

EXPLORING SUSTAINABILITY IN AGRICULTURAL ECOSYSTEM THROUGH ALDO LEOPOLD'S "A SAND COUNTY ALMANAC" AND POSTHUMANISM PHILOSOPHY

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Summary

The agricultural ecosystem is facing a significant threat due to human activities, with a 29.6% increase in global agriculture-related issues as at 2023. This research engages literature reviews and analysis of secondary data to emphasise the interconnectedness of all living organisms, post-humanist perspectives, agroecology and the importance of biodiversity conservation. By exploring a comparative case study of two continents to argue for the universality of sustainable agricultural challenge, this research result proposes innovative ideas embedded in literature (interdisciplinary approach) and data driven analysis.

Keywords: sustainable agriculture, development, post-humanism, agroecology.

Introduction

The negative impact of human activities on the agricultural ecosystem cannot be over-emphasized. In 2023, The Food and Agricultural Organization of the United Nation recorded a 29.6% increase in global agriculture related issues (Food and Agriculture Organization (FAO), 2023). Due to increase in population and hunger globally, the demand for food has been rising rapidly yet agricultural production suffers significant environment influences such as: degradation of agricultural land, pollution of rivers and aquifers due to agro-chemicals, increased freshwater consumption, greenhouse-gas emissions from agriculture and land-use change, loss of agro-biodiversity and other negative consequences (Editorial Nature, 2018). All of these environmental impacts severely undermine our ability to continue to feed a growing population and ultimately will jeopardise the opportunity to achieve sustainable development in the Agricultural sector, unless more sustainable food-production practices are embraced globally (Calicioglu, 2019; Berihun, 2021; Kanianska, 2016), thus calling for urgent attention. This research draws from Leopold's literature, frameworks for paradigmatic change by emphasising the need to drive a sustainable agricultural ecosystem through interconnectedness and interdependence of all living organisms within the planet which can be made possible by understanding the dynamics and global universality of contemporary agricultural issues and engage a re-designed approach towards solving the problem. As such, it further engages a post-humanist perspective which entails recognizing the reciprocal relationships between humans and non-human organisms, the importance of biodiversity conservation and focusing on the ideologies behind man-induced environmental problems.

Research aim: To identify the ideologies behind man-induced environmental problems and propose frameworks to promote agricultural ecosystem sustainability.

The following **objectives** have been set to achieve the aim:

1. To assess development trends in agricultural sustainability over the last decade.
2. To examine Agricultural trend across two continents (nations as case studies) to establish a universal call.
3. To advocate for a symbiotic partnership with the environment by encouraging and promoting pre-existing sustainable practices at the local and regional levels using Aldo Leopold's work.

Research object and methods

In this study, I evaluated the impact of human activities on agriculture sustainability as a globally-universal problem irrespective of location, using data to interrogate the inconsistent trends of sustainable agricultural development within the period of one decade (2013-2023) in contrasting agro-ecological environments: Nigeria (Africa) and Lithuania (Europe).

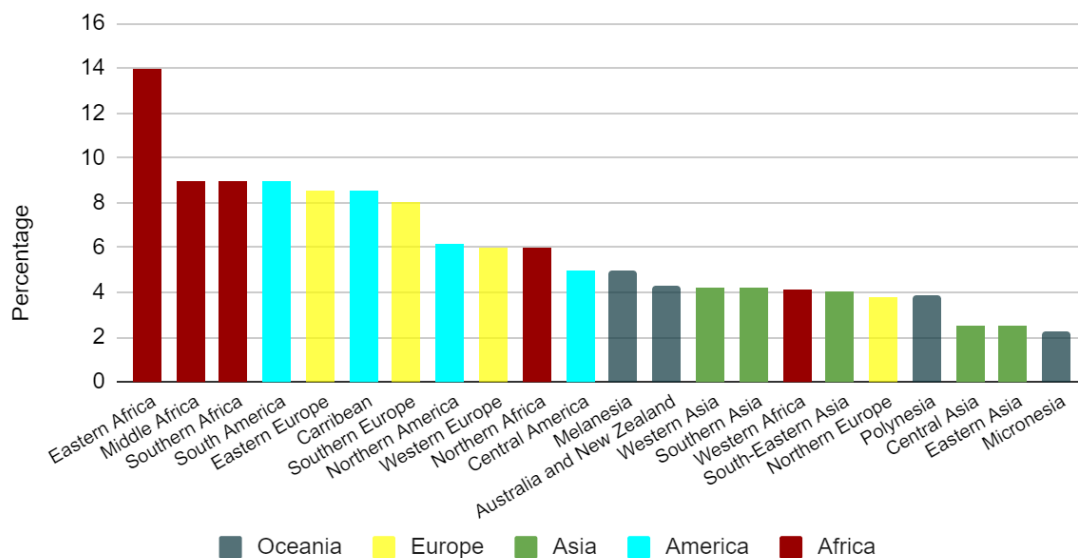
This research was done with reviews and data from previous scholarly works, peer-reviewed and non-peer-reviewed articles, with inclusion and exclusion criteria of article years, geographical location. specific keywords used to search for data were: agricultural sustainability, development trends, agroecology, global agriculture. These keywords were used in order to find relevant studies in developed and developing countries with specific focus on Europe and Africa (two continents/countries) pragmatically available for factual cross-reference to this conference and the paper author.

Research results and discussion

Sustainable agriculture is a system of farming that strives to provide the resources necessary for present human populations while conserving the planet's ability to sustain future generations (Dublely, 2024). Not only is agricultural sustainability a necessity to maintain and improve the quality of agricultural produce without exacerbating environmental degradation, it is also a panacea to solve ongoing challenges within the sector. Palomo-Campesino et Al. (2018) avows that- "current trends of global change are threatening the supply of agrarian ecosystem services on which human well-being depends". According to FAO, a sustainable agricultural system revolves around four pillars i.e. The **availability, access, utilisation** and **stability** of food supply (Food and Agricultural Organization, 2017) and sustaining the efficiency of these pillars remains a global challenge which this paper zooms in to proffer contributions.

From the below chart, it is not farfetched to allude that quantitative analysis of agricultural sustainability indicators over the last decade reveals both positive and negative trends (Echegaray et al., 2022) militating against the possibility of achieving a sustainable ecosystem beneficial to both humans and non-human (Agricultural products).

TOTAL AGRICULTURAL LOSSES BY SUBREGIONS (1991-2021)

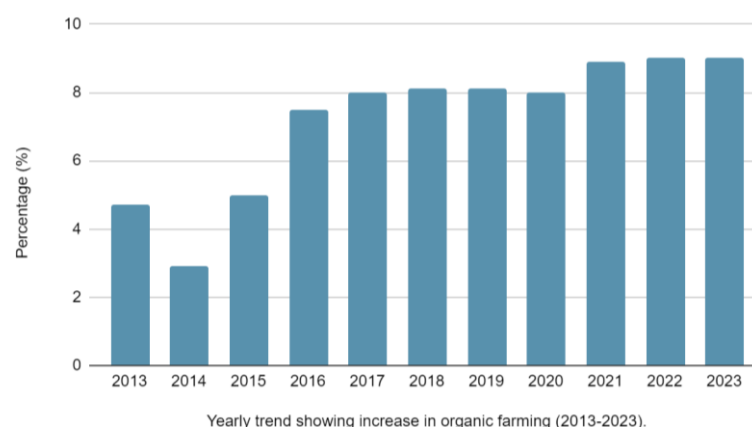


Source: The Impact of Disasters on Agriculture and Food Security 2023.

Figure 1. Statistical exposition of agricultural challenges across countries

Although organic farming and conservation tillage are examples of sustainable agriculture approaches that have advanced within this period, yet issues with pesticide use, degraded soil, and water pollution still exist. Some research findings reveal the detrimental effects of exploitation-driven agricultural practices. According to Ashoka et.al. (2023), farmers express concerns about soil depletion, loss of biodiversity, and the increasing prevalence of pests and diseases (Ashoka et al., 2023). Similarly, Ma et al. (2019) suggests that new management regimes in pursuing a sustainable agricultural system could revolutionise agricultural production, however, it requires an evaluation of the risks and opportunities. For instance, replacing existing conventional weed management with genetically modified, herbicide-tolerant (GMHT) crops might reduce herbicide applications and increase crop yields, but falls into a questionable trap owing to concerns about potential impacts on biodiversity (Ma et al., 2019). Organic agriculture as a production system aims at sustaining healthy soil, ecosystems and people by prohibiting the application of synthetic pesticides and fertilisers in crop production, is better-off when compared to nonorganic agriculture. But the positive effects on biological control services or emission of greenhouse gases are less evident, such that yield gaps between organic and non-organic agriculture are on average 20% (Birkhofer et al., 2016). As seen in the data below in Figure 2.

The unbalanced report above from EU 2023 country's report on sustainable Agriculture in Figure 2 (Progressive growth of organic farming over inorganic farming system) and Figure 3 (Shows' vulnerability and medium low rating on yield output of organic farming system in Lithuania-LT) developmental trends shows that despite the efficiency of modern agricultural systems, there are significant drawbacks it experiences such as: degradation of ecosystems and biodiversity loss, crops and human (consumers) health risks (Terence, Purushothaman, 2020). Compared to the EU average, Lithuania shows an overall lower level of capacities across all RDB indicators, negating its capacity to promote socio economic equity, earn profit, and maintain ecosystem welfare to ensure the wellbeing of all (Dublely, 2024). Additionally, research shows that more than any other sector, agriculture is the common thread which holds the 17 SDGs together and investing in the agricultural sector can address not only hunger and malnutrition but also other challenges (Farming First, 2024). However, the big question remains - are we doing it right? What approach can best provide an effective sustainable agricultural ecosystem?



Source: European Commission. 2023, p. 34

Figure 2. Percentage (%) of Organic Farming in Lithuania from 2013-2023

Dimension/Area	Vulnerability		Capacities	
	LT	EU-27	LT	EU-27
Social and Economic	Low	Medium	Medium	Low
Inequalities and social impact of the transitions.	Low	Medium	Medium	Low
Health, education and work.	Low	Medium	Medium-high	Low
Economic & Financial stability and sustainability.	Medium	Medium-high	Medium	Low
Green	Low	Medium	Medium	Low
Climate change mitigation & adaptation.	Low	Medium	Medium-high	Low
Sustainable use of resources.	Low	Medium	Medium	Low
Ecosystems, biodiversity, sustainable agriculture.	Medium	Medium	Medium-high	Medium

Source: European Commission. 2023, p. 38

Figure 3. 2023 European Union Country Specific (Lithuania) RDB Ratings on vulnerability and Capacity Index

In response, this paper suggest that sustainable agricultural ecosystem can be achieved by a tripartite methodology of a (1) Universal approach (for both developed and developing countries), (2) Holistic Approach (people-centred and planet-sensitive), (3) Measurable approach (to drive action and track progress). First, it is pertinent to push forward the argument that the desire for Sustainability in agricultural ecosystems is a universal challenge that cuts across continents. Using a converging lens approach on specific developing countries, (with a relatable fact database¹) I will set below two case studies using Nigeria (Third world developing country) in Africa and Lithuania (Second world developing country) in Europe as such;

Case study 1: Nigeria, West Africa, Africa. Nigeria has an arable land area of 34 million hectares: 6.5 million hectares for permanent crops, and 28.6 million hectares on meadows and pastures. Agriculture accounts for about 23% of Nigeria's Gross Domestic Product (Food and Agriculture Organization (FAO), 2023). The country is a leader in various types of agricultural production, such as palm oil, cocoa beans, pineapple, and sorghum. It is the largest producer of sorghum in the world just after the United States, and ranks fifth in the production of palm oil and cocoa beans (PricewaterhouseCoopers (PWC), 2021). Despite the contribution to the economy, Nigeria's agricultural sector faces many challenges which impact on its productivity and have worsened over the last 5 years, these include: poor land tenure system, low level of irrigation farming, climate change and land degradation (Dorosh and Thurlow 2016; Mathlouthi et al., 2022). Others are low technology, high production cost and poor distribution of inputs, limited financing, high post-harvest losses and poor access to markets. Also, climate change is exacerbating these challenges, as Nigeria experienced widespread flooding in September and October 2022 (Balogun and Sefihiat, 2023). These challenges stifled agricultural productivity from achieving a satisfactory sustainable agricultural ecosystem.

Case Study 2: Lithuania, Europe. Lithuania covers an area of 65,000 km² of which 85% is rural. Farmland comprises 60% of the area and the rest is forest (32%). The sector accounts for a higher share of the national gross value added than the EU average (i.e. nearly 4% of GDP, as compared to the EU average of 1.7% of GDP). There is a well-

¹ https://www.nationsonline.org/oneworld/third_world_countries.htm Accessed 14th March, 2024. t

developed network of farm advisory services. One fifth of farmland is under high nature value systems of farming (Organic Farming), yet, this sector is faced with challenges concerning environment and land management, some of which are: the preservation and improvement biodiversity, polarised farming, water and soil pollution, falling levels of livestock, fruit and vegetable production, addressing soil acidity and erosion, increasing soil organic matter, and reducing GHG emissions from agriculture (European Union, 2023). According to the 2023 European Union country report, 55 million tonnes of potatoes harvested across the EU in 2020 was about one-quarter (-27.4 %) less than in 2000². Also, in Lithuania the agricultural sector remains the second largest emitter of greenhouse gases in Lithuania, with emissions on a generally upward trend since the turn of the century. Ammonia emissions from agriculture are hampering efforts to reduce air pollution, and the downward trend in air pollution emissions is not strong enough for Lithuania to meet its emission reduction commitments. This calls for more action by stakeholders to help achieve the national and EU climate targets, this goal is actively supported through financial contribution of the common agricultural policy (CAP) promoting social, environmental and economic sustainability and innovation in agriculture and rural areas, in coordination with other EU funds (European Union, 2023)

It is pertinent to note that these findings underscore the urgent need for paradigmatic shifts in agricultural ecosystem approaches towards achieving sustainability. Such that, achieving agricultural ecosystem sustainability requires deconstructing various challenges, ranging from entrenched industrial agriculture practices to policy inertia, and socio-economic barriers. However, as researchers one should note that there are also opportunities for innovation, collaboration, and policy reform to foster transformative change, to this end I propose suggestions from posthumanism, agroecology and Leopold's philosophical work.

Post-humanism is a formulated continental philosophical idea influenced by the need to consciously advocate for an existence not limited to man alone or anthropocentrism. It is a process by which the welfare of other agencies beyond 'man' are placed into consideration. Posthumanization comprises "those processes by which a society comes to include members other than 'natural' biological human beings who, in one way or another, contribute to the structures, dynamics, or meaning of the society" (Gladden, 2018). Within the context of this research, this description entails plants, crops, and livestock whose interaction and existence influences the ecosystem just as human activities. Ecological humanism offers a third future, which takes the view that human beings are capable of transforming their societies in order to promote the flourishing of both humanity and nature in the face of ecological crisis, inspired by empathy towards the consequences of man's action on the field, animal grooming and plants cultivation. This approach of agro-posthumanism establishes a symbiotic consciousness that the actions of either agents (humans vs Agro-non-humans) is dependently interwoven on a quality output which can be safe or unsafe.

Leopold's literature on "A Sand County Almanac" emphasises the moral responsibility of humans to care for the land and its inhabitants. His work underscores the need for a shift in human attitudes and behaviours towards a more harmonious relationship with nature, specifically he shares his idea of land ethics, emphasising on a responsible relationship existing between people and the land they inhabit, he asserts that "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community, it is wrong when it tends to be otherwise". Leopold discusses a wide range of ecological ethics sharing his monthly experiences of how "development" and technological advancement are established at a cost i.e. in exchange of harm to our home and environment (community), according to him "... we are not sure, in our hearts, that we have gained by the exchange." I often find myself torn between the comforts provided by modern technology and the desire for a sustainable and thriving environment. (Leopold, 1949).

Furthermore, this research, leveraging on Leopold's expository ideas, pushes forward an agroecological approach to achieving a sustainable ecosystem in Agriculture. Agroecology is a science, practice, and movement that studies, develops, and promotes ecological processes that sustain agricultural production. It combines traditional ecological knowledge with modern scientific knowledge to create more sustainable and resilient food systems (Tracextech, 2023). Agroecology approach combines ecological principles with agricultural systems to promote resilient, environmentally friendly, and socially equitable food production. Summarily, promoting the understanding that all things are connected but the nature and strength of the connection varies and that climate change will increasingly influence all types of ecosystems can serve as a panacea and effective approach towards achieving a complementary sustainable agricultural ecosystem.

Lastly, investing in direct advocacy through community awareness, education outreaches where farmers and community members are equipped with knowledge about post-humanism, policies and their roles (directly and indirectly) in achieving a sustainable agricultural system is key. Empowering farmers with knowledge and skills in agroecology, soil conservation, and biodiversity conservation can catalyse positive changes at the grassroots level. Simultaneously, the effect of this advocacy, challenges weak loopholes within governmental policies and challenges structures to be reformed, because effective policies are essential to; regulate & implement sustainable agricultural practices, promote agro-ecological concepts, support grassroots farming and alleviate environmental challenges associated with industrial-scale agriculture.

Conclusions

This research findings establishes the instability of sustainable development within the global agricultural ecosystem and advocates for the acknowledgement of the role of a symbiotic relationship in achieving a sustainable agricultural ecosystem. Case studies and data examined within the paper supports the argument on the universality of this

²https://ec.europa.eu/eurostat/statistics-explained/index.php?title=The_EU_potato_sector_-_statistics_on_production,_prices_and_trade#Production:_area.2C_harvest_and_farms Accessed 14th March, 2024.

problem across major countries and proposes pragmatic methods of how deliberate consciousness on the symbiotic partnership between humans and the environment through regenerative agriculture, ecological restoration, and community-driven initiatives, can change the narrative with the end goal of improving farming systems and food security needed for the ever growing population.

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