EFFECTIVENESS OF TRADITIONAL ECOLOGICAL KNOWLEDGE SYSTEMS AND CONSERVATION OF NATURAL RESOURCES IN ACHIEVING SUSTAINABLE ECONOMY IN NIGERIA

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Abstract

This paper explores the effectiveness of Traditional Ecological Knowledge (TEK) systems as a pathway to achieving a sustainable economy through the conservation of natural resources. TEK represents the cumulative body of knowledge, beliefs, practices, and cultural values developed by indigenous communities over generations in close interaction with their environment. These systems have historically guided the sustainable use of land; forests, water, and biodiversity, offering models of resilience that predate modern industrial approaches. The study emphasises how TEK supports biodiversity conservation, sustainable land tenure, agroforestry, and livestock farming practices, whilst also safeguarding cultural heritage and spiritual values. It highlights African examples, particularly within Nigeria, where taboos, customary rules, and indigenous religious practices contribute to environmental preservation. Furthermore, the paper notes that integrating TEK with modern scientific and policy frameworks provides a holistic and eco-friendly strategy for resource management. By drawing on global and local perspectives, this paper argues that TEK is not merely a cultural relic but a vital tool for addressing pressing ecological and developmental challenges. The findings underscore the need for policymakers, educators, and conservationists to embrace TEK to strengthen community-based resource management and advance sustainable development goals. The study also reveals that traditional ecological practices—such as indigenous farming methods, forest and river conservation through taboos, and intergenerational knowledge transfer—remain active in Imo State. These practices contribute significantly to environmental sustainability and the rural economy. The study identified major factors hindering TEK preservation, including modernization, poor documentation, and lack of formal educational support. It further revealed that land policies and rights-based approaches affect community participation in resource conservation. Environmental adult education, when culturally grounded and community-driven, was shown to be an effective strategy for promoting TEK. Based on these results, the study concludes that TEK can be sustained through targeted adult education interventions. It is recommended that educational policymakers integrate TEK into adult education curricula and involve local knowledge holders in programme delivery to strengthen sustainable environmental practices.

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Introduction

Traditional Ecological Knowledge (TEK) comprises the accumulated, place-based knowledge, practices, and beliefs by indigenous and local communities that guide the sustainable use of natural resources. Linking TEK to Environmental Adult Education (EAE) helps to translate this knowledge into community-led learning, capacity-building, and

stewardship that support a sustainable economy (Brondízio et al., 2021; EAEA, 2021). Recent research emphasises the role of adult learning in enabling behavioural change for conservation and resilient livelihoods (Zarestky, 2024; Fitzwilliams-Heck, 2021).

EAE approaches—such as participatory workshops, farmer-to-farmer learning, and community learning circles—can revitalise the transmission of TEK to younger generations and adapt practices to contemporary challenges (Souther et al., 2023; Brondízio et al., 2021). In Nigeria, integrating TEK with EAE offers a practical pathway to strengthen sustainable resource management, local entrepreneurship, and green livelihoods. Community-based adult learning that foregrounds indigenous practices has been shown to improve resource and local conservation outcomes (Adeyanju, 2022; Onyekwelu, 2022).

Traditional ecological knowledge systems have been of an insurmountable issue globally due to its importance to man, the entire ecosystem and sustainability issues. Traditional knowledge systems are simple systems exhibited or practices in our different indigenous settings which helps encourage the conservation and preservation of national resources which supports sustainability in return.

Alcorn J. B. 1993(traditional ecological knowledge concepts and cases). Despite personal moves culture been a way of people's life includes their belief systems activities satiations and enthronization delve into the optimization of these indigenous practices in return. National resources are in full abundance on which the people on a particular environment depends on for their existence all these national endowment to a particular sect by nature could be inherited in the form of forest, a particular vegetation, landscape, mineral extracts, rivers oceans, seas, streams, different plains and plateau, fertile agriculture, biodiversity species etc. that are naturally given be nature.

There has been series of concern raised about the effort most conservation systems/organizations have put in conserving these resources and their outcome so far, globally most scholars, researchers have contributed to lack of wholesome management skills and commitment to the conservation of these resources through these belief systems. Which is referred to as a traditional belief system Despite the existence of traditional knowledge over thousands of years, recognition was made about far decades ago by western scientific community as vulnerable sources of ecological information. (Johnson 1992). This consciousness is diversely tagged as an indigenous technical knowledge ethno ecology, native science, local knowledge, folk knowledge, traditional knowledge, traditional ecological knowledge (hereafter TEK) and people's science (Berkes, 2008, Jon et al 2018).

According to Johnson (1998)TEK secured a global recognition through the declaration of reports by the international union for the conservation of nature and natural resources (IUCN) and our common future by the world commission on environment and development tittles world conservation strategy consequently in September 1991 the united nations educational, scientific & cultural organization Canada man and the Biosphere program and the Canadian environmental research cooperatively supported the international workshop on indigenous knowledge and community based resource management after attesting to the fact that TEK is important in planning and decision making for sustainable development following this, the aroused research and expanding growth research over interceding this particular field (Berkes 1993).

Conceptual Framework

TEK is multi-dimensional. Broadly, it includes local ecological knowledge (species, soils, seasons), customary institutions (taboos, tenure, sanctions), material culture (tools, agroforestry systems), and cosmological/ethical frameworks (spiritual norms, reciprocity). Scholars classify TEK into categories such as: 1) resource-use practices (e.g., agroforestry, rotational grazing); 2) social institutions (land tenure, sacred sites); and 3) knowledge systems (oral histories, ritual calendars) (Berkes, 1993; Brondízio et al., 2021).

For policy relevance, TEK components that most directly support a national sustainable economy are: (a) land tenure systems that secure access and incentivise stewardship; (b) agroforestry and mixed-cropping systems that sustain yields and biodiversity; (c) community governance mechanisms that regulate extraction; and (d) cultural observances that foster intergenerational conservation (Ntoko & Schmidt, 2021; Nzeadibe & Ajaero, 2011).
The ensuing discourse will examine strategies for promoting TEK to achieve a sustainable economy in Nigeria, focusing on areas such as natural resource conservation, agricultural practices, and community engagement.

Chacon (2012) and Krech (2005) have pointed out that the existence of traditional beliefs/taboos does not guarantee sustainable harvest of natural resources. But according to (international institute for environment and development 1992) some cultural practices and traditional African religion (ATR) as displayed in most African communities are environmentally friendly and sustainable, thus contributing so much to natural resources sustainability and conservation. In African, especially Nigeria traditional belief systems also known and recognized as TEK (Traditional Ecological Knowledge) attribute supernatural powers to objects himself as gods and goddesses. A fundamental aspect of African traditional religion is the belief that these duties inhabit natural elements such as rocks, streams, pound, oceans, caves, forests, sacred forests, or nay place within the community they wish to reside within the community. These spiritual entities choose their worship through the performance of certain ritual, incantations, initiations etc. The belief system implies that they choose a spoken person that mediates between the worshipers and their spiritual being it could be in the person of a juju priest, chief priest or priestess, the belief system applicable is that these Gods protect and shield the community members a form on tending dangers, harm, danger, famine, bareness, importance, war epidemic etc.

Strategies for Promoting Ecological Knowledge Systems to Achieve a Sustainable Economy in Nigeria

1. Integrate TEK into Environmental Adult Education (EAE) curricula: Develop short courses and community learning modules that document local practices and train adults in participatory natural resource management (EAEA, 2021; Zarestky, 2024).
2. Support community-based documentation and digital archiving: Use participatory mapping and community-led recording to preserve TEK while respecting intellectual property rights (Brondízio et al., 2021; Posey, 1999).
3. Promote inclusive governance and co-management: Establish co-management arrangements where local communities sit alongside state agencies in decision-making for forests, fisheries, and rangelands (Souther et al., 2023; Benyei, 2022).
4. Create incentives for green livelihoods: Provide microfinance, technical support, and market access for sustainable enterprises that build on TEK—such as non-timber

forest products, agroforestry products, and eco-tourism (World Bank, 1998; Das et al., 2021).

5. Strengthen gender-inclusive approaches: Recognise and empower women as custodians of seed systems and local agro-biodiversity through targeted adult training and extension services (Howard, 2003; Onyekwelu, 2022).

Land Tenure Systems

In traditional settings, land management and farming systems are inseparable. Among the Akans in Ghana, the living and the dead even the unborn generations have been considered owners of the land. The living are responsible for taking care of the land on behalf of both parties (Frazer, 1926). This belief has shaped land tenure systems and guided several ethnic groups in Ghana, based on customary laws.

In Nigeria, the land tenure system is predominantly communal. The ownership of land or acquiring land is a communal affair, wherein both agricultural and natural resources are often communal (Osemeodo, 1991). Sustainable management strategies can be observed when natural resources used for traditional healthcare delivery, recreation, food, and income generation are conserved through these traditional rules.

Conservation of Natural Resources in Achieving a Sustainable Economy in Nigeria

1. Protect and revitalise sacred groves and community-conserved areas: Legal recognition and local management plans for sacred sites reinforce cultural protection and biodiversity outcomes (Adeyanju, 2022; Sinthumule, 2024).
2. Apply agroecological practices at scale: Support farmer-managed natural regeneration, agroforestry, intercropping, and soil-restorative practices that increase productivity while retaining ecosystem services (Nair et al., 2008; Garrett, 2009; Das et al., 2021).
3. Enhance community monitoring and early-warning systems: Combine TEK indicators (phenology, animal behaviour) with low-cost sensors and community reporting to manage fisheries and wildlife sustainably (Souther et al., 2023; Thompson et al., 2021).
4. Secure tenure rights: Policies that formalise customary rights and recognise communal tenure reduce incentives for land degradation (Toulmin & Quan, 2000; Emmanuel-Barrey, 2023).
5. Foster cross-sectoral partnerships: Link ministries of education, agriculture, and environment to mainstream TEK-based conservation into national development planning (CBD, 1992; Brondízio et al., 2021).

Challenges of Traditional Ecological Knowledge

TEK is currently challenged by several factors, including changing religious beliefs. The embrace of Christianity has led many communities in Nigeria to disregard traditional beliefs and practices (Diano & Issifu, 2017). Furthermore, formal education, which emerged from colonial influences, has disrupted rich traditional systems relevant to natural resource management (Mapira & Mazambara, 2013).

Additionally, modernization and scientific advancements threaten the survival of TEK, as younger generations often adapt to new lifestyles that conflict with traditional practices (Diawoo & Issifu, 2017). Modern political systems have also diluted the authority of traditional councils, undermining their role in natural resource management (Ntoko & Schmidt, 2021).

Conclusion

Traditional Ecological Knowledge remains a vital resource for achieving a sustainable economy through the conservation of natural resources. If coupled with Environmental Adult Education, supportive policy frameworks, and secure tenure arrangements, TEK-based approaches can deliver ecologically resilient and socially equitable development. Nigeria's experience in sacred grove protection, agroforestry, and community governance illustrates both the potential and the urgency of integrating TEK into national strategies for sustainability.

While numerous challenges persist, TEK practices continue to thrive among local communities, presenting a valuable pathway for the in-situ conservation of biodiversity. It is essential to engage younger generations in these traditions to ensure their perpetuation.

Recommendations

1. Integrate TEK into formal and non-formal adult education programmes, with funding for community-led curricula and training (EAEA, 2021).
2. Legally recognise and protect sacred natural sites and customary tenure systems to incentivise stewardship (CBD, 1992; Adeyanju, 2022).
3. Establish benefit-sharing mechanisms and intellectual property protections that recognise community rights over TEK (Posey, 1999).
4. Promote hybrid monitoring systems that blend TEK indicators with scientific tools for adaptive management (Souther et al., 2023).
5. Support gender-responsive extension services and microfinance to enable TEK-based green enterprises (Howard, 2003; Onyekwelu, 2022).
6. Invest in participatory documentation and digital archiving undertaken by communities, ensuring free, prior, and informed consent.
7. Mainstream TEK across national development plans and SDG strategies through inter-ministerial coordination.

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