers (Maulidi & Kasiya, 2019). This means that men are the ones better equipped and who eventually plan sectoral affairs including that of agriculture, energy production, water resource management, environmental conservation, etc. In cases where weather and climate information is delivered in complex terminologies, few women and ethnic minorities will understand due to their low levels of education compared to men. This in turn impacts proper decision making (FAO, 2011). Therefore, weather and climate information should be simplified to be understood by all. According to Ziervogel and Opere (2010), both men and women request direct forecast products such as rainfall totals, onset, cessation, distribution within the season, etc. This is also confirmed by a study by Klemm and McPherson (2017) and this kind of direct information forms a major basis for decision making in climate planning for both men and women, for instance, in determining a productive season and making a seasonal plan and calendar of events. Therefore, for all weather and climate information end-users, the information must be straight forward and tailored to meet their needs. Since the SSA region depends highly on rain-fed agriculture (Serdeczny et al., 2017) and crops are highly sensitive to varying temperatures, it is important to incorporate all stakeholders in the climate planning process since the viability of the entire agriculture sector is at risk without a proper, all-inclusive, and participatory decision making. According to FAO, only about 3.7% of arable land in East Africa is under irrigation thus information on rainfall and temperature events should reach all the stakeholders and particularly the rural women. Most men and residents of well-off regions have a higher ability to respond to adverse effects of weather and climate variability and research show that men who practice these adaptation strategies have higher access to information on weather and climate thus more suited to act accordingly (Zongo et al., 2015). Those who frequently get more climate and weather information respond more to the impact of climate change (Smit & Skinner, 2002). Another point to note is that in many regions of Africa, area of residence, ethnicity and cultural beliefs affect greatly the way communities use weather and climate information (Atchoka et al., 2017). For communities living in most marginalized and generally dry areas, people are less confident in weather and climate information. Superstitions and perceptions override scientific information and thus these communities are less likely to use the climate information appropriately even if they have the ability.

4.3. Gender differentials in sub-Saharan Africa's crop production

Exposure to climatic shocks in agriculture largely is contingent on the availability of productive land, farming systems, access to agricultural inputs and implements. As climate change brings with it increased extreme weather events amongst other effects, one of the pressing issues for Africa’s farmers will be how to address these challenges. It is worthwhile to note that men and women farmers are responding to the pressures differently. In most SSA countries, women are more vulnerable to the impact of climate change than men because of their locally defined roles as wives and mothers, while they have limited access to natural resources like arable land and little voice in decision making (Djoudi & Brockhaus, 2011; Omari, 2011). Hence, men and women have different adaptive strategies and spatial perceptions that reflect their activities, social positions, and differential access to and control over resources (Meinzen-Dick et al., 2014). Choices in farming among women and men largely are a function of their capacity to secure and utilize farming resources to meet their needs. For example, Beninese women opted for maize and rice to satisfy food consumption, whereas men chose cotton for which they receive government subsidies (Toulmin & Guéye, 2003). In Ghana, a study revealed the heavy inclination of men to produce crops for the market (Doss, 2002), hence production is vulnerable to market pricing forces. On the other hand, women are highly engaged in the production and marketing of all principle crops (Doss, 2002), thus potentially are well cushioned against both climate variability and market pricing forces. Globally, more often than not the availability agricultural resources, inputs, finances, and
credit facilities to women is limited compared to men (Fletschner & Kenney, 2014), resulting in women’s exacerbated susceptibility to impacts of climate change (Glazebrook, 2011; Peterman et al., 2014). This is compounded further by irrigation water deficits during a drought that limits options for adaptation. Similar findings have also been observed in Ethiopia. Gender differentials in the use of pesticides and fertilizers are particularly large in Ethiopia (Ragasa et al., 2012), explaining the agricultural productivity gap. Productivity gaps exist in Africa in favor of male-headed households (Kiliç et al., 2015). Women are especially constrained by their relative lack of access to inorganic fertilizers, which must be purchased in the marketplace (Farnworth et al., 2017). Then, they tend to rely more on organic fertilizers, which are usually produced by livestock owned by a household. In Senegal and Benin, men largely control the use of household productive resources (such as donkey carts and labor); as a result, women’s fields are planted last, such that their crops are often not harvested until well into the rainy season when they are more susceptible to failure from dry spells (Kinkinginhoum-Médagbé et al., 2010; Tall et al., 2014). In Kenya, more often than not are women to be found working their fields with the handheld hoe than using animal-drawn implements or tractors (Wanjiku et al., 2007). Due to limited options, there is a low likelihood that female farmers will use alternative varieties, cropping systems and farm inputs for adaptation to the changing climate (Doss & Morris, 2001).

4.4. Gender dimension in the mitigation and adaptation to climate change in crop and livestock production in sub-Saharan Africa

Largely, small-scale farmers in SSA modify agricultural operations on their farms in response to local climate variability and related factors like market access, the variability of input prices and level of infrastructural development (Otzelberger, 2011). Like men, women possess significant beneficial information for developing adaptive measures and plans for combating the adverse effects of climate change concerning household food security and human nutrition (Bradshaw & Fordham, 2015). Men and women are equally aware of climate variability and share similar coping strategies. For example, they adopt new, improved crop varieties when possible. Changing the time of planting and harvest, repeated sowing, application of fertilizers and pesticides, diversifying crop production, adopting different farming practices such as mechanization and growing improved cultivars top the list of practices used by farmers for adapting to climate change. For instance, Bawakyillenuo et al. (2016) established that Ghanaian farmers have diversified crop and livestock production, intensified irrigation, use of soil and water management methods and engage in off-farm income-generating enterprises for enhancement of livelihoods. In Malawi, women have limited off-farm adaptation choices at their disposal partially as a result of spending more time on farming activities. Documented evidence indicates women in Malawi are less likely by half than the male counterpart to embark on charcoal business to adapt to climate change off-farming activities (Sellers, 2016). However, they tend to be more inclined to embark on small scale businesses as a way of adapting to climate shocks (Sellers, 2016). Women are central in the preservation of agro-biodiversity and resilience in households through the cultivation of gardens or small household plots (Howard, 2006). They are custodians of indigenous knowledge about varieties and diversity of crops usually done by keeping and sharing seeds and home gardening. Preserving and diversifying crop production confers cropping system resilience to adverse impacts associated with climate change (Altieri et al., 2015). Some corroborations point to an increase in time spent by women on agricultural activities emanating from adverse impacts of climate change (Benin et al., 2006). There is a need therefore to train women in good agricultural practices and most importantly strengthen their access to productive assets and resources, to strengthen their participation in producer groups and community decision-making bodies, and to strengthen their voice in intra-household decision making (Farnworth et al., 2013). To reduce gender inequality in farming, it will be crucial to provide female farmers with extra leverage, tools, and resources needed to succeed (Falk & Bessonova, 2018).

Underlining the significance of appreciating mitigation and adaptation will guarantee inclusiveness in servicing the needs of different gender groups (Sellers, 2016). There is need for a proper
appreciation of present adaptive methods used by farmers, how they rate the effectiveness of the methods, their preferred options for support from government and other stakeholders while having a future outlook on adaptation to enhance planning and develop strategies (Kakota et al., 2011).

Livestock plays a vital role in the livelihoods of farmers in SSA. It is a source of food like meat and milk and a source of income even though it is associated with some negative impacts on the environment (Tall et al., 2014). Livestock contributes to crop production as drought power, fertilizer and means of transport. It can be also used as insurance for farmers in the absence of these financial institutions. Livestock is “a saving account” for the poor as these people often do not have access to standard financial markets (Randolph et al., 2007). However, sometimes there is a gendered understanding of the functions of livestock in SSA. For example, for women livestock is primarily contributing to food security, whereas for men it is like a long-term investment (Gallina, 2016).

Gender and cultural norms dictate men’s and women’s roles in livestock production in SSA. For example, in central and eastern Kenya, livestock management activities such as the feeding of cattle are done mainly by women, whereas watering and disease management aspects are covered by men (Njuki et al., 2016). In Ethiopian highlands women do activities such as cleaning sheds, milking, looking after calves and sick animals, cutting grasses and feeding, supervising grazing cows, making dung cakes, processing the milk into butter and cheese and selling milk products; whereas feeding oxen and managing health aspects are done by men (Yisehak, 2008). A similar trend is reported in Nigeria that women feed and take care of vulnerable animals, clean barns, milk cows and make butter and cheese; and men do livestock marketing and animal disease management (Ayoade et al., 2009).

In many developing countries, owning livestock as an asset by women is easier compared to having land or other physical assets (Gallina, 2016; Tall et al., 2014). In pastoral livestock production systems, although women own livestock, the numbers of the livestock owned is less than the number of livestock owned by men (Flintan, 2011). The majority of urban cattle farmers in SSA countries such as Nigeria, Uganda and Kenya are women (Grace, 2007). However, this ownership is not a guarantee for women as there is no property right for livestock (Flintan, 2011; Kristjanson et al., 2010).

The livestock ownership between men and women often varies based on species and type of livestock. For example, in Ethiopia poultry is an important asset for female-headed households (Aklilu et al., 2007). In Kenya and Rwanda women own mainly local cattle than exotic cattle compared to men; and in SSA women usually own small ruminants such as poultry, goats and sheep (Gallina, 2016; Tall et al., 2014). Small-scale pig farming is also dominated by women in some countries in SSA (Sofa & Cheryl, 2011). On the other side, (Yisehak, 2008) reported that in mixed crop-livestock farming systems of Ethiopia, both men and women own cattle, goats and sheep, although men own more numbers. Generally, women in pastoral societies of SSA own livestock even if it is lower in numbers than men that makes the distribution of the resource in the sector more equitably between men and women unlike other assets like land (Flintan, 2011).

In SSA men and women may have different rights on livestock, which include resource access and decision-making rights (Abdulkareem, 2011; Kristjanson et al., 2010). For example, in livestock production systems of SSA, women generally own and manage poultry, but they do not make the sole decision over the use of chicken or eggs (Kristjanson et al., 2010). In Ethiopia, women decide in all aspects of poultry, which ranges from production to selling, but men come in when income from poultry becomes larger (Aklilu et. al., 2007). A study by Abdulkareem (2011) in the fishing community of Nigeria also indicated that poultry is solely managed by women; however, the income from the sale of birds and eggs is owned by men. Women control milk when it is for family consumption in many cases in SSA, but limited access to sell and expend it (Gallina, 2016;
Kristjanson et al., 2010; Sofa & Cheryl, 2011). In this case, women often control evening milk than morning milk as the latter is mainly for the market (Kristjanson et al., 2010; Njuki et al., 2016). Broadly, despite their significant role in livestock production, women are severely constrained to make decisions on livestock enterprises in SSA, which is mainly due to inadequate outside support they receive to help them make better decisions (Tall et al., 2014).

In strategies for coping with food shortages due to climate change, gender differences are visible in SSA and elsewhere in developing countries. However, the role of women in livestock systems is not studied well (ILRI, 2012; Lambrou & Nelson, 2010). Although women’s role in food production is significant in rural areas of SSA, their contribution is less acknowledged, particularly in livestock production (Bridge, 2014). Women make up more than 40% of agricultural labor in SSA (FAO, 2011). Women contribute to the adaptation of livestock production under the changing climate in SSA specifically in water and feed supply. In a pastoral society of Borana of South Ethiopia, for example, women collect water for calves and other needy animals that are kept at the homestead, whereas men drive herd long distances searching feed and water during drought (Nicola & Stephen, 2015).

Breed preference is another gendered adaptation mechanism to climate change in livestock farming communities of SSA. For example, female livestock keepers in Kenya and Rwanda prefer local breeds than exotic ones (Kristjanson et al., 2010). This is because local cattle breeds are relatively easy for women to manage as they have less time due to their other responsibilities in the household. A study by Djoudi et al. (2011) in the livestock farming community of Northern Mali indicated that there was a difference in adaptation strategies between men and women to climate change and variability. Men considered migration as an adaptive strategy whereas women perceived this strategy as a cause of vulnerability. This is because when men migrate, their activities will be added to women’s workload thereby hindering them from availing food for the household. This also meant children stop their school to replace the last person. One of the strategies in this community to reduce workload and then vulnerability was the use of donkeys and camels to transport local water.

A case study on pastoralists in the Samburu district of Kenya (Ongoro and Ogara, 2012) indicated that women are more vulnerable than men. The community makes the effort to utilize differentiated gender roles and responsibilities into practice to adapt to climate change. Samburu women and girls try to adapt climate change being involved in small businesses; poultry keeping and goat selling were among the coping strategies. Men and boys in this community try to adapt by driving the livestock herds hundreds of kilometers to look for water and pasture. During long droughts men keep small-sized animals like poultry and goats; and drought-tolerant animals like a camel as an adaptation mechanism rather than cattle.

In general, as far as livestock keepers in SSA are concerned, women are more vulnerable than men to climate change. This is because they are less empowered economically, decide less on the resources and lack some technical skills of livestock agriculture as extension training is often provided to men. The disparities have to be addressed in a drive to build the adaptive capacity of communities to the adverse impacts of climate change in SSA, through formulation and implementation of inclusive climate change adaptation policies.

4.5. Gender dimensions and the current status on gender inclusivity and potential impacts in forestry and natural resources management in sub-Saharan Africa

Rural women are the poorest and depend on forest resources that increase the level of deforestation and their vulnerability to disasters in addition to the inequalities. Gender mainstreaming in the mitigation of climate change impacts implies the reduction of inequalities and dependence on forestry and natural resources (Mukoni, 2013; New Course, 2010; Shandra, 2008). The transfer and distribution of knowledge based on gender inclusivity and experiences could help to face climate change effects ( Fonjong, 2008).
The dependence of communities on natural resources varies largely according to gender and economic status (Madonsela, 2002). Regarding men and women reliance on forestry and the use of the natural resources in SSA, it has been established that women are the most dependent, the most impacted by the degradation of these resources but they play an important role in their sustainable management (ECA, 2006; Takang, 2012). Women in the rural SSA communities are the main users of the non-timber forest products (NTFPs), energy providers through the use of forestry and agroforestry products. They contribute highly to feed their families, provide incomes in their families and communities. They use forestry resources for medicine purposes (ECA, 2006; New Course, 2010; Takang, 2012). For instance, it has been established that more than 60% and 70% of women depend directly on natural resources for their needs and those of their families’ respectively in South Africa and Mozambique (Mutangadura, 2004). Women in Uganda and Ghana depend on wood to produce fuel (New Course, 2010; Shandra, 2008).

In his study on gender in Zimbabwe, Mukoni (2015) showed that women’s reliance on the use of water was most reflected than those of men due to their gender roles and responsibilities (cook, wash, bathe, drink, etc.). Because of water scarcity in rural areas, women in SSA spend more or less 40 billion hours per year to fetch water (ECA, 2006). Indeed, GSDR (2015:2) highlighted that women in Guinea and Malawi spent more time (three and eight times respectively) than men to collect water. Women and children walk far from their homes in rural communities to collect water for daily household needs (ECA, 2006). In the study on smallholder farming of Ghana, Alhassan et al. (2018) demonstrated that women use more energy to collect clean water compared to men since women walk, while men use bicycles and motorbikes to go and fetch water. In Northern Nigeria for instance, men leave temporarily the rural areas during flood periods and the dry season, leaving all the household responsibilities to women (Agwu & Okhimamhe, 2009). Women’s rights compared to those of men are not equal and their access to forestry and natural resources are limited (ADF-VIII, 2012). Croppenstedt et al. (2013) showed in their study in 16 African countries that women ownership rights to land were recognized in six of them with 2% having land titles. The same observations were made in Zimbabwe, Cameroon and Ethiopia where women do not have real land ownership despite the legal rights that allow them to own land and resources (PRB, 2002; Sass, 2002; UNDESA and GWTF, 2006; Coleman, 2008). In Burkina Faso, low women’s access and control of land and forest resources are related to traditions that play a role in the inequalities between men and women (ECA, 2004). In his study carried out in the villages of the North West Province of Cameroon, Fonjong (2008) also highlighted that women were not allowed to carry activities out near to the reserved areas and to manage them because of their traditions and cultures. In a general review of agroforestry in Africa, Kiptot et al. (2014) showed that because of the culture and absence of resources, the participation of women in the activities was limited. Since land ownership reduces the dependence on natural resources (USAID, 2006), consequently the fewer women have ownership the more they will rely on these resources for them and their families, hence leading to degradation.

There is not enough data on women’s involvement in forestry and natural resources management in Africa (ADF-VIII, 2012; FAO, 2007). The statistical data in Mali shows a low representation of women in the research institution, administrations and projects relative to forestry, while in Tanzania there were no women in decision-making positions in the forestry sector (FAO, 2007). According to Weah (2012) in Liberia, despite the equal right for men and women established by the constitution, the inequalities between men and women are still present in the management of forest resources. Some governments like those of Cameroon, Tanzania, Ethiopia, Burkina Faso and Ghana tried to reduce the gender inequalities in the forestry sector by giving equal opportunities to women and men (FAO, 2007).

Inclusion of gender aspect in the process of natural resources conservation and sustainable development seems to be a necessity and it must not be ignored. In the case of woodlot management in the Makete District Council of Tanzania, the inclusion of men and women proved to be efficient since they used their local knowledge and practices to improve the
development and the diffusion of the forest and natural resources management guidelines (Aguilarr et al., 2011). Müller et al. (2014) in their study showed that West African women comparatively to men, were more able to indicate the different species of the non-timber forest products. Base on their different use of forestry and natural resources, both men and women have different knowledge that could contribute to the conservation and the management of the resources. Indeed in the exploitation of trees by the local communities of Burkina Faso, women and men could identify the different species' environments and peculiarities base on their experiences and knowledge. The women know the curative attributes of the trees while men were more focused on the trees' ecological functions (Aguilarr et al., 2011). Women in Mali and Ghana, use their knowledge of *Jatropha curcas* cultivation to produce bioenergy and the seeds for commercial purposes (UNDP, 2009). To mitigate climate change impacts, women in some countries like Ghana, Senegal, Mali, showed efficiency in helping their communities to face to the environmental disasters through the use of biodiversity in both animal and crop aspects and the prevention of land degradation, the use of cooking stoves and biogas (Dankelman et al., 2008). In Tanzania, men and women have been included in the process of mitigation of climate change through the improvement of agroforestry technologies, biodiversity, and preservation of forest resources and enhance the prevention of land degradation (Kitayali et al., 2010). In Northern Nigeria, women use as an alternative to fuelwood maize, guinea corn stalk or animal dung for cooking to address deforestation and climate change effects. They collect rainwater during the rainy seasons that they use during the dry seasons (Agwu & Okhimamhe, 2009). Use of *Jatropha curcas* in Nigeria, Mali and Ghana has proved to be an alternative for the mitigation of climate change. Indeed, by using it as bio-energy, rural women contribute to decreased pollution. They also use this shrub to prevent land and soil degradation and improve water infiltration and retention (UNDP, 2009). Since this shrub can grow fast, it constitutes an alternative to deforestation. The differences in skills and knowledge among various gender groups could thus, play an important role in the management of natural resources (Aguilarr et al., 2011; Carney & Elias, 2006; Chalfin, 2004; Maranz & Wiesman, 2003). During the process of water fetching, women in South Africa identified some trees (*Acacia erioloba, Ziziphus mucronata, Acacia Albida, Euclrea divinorum*, etc.) that play an important role in the avoidance of water pollution. Because of this characteristic, women take into account these trees in their management of the resources. Women and men use different knowledge and practices to face soil deterioration; men used to build drains and women used to plant some tree species and grass (Mukoni, 2015). Women’s tasks take also into account the transmission of cultural knowledge and the management of natural resources (ECA, 2004). Gender inclusivity, mainly women’s inclusivity in forestry and natural resources management organizations is a key factor to avoid dissensions by taking into account the different actors’ needs (Agarwal, 2001; Coleman & Mwangi, 2013; Stloukal et al., 2013). Indeed, in the North West Province of Cameroon, both economic instability and dissensions used to happen because gender was not mainstreamed in resource management (Fonjong, 2008). The efficiency of the law and rules for the inclusivity of women in the rules and laws mostly depend on the culture and are thus difficult to apply (ECA, 2004). For instance, in Burkina Faso, there is a gender bias in the forest laws (Takang, 2012). Under the changing climate, the improvement of women’s working conditions and the full respect of gender equity and the elaboration of oriented policies could impact positively the management of natural resources (ECA, 2001).

### 4.6. Socio-economic implications of gender inclusivity in agriculture under the changing climate

Although women bear a significant burden of agricultural labor in SSA, their contribution widely is unappreciated (Akram & Komba, 2018; Sofa & Chery, 2011). The lack of recognition of the contribution by women is on the backdrop of the recent rise of the feminization of agriculture in parts of the region whereby women are becoming the dominant group in the sector (Agarwal, 2011; Djurfeldt & Jirström, 2013; Lastarritia-Cornhiel, 2006). The feminization of agriculture has been attributed to the migration to urban areas and increased mortality rates among men due to HIV and AIDS among other factors (Djurfeldt & Jirström, 2013). However, women continue to have
limited control over agricultural production, and are unable to access credit facilities and agricultural extension services relative to men (FAO, 2011; Hussein & Suttie, 2016).

Off-farming activities, high involvement of women is reported in the agricultural value chain, from the processing of the agricultural produce, trading and entrepreneurship amidst several obstacles, relative to men, in accessing markets (Hussein & Suttie, 2016). Despite increasing feminization of agriculture, it has been observed, however, that in SSA a significant number of agricultural policies and development projects still are advancing the notion that the agricultural and the rural workforce principally is comprised of men (World Bank, 2007). The youth, who are the new labor force usually are marginalized yet yearly, over 10 million youths are being added to the continent’s labor force (Losch, 2016). This calls for the deployment of a gender-responsive approach in the sector to embrace the women as well as the youth in agriculture. The approach entails holistic recognition and consideration during the design and the implementation of adaptive actions of the aspirations of the youth, women and men to facilitate equal distribution of benefits accruing from the implementation of the adaptive actions (World Bank, FAO and IFAD, 2015). Implicitly, it connotes that as transformation in the sector is being advanced in response to climate change, current socio-economic dynamism has to be considered as well. For instance, the feminization of agriculture arising from the departure of men from the sector and the associated inequities in rights over productive resources (Huyer et al., 2016). It also espouses the encapsulation of gender-sensitive indicators in the monitoring plan that assist in tailing progress made in alleviating gender disparities in the sector (Huyer et al., 2015). There is increasing evidence attesting to the fact that more equal intrahousehold and intracommunity gender relations result in improved outcomes agriculturally and developmentally, including enhanced household food and nutrition security (Farnworth et al., 2013; Nuhu, 2015). Related corroboration ascertain that consolidation of the rights to ownership of land by women could considerably improve family earnings and wellbeing (Katz, 2003; Quisumbing & Maluccio, 2003). Some countries in SSA have passed a law officially declaring women’s entitlement to land ownership. The passing of the law has had some positive impact on the wellbeing of women and their families (UN-Women, 2013). For instance, Rwanda’s recent land regularization program improved land access for legally married women and increased investment in soil conservation measures, especially among female-headed households (Ali et al., 2014). The certification process in Ethiopia made an effort to include women’s names on the documents; one result is that women heading their households were more likely to rent out the land that they were not farming, increasing their household welfare.

Enhancing the capacity of women to improve productivity is critical to improving livelihoods. World over at the top of the mean farm power input in agriculture are the women in SSA projected to be around 63% while the global average is pegged at 36% (Farnworth et al., 2013). For instance, in Ghana, men produce 30% of the food crops, while the remaining 70% is produced by women; the women supply 52% of the farm power, provide almost all the labor (95%) in agro-processing and distribution of food (85%) (JICA, 2013). It is reported that grossly in SSA women comprise up to 44% of the productive population with 65% of that segment involved in agriculture (Farnworth et al., 2013). The statistics underscore the significance of axing the existing gender gaps. It is on record that availing equal rights to both women and men on resource use farm productivity can go up with 20–30% (FAO, 2011). A study in Kenya revealed that enhanced production would arise by making sure that agricultural inputs are accessed equally by both women and men (Ellis et al., 2007). Related work indicates that there is a high likelihood (about 90%) among women to use the resources and income at their disposal for improving the welfare of their families (AfDB, 2016). Furthermore, strategies to enhance the influence of women in homes like education are related to the improved wellbeing of children (Farnworth et al., 2013). A study in villages of two indigenous communities north of Burkina Faso established that one community ably adapted to climate change while in the other community poverty was getting entrenched (Nielsen & Reenberg, 2010). The prime reason for the observed difference was that inclusion of the livelihoods diversification strategy that embraced the involvement of women in economically productive enterprises.
by the first group traditionally was inappropriate for the second group (Nielsen & Reenberg, 2010). If accorded the chance, women, as households’ principal food producers and communities’ managers of natural resources, are well situated to be effectual change agents in actions to mitigate and adapt to climate change (UN-Women, 2008). Additionally, axing gender disparities in agricultural production can sustainably end hunger for over 100 million people globally (FAO, 2011). In reality though, changing the status quo is a mammoth task that demands an intentional, strategic and far-reaching change in current gender dynamics.

4.7. Improving women’s access to resources in sub-Saharan Africa under the changing climate

Women in SSA, for the most part, lack proper access to crucial resources including land, credit, livestock, equipment, and technology. This has severely curtailed their ability to demonstrate their strengths in enhancing their livelihoods and effectively contributing to the improvement of their communities. Additionally, rarely are they included in natural resource management decision-making (; Tantoh and McKay, 2020). In the region, women and men have diverse roles and priorities in the utilization and management of natural resources as revealed by a gendered analysis of natural resource management difficulties in SSA (Fonjong, 2008). Largely in the region, women and girls, for instance, are typically responsible for collecting water, gathering firewood, and other domestic tasks (Tantoh and McKay, 2018, 2020), which has hindered their ability to thrive in other socioeconomic and political areas. The patriarchal orientation in social processes and resource management reinforces this (Tantoh and McKay, 2020). Women and the youth are frequently neglected or purposefully excluded in these situations (Lendvolo et al., 2012). As a result, males in the community dominate decision-making and resource control, reinforcing disparity and proliferating the repression of the rights of others especially the female members and the youths. This is exacerbated by a lack of political will and commitment on the part of both the central government and local governments to address patriarchal practices and privileges at the community level, like discriminatory gendered community duties (; Tantoh and McKay, 2020). It is contended that women’s land tenure security will encourage them to pursue different livelihood plans, resulting in secure and enduring communities (Namubiru-Mwaura, 2014). This is because land is a reserve of worth, and having land and property allows women to participate in other socioeconomic and income-generating activities (Villamor et al., 2018). Land tenure security is one of the most essential economic rights (AfDB, 2011). When women do not have title to land or houses, their economic alternatives are limited. They do not have enough collateral to get credit to purchase other essentials. Gender rights in land access, ownership, and the capacity to make genuine choices must be addressed in any serious effort to promote women’s capacity for adaptive action (AfDB, 2011).

Noteworthy is the fact that farmers, men and women alike, are acquainted with the process of adapting to climate unpredictability (AfDB, 2011). Farmers respond by switching crops or kinds, adjusting harvest and seeding dates, adjusting farm management, and implementing water-saving practices (AfDB, 2011). Nonetheless, faced with enduring climate change they are encountering additional issues. This is where governments and development agencies can perform a critical part in enhancing farmer’s coping abilities. Women and men’s adaptive capability is determined by their ability to utilize resources in order to optimize their livelihood results. In this sense, adaptation depends on factors such as economic status, technology, health, education, information, skills, infrastructure, access to assets, and management capabilities. Differentiated power relations between men and women and unequal access to and control over assets mean that men and women do not have the same adaptive capacity. In this perspective, socio-economic factors and managerial capacities become critical in adaptation. The adaptive capacity of men and women differ due to unequal power dynamics between them, as well as imbalances in the right to use and control of resources. It is well known that women are characterized by distinct vulnerability and exposure to risk. Nonetheless, on the positive side they are also endowed with strong coping capacities in the face of climate change and can play an active role in adapting to its impacts to secure food and a livelihood for their households. Women are well-known for their
liability and susceptibility to risks. On the other hand, they have great coping capabilities in the face of climate change and can actively participate in adjusting to its effects in order to secure food and a living for their families. Therefore, in discussing adaptation to climate change, it is important not merely to focus on women’s vulnerabilities, but to understand their specific capabilities. Women’s experience and strategic position in society furnishes equips them with the potential to lead efforts at community and national levels. This is an understanding vital to good policy and advocacy. At the same time, support for adaptation approaches will inevitably be more effective when it leverages women’s traditional strengths (AfDB, 2011). Consequently, it is critical to concentrate not just on women's helplessness when discoursing climate change adaptation, but also on their special talents. Women's understanding and pivotal position in the general public provide them the ability to lead activities at the local and national levels. This is a crucial understanding for effective policy and advocacy. Provision for adaptation methods, on the other hand, will certainly be more effective when it capitalizes on women’s conventional capabilities.

Additionally, practical policy actions to improve access to resources by women could include advocating the adoption by all countries, as well as funding for the implementation of state agreements, like the Maputo Protocol on Women’s Rights, to ensure women’s wellbeing and legal status is recommended (AfDB, 2011). In addition, practical policy initiatives to promote women's access to resources could include campaigning for universal adoption and funding for the execution of state accords, such as the Maputo Protocol on Women’s Rights, to protect women's well-being and legal standing (AfDB, 2011). Women's land rights, inclusion in crisis preclusion and response, and peace-building actions should all be given singular emphasis at all phases. In addition, conservational activities and adaptation tools like the Green Funds should include provisions for committed experts and funds to ensure complete involvement of women in discussions, implementation, and leadership drills (AfDB, 2011); and offer direct committed resources to sustain projects that support women, mainly in agriculture, informal, and commercially oriented production (AfDB, 2011).

4.8. Some initiatives and policy development efforts promoting gender inclusivity on continental and/or regional scales

Recently, on continental, regional and national level, initiatives and policy development efforts for promoting gender inclusivity have been accorded significant attention. Markedly, the African Union (AU) is spearheading initiatives aimed at promoting gender equality and the empowerment of women on the continent. The avowal of the body’s dedication to the promotion of gender equality is stipulated in its Constitutive Act. Unequivocally, article 4 states: “The Union shall function under the following principles: […] promotion of gender equality” (AU, 2018). Furthermore, through the Maputo Protocol, which promotes and guard women and girls, the AU is advancing gender equality (AU, 2009). The tenets of the protocol include empowerment of women, gender equality and abolition of detrimental customs and traditional practices that debase females on the continent. Therefore, the role being played by the Maputo protocol in the restoration of the decorum of females on the continent is significant. Additionally, the AU is advancing gender equality through other instruments like the Solemn Declaration on Gender Equality in Africa. Furthermore, the AU developed a gender policy in 2008 that is founded on documented gender inequalities prevalent on the continent in focal formal sectors like agriculture. The goal of the gender policy is to abolish the inequalities by implementing considered actions (AU, 2009).

Besides the AU, key development agencies on the continent like the African Development Bank (AfDB) have made an outstanding contribution towards addressing gender disparities. For instance, in 2015, the Bank profiled the Africa Gender-Equality Index (AGEI) for 52 of the 54 countries in Africa (AfDB, 2015). Generally, in Africa, the experience among women and men in most aspects of life is at variance. Some of the disparities occur in terms of exposure, education, and training, incomes, discriminatory laws and culture. The AGEI profiles the disparities along three folds, namely: “economic opportunities, human development, and law and institutions” (AfDB, 2015). Respective folds are
measured using established pointers that generate the total for a country. The index aims to assist decision making and deal with ominous blockades that hinder the progress of women on the continent, and assist the populace to make their governments accountable, and aid the bank to accentuate better its gender-linked initiatives (AfDB, 2015).

Over and above, many countries in SSA have embraced the gender budgeting; an approach that utilizes financial procedures and management to deal with gender disparities and promote women empowerment (Stotsky et al., 2016). Listed countries implementing the policy include; Benin, Cameroon, Ethiopia, Gambia, Mali, Mauritius, Mozambique, Nigeria, Rwanda, Senegal, South Africa, Tanzania, Uganda and Zimbabwe (Stotsky et al., 2016). Noteworthy is the fact that SSA nations assumed leadership in using gender budgeting across the globe after countries like Australia initiated its implementation. Presently, leading countries in the region are Rwanda and Uganda. Comparatively, against other nations in the region, the two countries, have incorporated goals focused on gender in budgeting instruments, plans and procedures in profound directions (Stotsky et al., 2016). It has been recognized that central to the registered and long-term success of gender budgeting in SSA is governance through the Ministry of Finance, and sustained advocacy by nongovernmental organizations (NGOs) and legislatorial groups (Stotsky et al., 2016). For instance, in Rwanda and Uganda the Finance Ministries authorized other line Ministries or Government institutions and Departments in charge of the affairs of women to fund gender-related activities through their annual budgets. Spurring the initiatives were lawmakers at national assemblies (Byanyima, 2003). Reportedly, there was concession among Government officials that implementation of the approach could translate into significant improvement of the welfare of women and society at large (Stotsky et al., 2016). The donor community and NGOs were instrumental through policy advocacy and lobbying for policy shifts using evidence from research in these nations. Additionally, gender budgeting initiatives were supported financially by donors. Apart from Rwanda and Uganda some countries in the region registered some achievements with significant initiatives in their infancy and some being sporadic (Stotsky et al., 2016).

5. Conclusion
Agriculture is the most vulnerable sector to climate change, since climate plays a great role in biophysical and the socio-economic environments of SSA. Mitigating and adapting to the impacts of climate change requires gender inclusivity in the various sub-sectors of agriculture and natural resources management. Gender predefined roles in rural and urban areas along with sociocultural constraints make children, women and young people especially vulnerable to the changing climate. To effectively respond to the impacts of the changing climate there is need therefore to design interventions that address the needs of the respective gender groups. Gender inclusivity will ensure that the differentiated needs of all gender categories are addressed during the planning and implementation of mitigation and adaptation measures. Additionally, doing so will harness the unique abilities, knowledge and skills of each gender group towards a unified and potentially effective response to climate change. It is recognized, however, that achieving gender inclusivity is not an easy task due to deeply entrenched societal and cultural dispositions, inequitable power relations, disparities in education, economic and access and control of resources that tend to marginalize climate-vulnerable gender groups. Major policy shifts in SSA countries coupled to the tenacious implementation of gender-sensitive interventions will be the bedrock for sustaining the momentum to effect changes. Crucially, unwavering political and financial support galvanized by advocacy at all levels in the sector is critical in the process as demonstrated by successes in gender budgeting initiatives implemented in the region. Commendably, the AU and other global, continental and regional bodies as well as some countries in SSA have made significant policy shifts in their policy instruments and are implementing gender-sensitive interventions, thus providing hope for the advancement of the gender inclusivity agenda in the region.

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