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ADAPTATION PLANS: BUILDING CLIMATE RESILIENCE IN AGRICULTURE

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ABSTRACT

Climate change is real, and its impacts are overwhelming, particularly in developing countries. This paper examines how adaptation plans can be built in order to enhance the climate resilience in the agricultural sector. Data were collected from the United Nations Development Programme (UNDP) and the Food and Agriculture Organization of the United Nations (FAO) experts through the United Nations Institute for Training and Research (UNITAR) Massive Open Online Course (MOOC) on national adaptation planning in the agriculture sector. The data were analysed by manual coding. The findings from the analysis indicate that increasing temperature variability and changes in the level of precipitation will adversely affect the poor, such as fishers, farmers, cattle breeders, and communities depending on forest products as well as women and indigenous people. And this will, in turn, lead to an increase in poverty, a rise in food insecurity, alteration of the nutrition, unemployment, and conflicts and violence within poor communities leading to forced displacement and migration. The findings from this study outline measures that can be taken to build adaptation plans to reduce the magnitude of the impacts of climate change.

Keywords: Adaptation, agriculture, climate change

INTRODUCTION

Climate change will decrease food production by causing changes in rainfall patterns and temperature (Awojobi & Tetteh, 2017). This is because agriculture is an economic enterprise that is deeply dependent upon climate and weather for the production of food needed for human sustainability (IISD & Environmental Adaptation Research Group, 2002).

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Increasing temperatures, increased frequency and severity of harsh climate conditions and changes in the distribution, quantity and timing of rainfall projected over the course of the 21st century could have decisively negative effects on crop and livestock production (Padgham, 2009). For instance, in the Lake Chad Basin in Sub-Saharan Africa, the impacts of environmental degradation and climate change have resulted in the loss of approximately 90 percent of the water mass with destructive consequences on food security and livelihoods of the inhabitants depending on fishing and irrigation-based agricultural enterprises (FAO, 2017).

The increasing impacts of climate change on agriculture need to be addressed. That is why adaptation to climate change is more necessary than ever (Padgham, 2009). Extreme impacts from climate change can be decreased through successful adaptation, which would be expected to be less than the cost of the effects that would otherwise arise without adaptations (IISD & Environmental Adaptation Research Group, 2002). At the center stage of concerted efforts to address the impacts of climate change on the international level is the United Nations Framework on Climate Change (UNFCCC) (UNFCCC, 2007). "The UNFCCC provides the basis for concerted international action to mitigate climate change and to adapt to its impact" (UNFCCC, 2007, p. 10).

The aim of this paper is to examine how counties can build climate resilience in agriculture sector through adaptation plans. Data were gathered from FAO and the UNDP experts in the fields of climate change adaptation and agriculture. Section two of this article explains the methodology adopted. Section three discusses the findings why section four is the discussion and section five concludes.

MATERIALS AND METHODS

Experts' opinions

This paper uses detailed information on National Adaptation Plans: Building Resilience in Agriculture from international agriculture and climate experts from the Food and Agricultural Organization of the United Nations (FAO) and the United Nations Development Programmes (UNDP). These experts were part of a Massive Open Online Course organized by the United Nations for Training and Research (UNITAR), the FAO and the UNDP with support from the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety. In qualitative research, expert opinion is very crucial in the area of study. The Treasury Board of Canada claims that expert opinion consists of asking experts in a given subject area of concentration for their opinion on specify issue (Treasury Board of Canada, 1998). Researchers use the information from experts' opinions to determine the outcome of the study in focus (Treasury Board of Canada, 1998).

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Six documents that contain experts' opinions were downloaded from the Massive Open Online Course platform. Each of these documents contains information on building resilience in agriculture. The topics listed in these documents include:

- Impacts of climate change on agriculture, livelihoods and women, and vulnerabilities in agriculture sectors
- Types and sources of information needed for adaptation planning
- Climate Information for Resilient Development: CIRDA Project
- Climate adaptation actions in the agriculture sector
- Diversification as an option to adapt
- Adaptation Monitoring and Evaluation (M&E) in the agriculture sectors

All the downloaded documents formed part of the data in this article. Each of the experts focuses on their area of specialization of climate resilience in the agricultural sector. Scientific and grey literature were used to support the opinions of the experts in this paper.

Data Analysis

The opinions of the development and environmental experts were analysed with manual coding. The most salient points in the form of concept, words, phrase and sentence were coded. This is known as opening cording, and it is the "breaking down of data" in order to identify concepts (Strauss & Corbin, 1990, p. 61). The next stage of coding (second coding or the stage of data display) involved linking categories of data detected from the first level coding. This reason behind this is to find any link between categories in the areas of cause and effect relationship and comparison and contrast. The final stage of coding also known as the conclusion drawing and verification is when a core category is detected or identified. Emerging themes from the experts' opinions and the similarities and differences emanating from comparison cases at this level looked for terminology concerning emanating themes. At this stage, there is no room to further develop categories. This process of data collection and analysis communicated how climate change affects agricultural production and how adaptation can be built in order to enhance climate resilience in the agriculture sector.

Findings

Impacts of climate change on agriculture

In most developing countries, agriculture is the main source of livelihood and agricultural products such as forestry, fisheries and aquaculture remain significant sources of income, nutrition, food and livelihood for millions of people worldwide. According to FAO experts, climate change is a major threat to global food security and a powerful "hunger-risk multiplier."

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Increasing temperatures, expended temperature variability, diversities in levels and prevalence of rainfalls, a greater regularity of dry spells and droughts, rising ferocity of harsh weather events, increasing sea levels, and salinization of cultivable land and freshwater, disease and pest outbreaks will affect the poor such as fishers, farmers, cattle breeders, communities depending on forest products as well as women and indigenous people.

Experts from the FAO and UNDP claim that climate change affects the four dimensions of food security. These are availability, access, stability and utilization of food. Climate change will lead to the reduction in crops, livestock and fisheries and aquaculture mostly in Sub-Sahara Africa and South Asia. The accessibility to food by the poor will be hindered by climate change vis a vis increasing in food prices. Furthermore, climate change affects food utilization by the reduction of food safety through a higher incidence of food-borne diseases. Similarly, the increasing impacts of climate change on resources and infrastructures reduce overall food production.

In general, climate change impacts will increase poverty, raise food insecurity, alter the nutrition, create unemployment, activate conflicts and violence within poor communities leading to forced displacement and migration.

Climate adaptation actions in the agriculture sector

Climate change adaptation is progressively on the agenda of international development experts who take cognizance of the fact that climate change is real and threaten to circumvent social and sustainability (International Food Policy Research Institute, 2009). In the agriculture sectors "adaptation efforts focus on implementing measures that help build rural livelihoods that are more resilient to climate variability and disaster" (International Food Policy Research Institute, 2009, p. 13). Without adaptation to climate change, achieving food security will be a mirage. This is because eradicating hunger, malnutrition and poverty will not be possible according to development experts.

According to experts from the FAO and the UNDP, building resilience through adaptation requires:

- Better understanding of the direct and indirect influences on agricultural and rural systems in a given place;
- Integration of social, economic and biophysical data;
- Commitment across sectors, such as agriculture, transportation and water;
- Investments at different levels, such as farm level, local cooperatives and national institutions;

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- Consideration of different approaches including changes in agricultural practices, institutional strengthening, provision of needs-based climate information services, early warning systems, agricultural support services, mainstreaming and policy support.

Also, the FAO classifies six vital areas of adaptation actions in agriculture and food security. These include:

- Increasing resilience of livelihoods
- Building resilience of agricultural systems
- Managing genetic resources
- Investing in resilient agricultural development
- Investing in systems to assess risks, vulnerabilities and adaptation options
- Enable adaptation through policies and institutions

Climate information is crucial in building resilience. Medium and long-term adaptation planning needs that policymakers at all levels have access to and understand climate information. Furthermore, proper, steady, and prompt weather and climate information are fundamental to building resilience to climate change in saving lives and bolstering livelihoods across most vulnerable communities.

Regarding agriculture, with better climate information in incoming weather events, farmers can protect assets and human lives. "They can access risk-management mechanisms like index-based insurance and create long-term plans for a future that will be highly dependent on rainfall patterns, droughts, floods and other natural disasters" (FAO Experts).

Diversification is another fundamental strategy for building resilience in farming communities. Diversities in farming practices and decisions can be considered in-farm diversification. Farmers can diversify their planning seeds by adopting a merger of seeds, based on the number and category of land that they cultivate.

Sustaining adaptation requires monitoring and evaluation (M&E). This is because both concepts provide a mechanism to tack and assess if activities and policies are producing needed goals and objectives. M&E of adaptation in the agriculture sector should have an articulated aim and should encompass a Theory of Change, a purpose and focus according to FAO experts.

DISCUSSION

Climate change is real, and its impacts are overwhelming. Climate change affects city infrastructure, human health and ecosystem (Awojobi & Tetteh, 2017). In developing countries, the impact of climate change in the agriculture sector will lead to a food shortage (Awojobi & Tetteh, 2017). This is because of the changes in weather condition due to climate change.

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Evidence has shown that climate change has affected food production in Sub-Saharan Africa. For example, within the period of 1996 and 2003, rainfall decreased by 50-150 mm for each season and this led to the reduction of sorghum and maize production in some East African countries (Funk et al., 2005). In a similar manner, the prevalence of droughts in Somalia, Kenya and Ethiopia have affected agricultural production leading to forced migration (Besada & Sewankambo, 2009).

Those who depend on agriculture products will be extremely be affected by harsh climate events. This will lead to poverty, forced migration and conflicts. When climate change affects agricultural fields through droughts and flooding, owners of such fields are thrown into the unemployment markets and if the cultivated land is meant for subsistence farming that means the farmer's entire household is a precarious situation. Climate change may affect household welfare through a diversity of ways (Skoufias et al., 2011). For instance, climate change might have a negative impact on agricultural productivity, especially in the tropical regions, in addition, it also affects vulnerable people's livelihood through its impacts on health, access to water, natural resources, homes and infrastructure (Skoufias et al., 2011). There is increasing evidence of the negative impact of climate change on household welfare and agricultural productivity (Skoufias et al., 2011). These impacts are connected to geographical setting and household characteristics (Skoufias et al., 2011).

The increasing impacts of climate change, particularly in developing countries calls for adaptation strategies. Since agriculture is the main source of livelihood in most developing countries, climate change has the possibility to push developing countries back into poverty trap (UNFCCC, 2010). "Adequate attention must be given to respond to the impacts of climate change that are already occurring, while at the same time preparing for future impacts" (UNFCCC, 2010, p. 1). Using adaptation to reduce the impacts of climate change will likely be less than the cost of the impact of climate change (IISD & Environmental Adaptation Research Group, 2002).

Adaptation in the agriculture sector needs research and development expenditures, solid assimilation of natural resource management into agricultural production, expanded household access to production assets, education and skill development (Padgham, 2009). The Intergovernmental Panel on Climate Change (IPCC) ascertains that adaptability via changes in "processes, practices or structures" is an essential element in decreasing possible negative effects or influencing beneficial effects of climate change (Kurukulasuriya & Rosenthal, 2013). Adaptation is crucial to evade the effects that can otherwise occur progressively and maybe irreversible (Smith, 1997). For this, adaptation is seen as a central step to enhance local capacity to deal with projected and unpredicted climate events (Smith & Lenhart, 1996).

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CONCLUSION

This paper assesses building adaptation in the agricultural sector from detailed experts' information from the FAO and the UNDP. Climate change affects the agriculture sector, mostly in developing countries. The poor are the most vulnerable because of their poor capacity to adapt. Why adaptation is needed to reduce the impact and future occurrence of climate change, development experts are calling for the integrating of adaptation in national development plans. However, the United Nations Framework for Climate Change (UNFCCC) maintains that:

> Successful adaptation not only depends on governments, but also on the active and sustained engagement of stakeholders including national, regional, multilateral and international organizations, the public and private sectors, civil society and other relevant stakeholders, as well as effective management of knowledge. Adaptation to the impacts of climate change may be undertaken across various regions, and sectors, and at various levels.

Why stakeholders' role is vital in building adaptation plan, the women mostly in developing countries should be educated on climate information this because women constitute a large segment of the labour force in the agriculture sector. Aside from this, concerted efforts are needed for an adaptation plan to be successful in developing countries that are vulnerable to the impacts of climate change. This is one way that progress can be made in building adaptation in the agriculture sector.

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