AI, CLIMATE CHANGE AND ENVIRONMENTAL SUSTAINABILITY IN AFRICAN WORLDVIEW

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Abstract

In the face of escalating climate change, Africa's rich cultural heritage can be looked into with the hope of offering a unique perspective on environmental sustainability. Traditional African worldviews emphasize harmony with nature, communal responsibility, and reverence for the land. However, integrating Artificial Intelligence (AI) into African societies seems to present both opportunities and challenges for environmental sustainability. This study explores the intersection of AI, climate change, and environmental sustainability through the lens of the African worldview. Adopting the method of dialectics and analysis, this study investigates the complexities of adopting AI technologies within African contexts. While AI can enhance climate sustainability and development, its application requires a critical look and approach, ensuring that it does not erode the cultural beliefs of the African and his environment. The study also captures the role of AI in African environmental sustainability, touching on the need for a culturally sensitive and inclusive approach that prioritize indigenous knowledge and community-led initiatives. The study argued that fusing traditional African worldviews and modern technologies can bring about innovative solutions for a more sustainable and climate-oriented Africa.

Keywords: Artificial Intelligence, Climate Change, African worldview, Sustainability, Development, Reorientation, Eco-friendliness

Introduction

The effects of climate change in Africa have become alarmingly severe in a technological era in which artificial intelligence (AI) is constantly and growingly positioned as a critical tool for environmental management. Africa, contributing the least to global emissions yet disproportionately vulnerable to climatic disruptions, faces a complex task of adapting to technological solutions. According to the Intergovernmental Panel on Climate Change (IPCC), African nations are experiencing "heightened exposure and sensitivity" to climate risks, including food insecurity, Technology city, and loss of biodiversity, magnified by historical inequities and present socio-economic chauffeuring (IPCC, 2022, p. 20). These challenges demand an urgent need for exploring how AI, as a frontier technology, might serve environmental sustainability without undermining African worldview with a traditional foundation touching on a profound interconnectedness between humanity and nature.

Russell and Norvig (2021) conceptualized Artificial intelligence as "the study of agents that receive precepts from the environment and perform actions" (p. 1). This holds considerable promise for supporting climate adaptation strategies. The application of AI in predictive modelling for agricultural yields, early warning systems for extreme weather, and optimized resource management have been celebrated for their potential to "revolutionize responses to environmental degradation" (Rolnick *et al.*, 2019, p. 2). Suchman (2007) argues that, technologies are "never neutral tools" but are "embedded with the assumptions and priorities of their creators" (p. 226). Therefore, the deployment of AI solutions in African environmental contexts will necessitate a deliberate interrogation of whose knowledge, values, and environmental philosophies are being advanced.

This calls to question, the full understanding of traditional African eco-system which is deeply rooted in the notions of force, harmony, and community offering an essential counterbalance to the mechanistic and utilitarian perspectives often implicit in contemporary technological discourses. Tempels (1959) for instance, articulates the African metaphysical commitment to "vital force," emphasizing that every being, animate or inanimate, participates in an interconnected web of existence where the flourishing of one is contingent upon the flourishing of all (p. 43). Similarly, Mbiti (1969) avers that the African conception of existence is fundamentally relational: "I am because we are; and since we are, therefore I am" (p. 108). In environmental terms, this relational ontology engenders a stewardship ethic where land, rivers, forests, and animals are not mere resources but integral parts of the community to be respected and nurtured. Integrating AI into such a worldview, therefore, requires a profound reorientation of technological design and application, one that is culturally sensitive, inclusive, and aligned with indigenous ecology.

The research problem then, is the tension between modern AI-driven approaches to environmental sustainability and the traditional African worldview's holistic eco-ethic. AI systems, by their nature, often give premium to optimization, efficiency, and control. These are values that can conflict with the African emphasis on balance, coexistence, and respect for natural forces. For instance, while AI might optimize agricultural production through precision farming, traditional African farming practices often involve rituals, seasons, and community deliberations that cannot be captured by mere data inputs. To this end, Escobar (2018) warns that, "technology, development, and globalization have historically marginalized other ways of knowing and being, favouring a singular, modern ontology" (p. 34).

This study thus aims to explore the dialectical relationship between AI technologies and African eco-philosophy in the context of

climate change mitigation and adaptation. Specifically, it seeks to (i) critically examine how AI technologies can support or undermine environmental sustainability in Africa; (ii) analyze the core tenets of the African worldview relevant to environmental stewardship; and (iii) propose a framework for integrating AI into African environmental strategies in ways that respect and enhance indigenous ecological knowledge.

Methodologically, the study will adopt a dialectical approach, recognizing that the relationship between AI and the African worldview is not one of simple opposition or synthesis but one characterized by tension, contradiction, and the potential for transformative integration. The study also employs analytical methods to unpack specific cases where AI has been implemented in African environmental contexts, examining the assumptions, outcomes, and cultural negotiations involved. Through a detailed analysis, the study will investigate whether and how indigenous environmental philosophies have been accommodated, ignored, or transformed by technological interventions because "indigenous knowledge systems are critical for the survival of marginalized communities in the face of global change" (Hoppers 2002 p. 9)

The Climate Change Conundrum in Africa

Climate change represents one of the most pressing existential threats to the African continent. Africa, it is held, is warming faster than the global average; with projections indicating that "temperatures over African land mass will rise faster than the global land average" even under the most optimistic emission scenarios (IPCC, 2022, p. 14). These causes the reduction in agricultural yields, increased frequency of extreme weather events, worsen water scarcity, and the destabilization of ecosystems fundamental to African livelihoods. Niang *et al*., (2014) hold that "by 2050, major cereal crop yields could decline by up to 22%" due to climate-related stresses" (p. 1201).

Given that over 60% of Africa's workforce is employed in agriculture, such a decline threatens not only food security but also a broader economic stability. Tschakert (2007) argues that, "vulnerability in Africa cannot be adequately understood without considering the socio-historical processes that have shaped uneven exposure and adaptive capacity" (p. 388). This complexity necessitates climate solutions that are not merely technical but also socially transformative. Bond (2012) stresses that the dominant climate governance structures, particularly mechanisms like the Clean Development Mechanism (CDM), "have systematically sidelined African priorities in favour of market-driven approaches" (p. 48). Hence, Isife (2023b) has argued that climate solution, "just like many other realities in traditional Africa, follows the principle of complementarity" (p.8). So, pluralistic approaches are inevitable for climate solutions in Africa.

African Worldview of Force, Harmony, and Nature

The African worldview is deeply rooted in the relational ontology of being. Traditional African cosmologies hold dearly the concept of force which is a metaphysical principle that permeates all existence. Tempels (1959) writes that, "force is the essence of being; being is force" (p. 51). Here, every entity, whether human, animal, plant, or even mineral, is imbued with a dynamic vitality that binds it to the wider cosmos. Unlike Cartesian dualism which separates mind and matter, or human and nature, the African metaphysical system insists on an integrated and interdependent vision of life. This ontological principle of force grounds the African ethical orientation toward nature.

Mbiti (1969) further asserts that, "the universe is a religious universe: the visible and invisible worlds are one" (p. 41). This suggests that environmental stewardship is not merely a matter of utility or resource management but a profound moral obligation. The land, rivers, forests, and animals are not seen as inert commodities but as living entities with spiritual significance,

deserving reverence and care. Harmony here becomes the corollary of this ontology of force. The African worldview posits that the health of the individual, the community, and the environment are intricately tied such that imbalance in one sphere echoes across the others. According to Bujo (1998), “an action that disturbs the harmony of the cosmos brings misfortune not only to the doer but to the entire community and nature itself” (p. 85). Thus, ecological degradation is not solely an environmental issue but a communal, spiritual, and moral crisis.

The practical expression of this cosmology can be seen in indigenous environmental practices that prioritize balance, renewal, and respect for natural limits. Berkes (2012) observes that many African indigenous knowledge systems operate through a principle of “adaptive management," characterized by practices such as rotational farming, sacred groves preservation, and water conservation rituals (p. 46). These practices arise from a worldview that understands sustainability not as a modern invention but as a way of life enhanced through generations of relational engagement with the land. In addition to relationality and harmony, communal responsibility stands as a pillar of the African ecological ethic. Wiredu (1996) emphasizes that African ethics are “primarily communal rather than individualistic" (p. 154), a value orientation that extends to environmental stewardship. While Isife (2022) avers that “traditional African identity can be sought out from three areas namely: communalism (social), religion and ethics or values. These are areas in which traditional Africans left their imprint on the sand of time”. (pp: 51-52).

This communal environmental ethic sharply contrasts with neoliberal models of environmental management which gives credence to privatization, individual property rights, and market-based conservation schemes. Ndlovu-Gatsheni (2013) avers that, "colonial modernity sought to displace African communal values with capitalist logics of accumulation and ownership" (p. 89). In

the environmental arena, this epistemological shift has often led to practices that undermine indigenous sustainability practices. Sacred natural sites provide a good illustration of the African philosophy of environmental reverence and protection. In many African societies, certain forests, rivers, or mountains are designated as sacred, permeated with spiritual significance, and protected through taboos and rituals. Mugambi (1989) notes that "the sacredness of the earth is deeply embedded in African religious consciousness, and the desecration of land is tantamount to a grave moral offense" (p. 102).

Another interesting dimension to the African environmental worldview is the understanding of time and cycles. Unlike the linear, progress-oriented conceptions of time that dominate Western modernity, African cosmologies often conceptualize time as cyclical and regenerative. Gyekye (1995) notes that, "African time consciousness emphasizes seasons, rhythms, and the interconnectedness of past, present, and future generations" (p. 92). This cyclical understanding of time creates a deep respect for natural rhythms and seasonal variations, grooming agricultural and social practices that are attuned to ecological processes rather than abstract economic necessities. This take on time also supports the ethics of intergenerational responsibility.

Achebe (1958) points out that the land is not owned by the living alone; it is a sacred trust inherited from ancestors and held for posterity. It is in the same vein that Isife(2023b) maintains that "there is a great link and interaction between the dead, the living and the unborn which is perpetuated through the knowledge and worship of Earth Goddess" (p.12). Moreover, Ramose (1999) argues that Ubuntu "encompasses not only interpersonal relations but relations with all forms of being in the universe" (p. 52). Thus, environmental harm is not merely an attack on nature but a rupture in the fabric of communal and cosmic interconnectedness. Significantly, African epistemologies recognize the agency of

nature. In many traditional beliefs, rivers, mountains, forests, and animals are understood to possess will, intention, and even consciousness.

Moreover, storytelling, proverbs, and oral traditions serve as crucial vehicles for transmitting environmental knowledge and values across generations. Vansina (1985) explains that, "oral traditions encapsulate complex ecological knowledge, ethical norms, and cosmological insights" (p. 19). For instance, proverbs about the wisdom of trees, the patience of rivers, or the resilience of the earth serve as mnemonic devices that embed ecological stewardship into the cultural fabric. The loss of indigenous languages, the erosion of ritual practices, and the marginalization of oral knowledge traditions represent not merely cultural losses but environmental ones as well.

In the light of the African worldview of force, harmony, and nature, it becomes evident that any sustainable technological interventions, particularly those involving AI, must be sensitive to and inclusive of these profound philosophical commitments. The relational, communal, cyclical, and spiritual dimensions of African ecological ethics without doubt will provide resources for rejigging technological futures that are not merely efficient but also just, inclusive, and lifesaving.

The Fusion of AI into African Worldview for Climate Sustainability

The convergence of artificial intelligence (AI) with African worldviews on nature and sustainability will necessitate a fundamental rethinking of both technological design and environmental governance. Rather than treating AI as a neutral or universally applicable tool, it is imperative to view it as a socio-technical system that must be culturally contextualized to respect

the philosophical traditions, ecological ethics, and communal structures intrinsic to African societies. Suchman (2007) agrees that, "technological artifacts are not merely technical but are saturated with social, cultural, and political meanings" (p. 225).

The first principle in achieving this fusion is recognizing indigenous knowledge as epistemically valid and not merely as folklore or cultural background. Odora Hoppers (2002) affirms that "indigenous knowledge systems constitute organized bodies of thought and practice developed through generations of critical observation and interpretation" (p. 8). In the area of climate change adaptation, traditional African practices such as rainfall prediction based on animal behaviors, the use of sacred forests as biodiversity reservoirs, and rotational farming shows sophisticated ecological understandings. Isife (2022) explains that “unveiling traditional African identity entails an excursion into Africa's past. It may not be easy to glean through all the features of this history. But it is undoubted that traditional Africa has an existential lived situation”. (p. 50).

AI systems designed to support environmental sustainability in Africa must therefore integrate, rather than supplant, these rich reservoirs of localized knowledge. This integration requires participatory methodologies in AI system design just as Smith *et al*. (2019) argues that "designing AI systems with marginalized communities, rather than for them, fosters trust, relevance, and long-term sustainability" (p. 56). In African environmental schema, participatory design would entail engaging traditional ecological knowledge holders such as elders, farmers, spiritual leaders, and community groups in defining the problems to be addressed, the data to be collected, and the metrics for evaluating success. Such an approach will shift the locus of technological authority from external experts to the communities themselves.

Moreover, the philosophical commitment to harmony and relationality that supports African environmental ethics must capture AI modelling processes. Rather than enhancing exclusively for efficiency or resource extraction, AI algorithms could be designed to prioritize ecological balance, biodiversity preservation, and intergenerational equity. An AI system grounded in such principles would, for instance, recommend agricultural practices that support soil regeneration and communal land rights over industrial assertion, even if the latter appear economically superior in the short term. Farmers are not passive recipients of technological solutions but active co-creators, producing localized innovations that respect indigenous farming calendars, ecological beliefs, and communal labour systems. This participatory AI model would bridge how technology can be reoriented to serve, rather than disrupt, African ecological wisdom.

Another dimension critical to fusing AI with African worldviews is embedding ethical safeguards against the risk of epistemicide and cultural dislocation. Ndlovu-Gatsheni (2015) warns that "modern knowledge systems have historically engaged in the systematic erasure of non-Western ways of knowing" (p. 75). In the environmental sector, the imposition of external AI systems that ignore local ontologies could further these patterns of domination. Consequently, AI governance agendas in Africa must be explicitly decolonial, protecting indigenous knowledge rights while ensuring data control.

Also, the fusion of AI with African worldviews also requires rethinking data ontologies since traditional AI systems are premised on standardized and reductionist data models that seek universal patterns. African indigenous knowledge systems, by contrast, value contextual, relational, and often non-quantifiable knowledge. On this, Agrawal (1995) contends that, "the separation between indigenous and scientific knowledge systems is often based on the privileging of universalism over context-specific

ways of knowing" (p. 416). Bridging this epistemic gap will demand AI models capable of integrating qualitative data such as oral histories, proverbs, and ritual practices alongside quantitative metrics.

For instance, machine learning models could be trained not only on satellite imagery and meteorological data but also on localized ecological indicators, such as traditional signs of seasonal changes (bird migrations, flowering of specific plants) recognized by local communities. Furthermore, AI technologies merged with the African notion of force and vitality will challenge prevailing assumptions in AI ethics about the inertness of non-human entities. Where Western AI ethics frameworks often prioritize human rights and anthropocentric concerns, an African-informed AI ethic would recognize the rights and intrinsic value of rivers, forests, and animals. Sila (2015) exclusively assert that, "African environmental philosophy affirms the sacredness and agency of the earth itself" (p. 93).

This philosophical shift has practical implications for climate sustainability action. Conservation strategies powered through AI will place more premiums on ecological restoration projects that honour sacred sites and maintain biodiversity corridors essential for the spiritual and physical health of communities. Rather than focusing narrowly on carbon impounding targets, these AI systems would support holistic ecological well-being, in alignment with traditional African concepts of wholeness and reciprocity. In addition, the temporal orientation of African environmental worldviews emphasizing cyclical time and intergenerational continuity should guide the temporal contexts embedded within AI models so that "respect for ancestors and concern for descendants are twin pillars of African moral consciousness" (Gyekye 1995 p. 99).

Evaluation

It is evident that African environmental worldviews and AI systems are not inherently antagonistic. Both embody the need to make the environment harm-free albeit grounded in different epistemological traditions. AI, when properly contextualized, can complement African eco-philosophies by enhancing the predictive and monitoring capacities essential for the present climate efforts. Since, "machine learning offers powerful tools to aid sustainability efforts by improving prediction, optimization, and modelling of complex systems" (Rolnick *et al.* 2019 p. 3), these tools can be designed and governed in ways that respect African relational ethics, they could significantly bolster local capacities to adapt to climate change.

However, achieving this complementarity is contingent on reconfiguring dominant technological models as Suchman (2007) reminds us that, "the assumption that technologies can be designed independently of their contexts of use must be abandoned" (p. 227). AI systems must therefore be co-constructed with African communities, inspiring indigenous values such as communal stewardship, ecological reverence, and intergenerational responsibility into their designs. Without this, AI risks becoming another path of epistemic and ecological colonization.

Moreover, a critical evaluation must address the philosophical tensions between the African ontology of force and vitality, and the mechanistic underpinnings of most AI systems. Where African worldviews see nature as animate, sacred, and interconnected, AI tends to abstract nature into datasets and variables optimized for human-defined goals. Arising from this, Harding (2011) argues that, "scientific-technical knowledge systems are structured by particular ontological and epistemological assumptions, often rooted in Eurocentric traditions that separate humans from nature" (p. 7). There must be a more pluralistic adaptation and relational epistemology, which acknowledges that environmental entities

possess agency, value, and rights independent of human utility.

Furthermore, the African principle of ubuntu, with its emphasis on relationality, collective responsibility, and humaneness, holds critical ethical lens for evaluating AI impacts. Ramose (1999) proposes that ubuntu demands an orientation toward technologies that enhance communal well-being and cosmic harmony rather than individual gain or domination. Applying this to AI would prioritize models that support community resilience, ecological integrity, and social equity over those that merely optimize technical or economic gains. AI models designed with African worldviews in mind would therefore prioritize long-term environmental health, cultural continuity, and community autonomy over short-term outputs. Hence, Isife (2023a) notes that "the term indigenous science is usually understood to be referring to areas of human inquiries in astronomy, indigenous physics, ethno-medicine, ethno-botany, ethno-zoology, as well as ethno-psychohistory" (p.42). At the foundation of this science is African worldview, which is so relevant to AI designs for Africa.

Most AI technologies are developed by multinational corporations headquartered in the Global North, with incentives aligned toward profit maximization rather than sustainability or cultural preservation. Decolonizing AI in the environmental sector thus requires not only technical adaptations but systemic transformations in who designs, controls, and benefits from technological innovation. This will demand a commitment to epistemic humility, participatory governance, infrastructural investment and philosophical pluralism. Only through such a holistic and critical approach can AI become a tool for ecological regeneration and cultural revitalization, rather than another

mechanism of extraction and domination.

Conclusion

The grim realities of climate change present profound challenges for African societies, necessitating innovative yet culturally grounded approaches to environmental sustainability. This study has explored the intricate connections between artificial intelligence (AI), climate change, and the African worldview, showing that sustainable futures in Africa must be built on the twin pillars of technological innovation and indigenous ecological wisdom. The African worldview, with its deep commitment to relationality, communal responsibility, reverence for nature, and intergenerational focus, holds great philosophical resources that are indispensable for reimagining AI's role in environmental governance.

The deployment of AI in African environmental contexts must be critically mediated to avoid replicating historical patterns of epistemic domination and ecological extraction. The dialectical relationship between AI and African eco-philosophy reveals that integration is possible but contingent on a fundamental reorientation of both technological and epistemological assumptions. AI systems must not merely be applied to African problems but must be co-designed with African communities, drawing upon indigenous knowledge systems that have sustained ecological balance for centuries.

The study invites the cultivation of AI systems that are relational rather than extractive, inclusive rather than exclusionary, and regenerative rather than exploitative. Building such systems demands humility, dialogue, and solidarity across disciplines, cultures, and generations. By fusing the dynamism of AI with the wisdom of African ecological philosophies, it is possible to forge paths toward a future where technology serves and save life life,

community, and the flourishing of the earth itself.

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