Use of Artificial Intelligence to Fight Climate Change in Africa

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Introduction

Africa's development achievements are currently under the threat of destruction due to climate change and variability.

The continent is responsible for only 4% of global carbon emissions, yet experts consider it one of the most vulnerable to climate change. The effects of climate change manifest as cyclones in Southern African countries, extreme flooding in West Africa, wildfires in Northern and Central Africa, and extreme heat that causes drought across the different countries. Consequently, numerous research studies continue to make predictions of what could happen to Africa's environmental, social, political and economic systems if there is no action against the effects of climate change.

The World now has 8 years to achieve the Sustainable Development Goals (SDGs) and global citizens are making efforts to achieve them. Consequently, Artificial Intelligence (AI) has emerged as a new solution to assess and combat the gaps it has caused in societies, which are physical (in terms of its impact on nature) and social (in terms of social inequality within countries, where its effects exacerbate already present inequalities such as gender-based discrimination).

Now, Artificial Intelligence (AI) is seen as a valuable asset to mitigate, adapt and build resilience in countries in the fight against climate change.

Many organizations and individuals believe that AI can truly make a change. For instance, survey results show that 87% of climate and AI leaders find AI to be a helpful tool in the fight against climate change while 43% of organizations can envision the use of AI for their own climate efforts. Is this belief true for African states? This article contains an analysis of the solutions that AI offers to create climate change solutions and the aspects Africa needs for AI to successfully achieve its end goals.

The Solutions AI Offers for Climate Change

The 2022 State of AI in Africa Report affirms the state of the rapidly growing tech market in Africa, which is a strong indicator of the potential of local AI solutions. These solutions are currently present within the continent and are examined below.

AI generally uses algorithms to make better predictions on the short and long-term effects of climate change like floods. AI tools can be used to provide climate intelligence to **offer predictions of weather patterns** with the intention to assess future risks in human activities. An example of this is the provision of data on flooding to assist in preventing loss of life. AI solutions

further provide data that contributes to the **assessment of financial risks** to climate insurance companies, which advise on and compensate their underwriters for climate change-related losses. Most popularly, AI solutions help to offset carbon and conduct carbon accounting through data that helps understand the source of carbon emissions and how to reduce carbon footprint.

In light of this, the literature review suggests the following characteristics of successful AI solutions for climate change:

a) AI should be **user-friendly and readily accessible** to offer clear and meaningful data that will support the target users. Consider the 2022 Boston Consulting Group report that suggests companies use AI-automated CO2 emissions measurement solutions (i) to monitor their compliance with national and global climate policies on the macro level and (ii) to track the achievement of their ESG targets for easy accessibility by their consumers on a micro level.

b) AI should **offer tangible benefits** to the user. The World Economic Forum is certain that applying AI and digital technology can cause up to a 20% reduction in global carbon emissions by 2050, specifically in the highest-emitting sectors: energy, materials and mobility. Moreover, the WEF recognizes that different digital technologies can be used within the aforementioned sectors to reduce up to 10% of their emissions by 2030. These are but a few of the tangible benefits African countries hope to see by implementing successful AI solutions.

c) AI should provide **clear recommendations** that are easy to actualize. Data from AI solutions may offer insights that will greatly fill the data gaps and increase the accuracy of climate research in a country. As from the above, the data gathered from AI solutions will determine the course of actions to be taken, either at the private, national or regional level.

That being said, it is sensible to question whether AI does indeed work to fight climate change. The answer is yes. AI climate change solutions have been deployed in other global regions of the World, especially in the US, where more than half of its leaders envision AI use for climate change at their organizations. These projects have proven AI's ability to increase adaptation and mitigation capacity and to improve the decision of evidence-based decision-making. For one, the DeepMind system, present in the Google Data Centre, uses AI to take advantage of winter conditions, producing colder than normal water that reduces the energy required for cooling within the data center. The reduction in energy consumption therefore directly translates into reducing a building's carbon footprint.

In consideration of the characteristics of successful AI solutions, it is now prudent to look into the specific AI efforts currently undertaken in Africa to combat climate change.

Current AI Solutions to Combat Climate Change in Africa

Beginning with small-scale AI projects in Africa, the Sub-Saharan region has actively implemented a range of AI solutions: from conflict management to disaster warning mechanisms that have allowed policymakers to act fast and mitigate potential threats.

In particular, the Local Development Research Institute works with AI programs to help farmers in Kenya to effectively assess the impact of cultivating climate-smart hybrid crop varieties and to develop an early-warning system that informs their farming decisions and enhances climate change adaptation.

Recent large-scale AI solutions to combat climate change in Africa include:

a) The International Centre for Research and Development has established a project in partnership with the Swedish International Development Cooperation Agency to implement and manage an AI and climate change innovation research network. The hub will fund and support 10 climate change innovation research projects, as well as 10 masters' students, focused on the intersection of machine learning and climate change.

b) PlantVillage Nuru uses a variety of data to predict near-term crop productivity for farmers in Africa and may help them protect their staple crops in the face of climate warming.

c) Weathernews Incorporated (Japan) is supported by UNESCO to roll out AI messaging in East Africa to send information, such as river swells to citizens before a disaster and communicate with them during and after post-disaster. The aim of this project is to save lives and consolidate data for disaster prevention.

d) The Rockefeller Foundation provided funding of $5.5 million to a collaboration between the e-Guide and Atlas AI platforms to accelerate economic development through AI data, which will predict electricity consumption in Africa and measure productive energy use in the agricultural, transportation and energy industries. It is the goal of such data to help policymakers prioritize the projects in these aforementioned industries.

Looking Forward to the Future

Evidence gathered in a recent study suggests that the use of AI can provide welcome support to global efforts to better understand and handle the many challenges associated with a changing climate, specifically where due diligence has been observed.

The main concern with using AI in Africa is whether digital means can truly create sustainable and circular solutions that are inclusive. The literature review suggests that experts have concerns regarding insufficient AI expertise, limited AI availability and lack of confidence in AI-related data and analysis in Africa. What's more, a 2021 peer-review study notes the obscurity of AI tools offering maximum benefits to African countries since these tools are generally developed by developed countries.

Africa needs meaningful support above grants and donations that are unpredictable. - access to capital investment, decision-makers and trained practitioners. The continent further requires more

locally collected data by African researchers and scientists that enhance the creation of AI solutions that fit the African context, needs and priorities.

So far, we can draw the conclusion that the World has much to look forward to from Africa in this area. South Africa, Nigeria, Egypt and Kenya currently lead the way in terms of AI solutions. Lastly, I find myself being in agreement with the sentiments of Damien Gromier, founder of AI for the Planet, who states:

> *"AI has a strong promise to help solve the climate crisis, but AI alone is not enough. It depends on the will of decision makers to act and make necessary changes-supported in part by AI and other emerging technologies."*