

# What do we know about adaptation to climate change in Africa? A review of grey literature

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## **Abstract—**

**Background:** Africa is one of the regions that the impacts of climate change will be felt so much due to poor adaptive capacity and the reliance on agricultural production for human sustainability. While climate change is real in Africa, the continent has been building resilience through adaptation strategies.

**Objective:** To understand what adaptation strategies African countries have developed in response to and in anticipation of climate change.

**Methods:** The study reviews documents, reports and projects in the form of grey literature and content analysis was used to analyse these documents manually.

**Results:** Climate change has mostly affected the agricultural sector thereby reducing agricultural production. This has led to the introduction and implantation of adaptation policies and strategies on the African continent. However, there are barriers militating against adaptation measures.

**Conclusion:** In building resilience, some adaptation policies and strategies have been initiated mostly at the local levels with the financial support from donor agencies.

**Keywords:** Adaptation, Africa, Climate change, Grey literature.

## I. INTRODUCTION

When it comes to climate change, no one is immune to its impact, according to the Fiji Presidency of the Parties of the Conference (COP23) of the United Nations Framework Convention on Climate Change (UNFCCC). However, the degree of impacts varies across regions. Africa has been considered to be among the most vulnerable to the impacts of climate change (Association of German Development NGOs, 2009; UNDP, 2010; UNISDR, 2011; Ziervogel, Cartwright, et al., 2008). This was also noted in the Bali Action Plan acknowledged in Bali 2007, which acted as a major basis for the United Nations (UN) climate change negotiations at the Copenhagen climate summit (Association of German Development NGOs, 2009).

Drought, increasing temperatures, flooding and irregular rainfalls are some of the climate events that are common in Africa (see Awojobi & Tetteh, 2017). It is argued that these climate events have been responsible for forced migration, displacement and conflicts among Africans (Besada & Sewankambo, 2009).

Climate change is an element increasingly subverting development efforts (Association of German Development NGOs, 2009). Without adaptation, particularly in the agricultural sector, climate change will exacerbate the existing high level of poverty in the continent. This is because the agricultural sector is one of the main sources of employment generation.

Knowing fully well that Africa is considered as the most vulnerable to climate change. The continent since 2007, has gained know-how in conceptualizing, planning, and starting to execute and support adaptation activities (Niang et al., 2014). However, across Africa, most of the adaptation to climate change and variability is reactive in reaction to short-term motivations, is happening separately at the individual or household level, and lacks government support and policies (Berrang-Ford et al., 2011; Vermuelen et al., 2008; Ziervogel et al., 2008). As the climate change sphere unfolds (Ford et al., 2011). There is the need for new literature approaches if we are to establish and describe “what we know, don’t know, and need to know” (Hulme, 2009; Hulme et al., 2010) as cited in (Ford et al., 2011).

In this paper, I develop a grey literature review methodology to understand what adaptation strategies African countries have developed in response to and in anticipation of climate change.

The content of the paper is structured as follows:

- Section 2 explains the methodology employs to understand African adaptation strategies. The paper relies solely on grey literature for the analysis.
- Section 3 describes the findings from the analysis of the grey literature that was used for data gathering.
- Section 4 draws on the conclusion and it uses the solutions to climate change adaptation in Africa from the grey literature as recommendations for the paper.

## II. MATERIALS AND METHODS

### 2.1 Grey literature

Grey literature is “material that is not formally published by commercial publishers or peer-reviewed journals and is produced by institutions, academics, organizations and government agencies” (Degenhardt et al., 2016, p. 5). It comprises reports, conference proceedings, fact sheets and other documents from organizations, government agencies and institutions (Calabria et al., 2008). This paper decided to deviate from the normal peer-reviewed journals for secondary data collection and focuses on grey literature. The reason behind this is that climate change adaptation in Africa is mostly undertaken by the government and local and international organizations. Most of these organizations have the reports, policy and other documents published on their websites.

### 2.2 Searching for grey literature

The growth of the internet has made grey literature quickly accessible electronically in PDF format (Calabria et al., 2008). An electronic search was conducted on Google search engine with the topic “climate change adaptation in Africa pdf.” The outcomes of the search produced a lot of literature both in peer-reviewed and grey literature. The grey literature was sorted out from the peer-reviewed articles. Some of the grey literature include reports, documents, studies, briefing note and projects.

Content analysis was used to analyse the data manually. Content analysis is a method of analysing documents and it “allows the researcher to test theoretical issues to enhance understanding of data” (Elo & Kyngäs, 2008, p. 108). Why content analysis has been criticized by some scholars, it is considered to be very flexible in research design (Harwood & Garry, 2003).

### 2.3 Key findings

This section of the paper presents the findings from the grey literature that met the criteria of the study.

#### 2.3.1 Climate change impacts in Africa

Without the impacts of climate change or future impacts, there will be no need for adaptation. The grey literature reviewed in this paper presents some of the climate change impacts in Africa. For instance, in South Africa, a study by the University of Pretoria found a positive correlation between higher temperatures and the reduction of dry land stable production that affected small-scale farmers (Ziervoget al., 2008). In the southern African sub-region, El Niño associated with droughts that happened between 1965 and 1997 led to the reduction in agricultural production (Chishakwe et al., 2012). Similarly, the United Nations International Strategy for Disaster Reduction reports that the famines that occurred in some parts of Africa in the late 1980s account for the greater part of the distress in relation to the number of casualties (Ethiopia – 300,000; Sudan – 150,000; Mozambique – 100,000; Somalia – 600) (UNISDR, 2011). While there is still continuing debate on the correlation between climate change and conflicts, the Association of German Development NGOs assert that the impacts of climate change pose a greater risk of conflict in various regions of Africa (Association of German Development NGOs, 2009).

#### 2.3.2 Planning adaptation

Climate change will affect Africa now and in the future, according to environmental experts (see Association of German Development NGOs, 2009; UNISDR, 2011; Ziervogel, Taylor, et al., 2008). This has given the political leadership of the continent to take appropriate measures against the impacts of climate change. For example, Kenya has integrated climate change strategies in its national planning documents (FAO, 2014). In Senegal, a National Emergency Fund has been created for disaster risk reduction (UNISDR, 2011). Similarly, in Uganda, budgetary allocations are made yearly to the Department of Disaster Management based on its work plan for disaster risk reduction (UNISDR, 2011). Another model of such is in

place in Mozambique, where 53.9% of resources are committed to the ministry in charge of disaster management to fight disasters (UNISDR, 2011). These plans are to support climate change adaptation (UNISDR, 2011).

### 2.3.3 Practical adaptation responses

Some African countries have already taken practical steps in building climate resilience through adaptation measures. Most of these projects are supported by international development agencies who finance and designed these adaptation strategies.

**Table 1** below lists some of these projects.

**TABLE 1**  
**ADAPTATION STRATEGIES IN SOME AFRICAN COUNTRIES**

Adaptation Project	Country	Function
InforClim <sup>1</sup>	Senegal	To address gaps between adaptation practices of local government development plans
SADC Water Sector Climate Change Adaptation Strategy <sup>2</sup>	Southern African Development Community (SADC)	Aims at improving climate resilience in the region through integrated and adapted water resources management
FAO-sida intervention <sup>3</sup>	Ethiopia Kenya Tanzania	Adapting to climate change through land and water management in Easter Africa
Kyoto world water project <sup>4</sup>	Mauritania	To assist resolve water scarcity and sanitation problems

*Sources: (Akoh et al., 2011<sup>1</sup>; Department of Environmental Affairs, n.d.<sup>2</sup>; FAO, 2014<sup>3</sup>; UNDP, 2010<sup>4</sup>).*

### 2.3.4 Adaptation finance

Climate change adaptation is conveyed via a developing system of funds that composed of the Least Developed Countries Fund (LDCF), the Special Climate Change Fund (SCCF) and the Adaptation Fund (AF) (Chishakwe et al., 2012). Most of these funds are small in nature based on the voluntary pledges and donations from donors with the exclusion of the Adaptation Fund (Chishakwe et al., 2012). In Africa, various funds have been used to finance adaptation against climate change. The grey literature reviewed, listed some of the current climate funds significant in this paper. See **Table 2** below.

**TABLE 2**  
**ADAPTATION FINANCE AND PROJECTS IN AFRICA**

Climate Project	Administered by	Total Pledged (US Dollar)
Mitigation Project in Kuyasa, South Africa <sup>1</sup>	Department of Environmental Affairs	US\$ 3,76 million
Africa Biogas Partnership Programme <sup>1</sup>	Netherland	€30 million*
Water Security and Climate Resilient Development-Eritrea <sup>1</sup>	Adaptation Fund	US\$ 6,5 million
Congo Forest Basin <sup>2</sup>	AfDB	US\$165 million
Solar-powered water supply and irrigation system, Chanyauru, Tanzania <sup>3</sup>	UNDP	US\$48,270 and US\$4,541 (in two grants)
A community well and land reclamation, Hadiya village, Niger <sup>3</sup>	UNDP	US\$18,509 and US\$17,690 (in two grants)
Climate Change Adaptation in Africa <sup>4</sup>	AfDB	£24 million**

*Sources: African Union, 2014<sup>1</sup>; Chishakwe et al., 2012<sup>2</sup>; UNDP, 2010<sup>3</sup>; Ziervogel, et al. 2008<sup>4</sup>*

*\*The Project was financed in Euros*

*\*\* The project was financed in British Pound Sterling*

### 2.3.5 What are the barriers to adaptation in Africa?

Africa recognizes the fact that adaptation is an overriding priority for the continent (African Union, 2014). While efforts have been concentrated in building resilience, there are barriers to adaptation in Africa. The grey literature in this paper illustrates some of these barriers. For instance, in Kenya, while the majority of the farmers are aware of climate change and its impacts,

they felt that their communities felt cut off from NGOs and government support about what adaptive strategies to embark on (Chishakwe et al., 2012). In the African agricultural sector, firstly, climate change data are not accessible at the spatial resolution needed by farmers and as such farmers battle to harmonize their observations of the weather with climate projections and lose confidence in the projections (Ziervogel et al., 2008). Secondly, the timeframes over which climate data are announced is not of much importance to farmers. While it is expected that policymakers should consider the implications of a 2050 projection, African farmers base their judgement on more immediate issues (Ziervogel et al., 2008). Finally, only a few African scientists have the requisite training and experience to interpret and apply climate change data in the agricultural context (Ziervogel et al., 2008).

### III. CONCLUSIONS AND RECOMMENDATIONS

This grey literature review seeks to contribute to a better understanding of adaptation in Africa. While it is clear and certain that Africa has been considered as vulnerable to climate change from the reviewed literature, studies have shown some practical climate change impacts have affected mostly the agricultural sector. In building resilience, some adaptation policies and strategies have been initiated mostly at the local levels with the financial support from donor agencies. Despite African countries' attempts in building climate resilience through adaptation, there are still many barriers along the way. To address these situations, some recommendations have been suggested by the reviewed grey literature.

- The partnership between disaster risk reduction and climate change adaptation communities should be improved and institutionalized in order for African governments and donors to incorporate both disaster risk reduction and climate change adaptation concern into important public, private and household investment decision, based on the principles of cost-effectiveness and agreeable levels of risk to human life (UNISDR, 2011).
- Mainstreaming adaptation into national and regional economic and social development strategies, frameworks, and priorities will be important in reducing the impacts of climate change on sustainable development (USAID, 2012).
- Many African farmers know that climate change is real, however, many still see its impacts in the light of normal seasonal climate variability. A concerted effort is needed to raise enlightenment of climate change among farmers with the intensity of its implications for the choice of the farming methods, timing, and crop seed varieties (Chagutah, 2010).
- Capacity building and education have been used for agricultural innovation as ways of adapting to climate change impacts, laws and regulations should be drafted and enforced for sustainable use of land and water in communities (FAO, 2014).

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