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Ethical Integration of Indigenous and Scientific Knowledge Systems for a Sustainable Mitigation of Environmental and Climate Change Challenges

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Abstract
This study aims to bridge the ethical gap in integrating indigenous knowledge systems (IKS) and scientific knowledge systems (WSK) to enable sustainable mitigation of environmental and climate change challenges. Indigenous knowledge and belief systems have been used to guide nature conservation in sub-Saharan Africa for many years. Traditional knowledge is passed down from generation to generation, leading to resource management practices that promote environmental protection and sustainable development. Many indigenous communities in Asia, Australia and Africa just globally, have developed conservation plans that incorporate traditional ecological knowledge and community participation to protect habitats, animals, and ecosystems. However, there are ethical issues surrounding the integration of IKS and WSK that may weaken efforts to combat environmental and climate change challenges. To analyze many case studies from Asia, Australia, and sub-Saharan Africa (including Ghana, Nigeria, Zimbabwe, the Ivory Coast, and Zambia) that have investigated the integration of IKS and WSK for environmental and climate change mitigation, this study used a qualitative research method through the combination of document and content analyses. The study uses consequentialism and utilitarianism as environmental ethics theories to guide the integration of indigenous and scientific knowledge systems for sustainable mitigation strategies. Ethical issues encountered during the integration include proprietary rights for IKS, distortion and loss of traditional, cultural, and religious beliefs, and unequal recognition of IKS. The study advocates for broad and meaningful participation of indigenous and local knowledge in the international assessment process to promote effective environmental and climate change initiatives across diverse knowledge systems and perspectives.

Keywords: Indigenous Knowledge, Climate Change, Environment, Ethics, Mitigation.

Introduction

Indigenous knowledge systems (IKS), such as indigenous beliefs and practices both cultural and religious, have been facilitating the use and mitigation of environmental problems and climate change worldwide and in sub-Saharan Africa for centuries (Attuquayefio and Gyampoh, 2010). With all the efforts to reduce environmental problems and climate change, returning and approaching the IKS in these times when efforts to eliminate the effects of environmental and climate change challenges seem short off. This study envisages examining the suitability of African traditional knowledge systems (AIKS) for a practical education and framework for environmental protection and climate change mitigation in the sub-Saharan region of Africa. Due to the large impact of AIKS across Africa, it can be argued that its evaluation and application for environmental protection and climate change mitigation, the downstream effects of environmental use, are beneficial. The AIKS in sub-Saharan Africa stems from the African traditional religion, culture and traditions (Kugara *et al.,* 2022; Makondo and Thomas, 2018; Apraku, 2018).

It is important to note that the ecosystems and environments of indigenous communities are actively maintained by traditional cultural and religious knowledge systems (Roe, Nelson, and Sandbrook, 2009). It is, for this reason, that this study investigates the significance, function and role of IKS in safeguarding the environment and addressing climate change globally, giving attention to sub-Saharan Africa and reference to global perspectives especially Asia and Australia. Studies from Sub-Saharan countries, including Cameroon, Ghana, Nigeria, Kenya, Zimbabwe, Ivory Coast, Malawi and Zambia, have been examined in this study. The introduction and application of IKS as an environmental protection framework will be analyzed and the IKS's effectiveness in mitigating climate change in Asia, Australia and sub-Saharan Africa will be evaluated. As the world faces significant environmental and climate challenges, it is essential to recognize and utilize the knowledge systems of communities such as IKS to solve problems collaboratively. IKS meets the inclusion criteria for several environmental and climate change frameworks across sub-Saharan Africa (Kugara *et al.,* 2022). This study critically examines the role of IKS in protecting the environment and combating climate change.

The collaboration of indigenous and Western scientific knowledge (WSK) for educational and mitigation purposes is now seen as crucial in addressing environmental and climate change challenges comprehensively and sustainably (Grange, 2005). However, this integration process can encounter ethical gaps that must be resolved for effective collaboration and respect for diverse knowledge systems can often be overlooked. The ethical considerations surrounding the integration of indigenous and scientific knowledge systems play a critical role in shaping decision-making processes and outcomes in mitigating environmental and climate change challenges (Wallner, 2005). However, before creating sustainable,

effective and efficient frameworks to reduce environmental and climate change problems, the research argues that there is need to identify ethical gaps in the integration between IKS and WSK and bridge them. Through an exploration of the ethical dimensions of this integration, we can better navigate the complexities of merging different worldviews, values and approaches to create innovative and inclusive solutions for more sustainable mitigation of environmental and climate challenges. We examine the ethical frameworks of consequentialism and utilitarianism as environmental ethics theory to illuminate how ethical principles can guide the integration of indigenous and scientific knowledge systems towards sustainable environmental and climate change mitigation strategies. The study uses IKS as a general terminology for both AIKS and other indigenous knowledge systems used across the globe.

Environmental Ethics Theory (Consequentialism and Utilitarianism)

To understand the IKS's position in addressing environmental issues and climate change in sub-Saharan Africa, the study incorporates the consequentialism ethics theory and the ethical principle of utility. The view of consequentialism posits that the effects of actions are the sole basis for determining their moral status. African traditions and cultures emphasize the consequences of actions against the environment as regrettable and punitive by nature spirits. According to Leopold (1949), Devall (1985), and Taylor (1981), the principle of environmental preservation regards nature as a resource that holds value exclusively in its ability to satisfy human desires. However, they advocate for developing an attitude that recognizes the inherent worth of nature. The emphasis in the consequentialism theoretical framework lies on safeguarding and reviving the environment. An ethical collaboration between indigenous knowledge systems and Western scientific knowledge systems can be analyzed through the frameworks of consequentialism and utilitarianism. Consequentialism emphasizes the outcomes of actions in evaluating their moral standing, complementing African customs and beliefs that perceive the consequences of actions on the environment as punishing. This viewpoint prioritizes the preservation and restoration of nature, acknowledging its intrinsic value beyond its usefulness for human purposes. Kant, as quoted by Holbrook (1997), stresses that the correct action is driven by a duty, grounded in the categorical imperative. Jeremy Bentham (1996) defines utilitarianism as consequentialism that considers the effects of actions on sentient beings as the only relevant factor in determining their morality. Peter Singer (1986) believes that utilitarianism can evaluate not only the actions of individuals but also the actions taken by society.

According to Singer (1986), actions should be considered right or wrong based on the expected effects that are most reasonable to follow from them. Consequentialism assesses whether actions are right or wrong based on whether their effects contribute to or detract from the integrity of an ecosystem. Ethics, like those applied to land, evaluate actions and policies based on how they affect the

overall integrity of the ecosystem. Leopold (1949) argues that an action is right when it aims to preserve the stability, beauty and integrity of the biotic community and it is wrong when it does the opposite. Holbrook (1997) suggests that actual consequentialism provides one part of the puzzle for preserving and restoring the environment. Scholars have expanded environmental theory in recent years to include the rights and interests of non-human beings that were previously reserved only for humans. The environmental theory encompasses the preservation and restoration of the integrity of nature as it applies to non-human beings and is consistent with the African environmental philosophy where all things are interconnected, nature, environment, animals and humans are all connected and what affects one affects the whole ecosystem.

Materials And Methods

This study utilizes a qualitative research approach, incorporating document and content analysis to analyze multiple case studies across Asia, Australia and sub-Saharan Africa (Ghana, Nigeria, Zimbabwe, Ivory Coast and Zambia) that have explored the integration and cooperation of IKS and WSK for environmental and climate change mitigation. The research academic articles and documents underwent a thorough analysis process, consisting of three stages. The initial stage involved using sentiment analysis to evaluate the emotions and tones present in the documents. After that, text mining was implemented to identify patterns and trends in the data. Finally, text categorization was used to group the extracted data based on similar themes (Bowen, 2009). In the research, a deep dive was taken into the different traditional practices and knowledge employed by African communities to preserve ecological balance and mitigate the adverse effects of climate change. The study applies consequentialist and utilitarian ethical approaches to underscore the nature of IKS as a methodological stance in resolving environmental and climate change challenges. The goal is to obtain a comprehensive understanding of how IKS can be leveraged to promote sustainable development and mitigate the adverse effects of climate change, identify the ethical gaps within the IKS and WSK integration practices and measures of bridging these gaps and recommendations for the effective inclusion of IKS in mitigation frameworks to create effective, efficient and sustainable actions against environment and climate change challenges.

Results And Discussion

IKS' Mitigation of Environmental and Climate Change Challenges and the Integration with WSK

IKS have a reputation in the mitigation of environmental and climate change challenges. Equally, the WSK has made strides in mitigating climate change challenges. However, both have shortfalls, some scholars called for the integration

of IKS and WSK to produce an effective approach. This research intends to appreciate the use of IKS in environmental and climate change challenges and its integration with WSK.

Global Perspective

IKS, manifested as religious, cultural and traditional beliefs and practices, plays a huge role in conserving and managing the environment and its natural resources. Ostrom (1990) argues that there has been a worldwide increase in interest in environmental issues. The international community has taken the lead in ensuring the appropriate protection of natural resources through formal and professional standards. Meanwhile, traditional African communities, like other local communities worldwide, had already developed sophisticated resource management systems for centuries before the West introduced modern forms of natural resource conservation and management were introduced. Roe, Nelson, and Sandbrook (2009) indicate that for thousands of years, local groups of people have managed the land they lived on and the natural resources that surrounded them. Locally, well-informed traditional beliefs contributed to the conservation of available natural resources. Attuquayefio and Gyampoh (2010) contend that traditional societies used norms, myths, taboos, totems, closed seasons and other practices to conserve, protect and manage certain natural resources. People from indigenous communities engaged in a complex religious and cultural belief system aimed at protecting and promoting the welfare of the community rather than personal gain. This behaviour may be argued to contribute to the protection of the environment in these communities.

IKS play a central role in protecting the environment and mitigating climate change, particularly in Africa (Kugara, *et al.,* 2022; Makondo and Thomas, 2018; Apraku, 2018). This knowledge is passed down through generations, it offers valuable insights into local ecosystems and sustainable practices. However, integrating IKS with Western Scientific Knowledge (WSK) is essential for effective climate change adaptation and mitigation (Makondo and Thomas, 2018). Despite its potential, the protection of indigenous knowledge from exploitation is a key concern (Brewer and Warner, 2015). Therefore, a balanced approach that respects and integrates IKS with modern approaches is crucial for addressing climate change challenges. According to Kugara *et al.,* (2022), IKS is gradually being recognized as an imperative source of information for climate mitigation. Brewer and Warner (2015), claim that indigenous communities are the subjects of research efforts to study and acquire their traditional knowledge for its value in addressing climate change. Apraku, Akpan and Moyo (2018), maintain that IKS systems can help in empowering local communities to mitigate climate change impacts. Authried (2015) argues that IKS are a dynamic system to prepare adaptation strategies and help mitigate climate change when their rights are assured. Hosen and Nakamura (2020), traditional ecological knowledge held by indigenous peoples may be key to

combating climate change. Indigenous people play an essential role in the global fight against climate change. (Leonard *et al.,* (2013), contend that indigenous people offer alternative knowledge about climate variability and change based on their locally developed knowledge and practices of resource use. According to Kola-olusanya (2012), IKS are important approaches for shaping value, orientations, social action and mobilizing people to be interested in the environment to learn about it as well as taking action to protect and preserve it. Indigenous knowledge and coping strategies provide a crucial foundation for community-based adaptation measures.

Asian and Australian Perspectives

According to Grange (2005), ISK and WSK are not in opposition to one another, but instead, are complementary systems. As a result, it is important to integrate them to facilitate a more advanced production of knowledge. The use of IKS in managing the environment has been a common method for indigenous societies around the world. According to Lama's (2001) study, some native communities in Nepal utilize their traditional knowledge not only to maintain their traditions and values but also to safeguard the environment and its natural resources. Zukya, Islami and Faiz (2021) propose that there is a close relationship between environmental intelligence and indigenous knowledge. They suggest that indigenous knowledge contains valuable information such as suggestions, prohibitions and sanctions related to the environment. They further argue that research is necessary to develop this concept into an environmental intelligence indicator, which can be used to promote sustainability.

Ali *et al.,* (2019) contend that the environmental education provided by the Institute for Educational Development at the Aga Khan University in Karachi, with a particular emphasis on South Asia, draws on indigenous and feminist ideologies. This approach accentuates the significance of emotions, experience, memory and spiritual connection. According to the authors, this approach challenges the idea of a separation between nature and humanity. As a result, it offers an alternative to exploitative attitudes toward nature. Furthermore, the authors suggest that this approach provides a rich and spirited foundation for environmental education. Amin *et al.,* (2021) highlight the significance of indigenous techniques and knowledge practices at a local level in adapting to climate change. They believe that to guarantee sustainable climate change adaptation in Bangladesh's coastal communities, these techniques may be integrated into the country's framework for policy on climate change adaptation.

Bardsley, Prowse and Siegfriedt (2019) have indicated that the present academic understanding of Indigenous traditional fire management has been present in South Australia for a considerable period. However, they have also highlighted that the role of indigenous management in the landscape has been disregarded or undervalued within the field of environmental studies. The authors

further argue that, while traditional Indigenous burning practices hold significant knowledge, there is a lack of formalized academic knowledge that could be used to guide prescribed burning practices in the region. According to Bardsley, Prowse and Siegfriedt (2019), it is important to learn from the traditional Indigenous land management methods. They propose that it is crucial to establish formal knowledge about the historical burning practices in specific regions. Furthermore, it is necessary to understand whether these practices can be effective in managing hazards and promoting biodiversity outcomes in modern landscapes.

Sub-Saharan African Perspectives

Traditional religion and culture provide communities with methods of preserving and maintaining the environment, from taboos to prohibitions. Benson (2021) argues that traditional territories in Africa have a long-standing history of practising totemism and divine worship, which have been observed to have a beneficial effect on the environment. However, the reasons behind these practices are spiritual, rather than based on environmental awareness or practicality and clans widely follow these traditions. Arguably, to ensure effective environmental protection, it is advisable to combine modern scientific methods with age-old indigenous methods. Ethical collaboration and idea exchange between religious environmental activists, environmental organizations, governments and policymakers is necessary to manage environmental resources effectively in these circumstances. Emphasizing the need for collaborative efforts between IKS and WSK, Attuquayefio and Fobil (2005) assert that the depletion of natural resources is increasing, which poses a major danger to the existence of both humans and animals. The loss of any species leads to the loss of potential economic benefits and disrupts the ecological balance.

Traditional Beliefs, Norms and Conservation

Traditional beliefs, practices and norms contribute to the conservation of the environment. Despite the effectiveness and role of African traditional belief systems in natural resource management and conservation, this informal organization has received little attention (Kankpeyeng, 2000). Although there have been long-standing efforts to involve rural populations in natural resource conservation programs and projects, integration has been slow (Hulme and Murphree, 1999). The causes include increasing non-compliance with long-held traditional beliefs, Western technology, the increasing influence of foreign religions and beliefs and the lack of modern regulations to enforce traditional rules. Ntiamoa-Baidu (1995) noted that urbanization and resettlement have also contributed to this challenge according to Diawuo and Issifu (2015) social prohibitions and things deemed sacred or unclean are known as taboos. These traditional and community rules determine who can access specific areas and what can be harvested there, protecting them from human activities such as logging and slash-and-burn farming.

Anthropologists and historians find the cultural and traditional aspects of sacred forests intriguing, while biologists and conservationists view these places as ideal for preserving some of the world's most fascinating plants and animals, Miller (2008) perceived this as an opportunity.

AIR and Cultural Practices and The Conservation of Natural Resources

African Indigenous religion (AIR) and cultural practices have a significant role in the conservation of natural resources. According to Fongod, Ngoh and Veranso (2014), it is essential to promote environmental conservation and biodiversity in the South and Southwest regions of Cameroon by valuing traditions, customs, beliefs and cultural practices. Therefore, it is crucial to share and make popular the knowledge of ethnobotany and encourage the local communities that play an important role in preserving biodiversity. According to Eneji (2012), African cultural and religious practices are based on the belief that gods inhabit certain parts of the environment and nature and therefore have supernatural powers. Consequently, these environmental areas are protected to ensure that the abode of the gods is safe from exploitation, access and use. Arguably, this practice of protecting the abode of the gods promotes the protection and management of natural resources. These areas, referred to as sacred ponds, sacred streams and rivers, wicked forests, graveyards and sacred groves, among others, have played an important role in the conservation of natural resources, for instance in Cross River State and Nigeria as a whole.

However, the rise of Western education and Christianity in Africa has eroded these traditional practices that were once essential to natural resource management. Western influences did not see value in traditional African religious practices, and a review of these practices was necessary. Eneji (2012), argue that to ensure the protection and management of natural resources for the benefit of Nigerians and the world at large, it is necessary to have modern conservation programs that integrate traditional and indigenous knowledge systems into activities. However, we argue that modern conservation programs may not effectively integrate traditional and indigenous knowledge systems into environmental protection activities because of cultural differences. However, Eneji is not trying to undermine the prowess of Western education in equipping people with the necessary skills to protect the environment and combat climate, he acknowledges that Western education and Christianity might have contributed positively to the management and protection of natural resources. The call for integration of IKS and Western environment protection activities is well received, however, critical consideration to ensure an effective merger happens is a crucial must.

The Sacred - Ancestry and Spirits' Model for Sustainable Environment

The sustainable environmental lineage model of African religions can be of great importance in environmental management efforts. For example, Miller

(2008) discusses the controversial natural relationship between religion and the environment. African religions, particularly Western environmental ideologies that question the role of moral authority in lineage, challenge this traditional belief. Although Western influence weakened traditional beliefs about the power and status of ancestors, the transformative model of African religion supported moral, social, cultural, and educational development. He argues that African religions continue to play an important role in environmental protection in the 21st century and that a combination of academic knowledge and practical application is required to effectively carry out this task. It suggests that there is. However, we argue that we need to think about the effectiveness of combining academic knowledge and practical application in conservation efforts. Traditional beliefs in some African societies, such as the belief in water spirits, play an important role in the conservation of water and its inhabitants.

As an illustration, Boateng (1998) argues that Zimbabwe's attitude towards water spirits and the natural environment has gradually changed over the past century from an attitude of intimacy and involvement towards water spirits to one of alienation and indifference. doing. African religious beliefs promote a deep respect for nature, which has led to the development of knowledge about environmental conservation. Although environmental degradation is caused by factors beyond the rejection of water spirits, such as overpopulation and lack of resources for sustainable practices, it is unfortunate that AIKS is rejected in the African context. As Kouakou (2013) argues, the sacred aspects of plants and animals play an important role in developing an ethical approach to the environment. In African cosmology, especially in traditional Ivorian society, there is a deep spiritual bond between humans and nature. Therefore, the cultural and religious practices of traditional African societies display an ecological character, as they emphasize the importance of protecting and respecting the natural world. However, it can also be argued that sacred concepts alone are not sufficient to motivate people to protect the environment.

The Return to IKS for Environmental and Climate Change Challenges Mitigation

This study argues that integrating both traditional and modern conservation approaches can create a new conservation paradigm. This will help restore respect for water spirits and the sacredness of the natural environment to the Zimbabwean psyche. For instance, a research reveals that Zimbabwe is facing a serious problem of environmental degradation (Machoko, 2013). The research found that there was a contradiction between the approaches of Shona followers of African Traditional Religion (ATR) and followers of modern Western religions to conservation of the natural environment in Zimbabwe. Although this research considers the argument that Western modernity can produce advances in science and technology and contribute more effectively to the protection of the natural environment than traditional beliefs, this study nevertheless acknowledge AIKS'

efficiency in environmental protection. Machoko's study argues that in a mechanistic model of the natural environment, Western modernity has replaced the power and authority of Zimbabwe's water spirits. Most Zimbabweans have promoted and encouraged Western thinking in determining how the natural environment can be protected, treated and managed without considering water spirits. This may be due to the gaps in environmental management highlighted in the study.

In the 21st century, movements to combat environmental issues need to go beyond combining IKS and Western methods to transform AIR into a tool for ecosystem restoration, sustainability, and protection. Chibuye and Buitendag (2020) discuss the importance of adapting environmental theology to the African context, using the example of the Copperbelt region of Zambia, which is famous for environmental pollution caused by mining activities, and argue that the global environmental crisis is It claims to bring demands on all people: Prioritize environmental protection. They argue that environmental theology can be adapted to African contexts, particularly through the lens of Zambia's Copperbelt. They argued that ecological restoration was needed and that this could be achieved by reinterpreting the traditional beliefs of African religions. Their argument from the cosmology of the Lamba supernatural belief system was that respect for the environment was no longer included, but they recognized the sanctity of Mother Earth and were willing to protect against further pollution and exploitation. It was too late to organize a movement to protect the planet. However, this study argues that African traditional religions can be turned into tools to combat this ecological catastrophe.

Strengths and Limitations of IKS

IKS have strengths and limitations of IKS in mitigating environmental and climate change challenges. Traditional management practices are an important means of protecting the environment in many parts of Africa. In this way, Ayaa and Waswa (2016) stated that AIKS has great potential to promote effective, efficient and sustainable environmental management practices, especially among rural populations in developing countries. The authors suggest that efforts to restore, document and maintain good environmental practices in communities, such as Teso for Sustainable Environmental Management, should be revived and integrated into environmental policies. Kennedy's (2015) study of the Tongan people of southern Zambia shows that the role of culture in protecting the environment is often overlooked. The study appreciates the way the Tongans protect the environment and protect land, water, animals, medicinal plants, fruit trees and eating places. The Tongan people embrace food choices, totem worship and taboos, organic farming, crop rotation and exchange, and water sanctity and stewardship as key methods of environmental protection. This study shows that governments, policymakers and environmentalists should understand environmental protection measures to ensure

that the environment is protected. Ngara and Mangizvo (2013) argued that religious, social and cultural beliefs and practices are important in protecting the environment and other species in developing countries.

This research encourages conservation organizations to integrate traditional practices into their work. However, Adeyanju *et al.*, (2021) argue that if we want to integrate environmental activities with climate change, we must consider the conflict between African traditional beliefs and Western IKS thinking, which can serve as a solution to many problems. Environmental issues in sub-Saharan Africa. This can be seen from a study by Eluu (2015) who studied the nature and values of nature in Christianity, Islam and African traditional religions and concluded that environmental change has become a major concern and a major challenge for Nigerian scholars in the world. This is our time. Although environmental education is not available in Nigeria, this study demonstrates the potential of using religion as a tool to help address many of the environmental challenges facing Nigeria. The study recommends that civil society organizations should be involved in educating students and the public about environmental protection. Okeugo, Obioha, and Oninye (2020), in their study of Igala religion, noted that Africans exhibit environmental awareness. The study promotes environmental issues such as soil erosion, flooding, deforestation and environmental quality, encouraging awareness of environmental issues and celebrating Africa's long-standing neglect of traditional ways to protect a healthy environment. Therefore, it is important to consider that using African traditional religions as a good solution to environmental problems may not be effective due to the diversity of traditions in the sub-Saharan region. However, the use of these religions as a source of knowledge for environmental protection should be carefully considered.

Given these limitations and strengths of IKS, it is justifiable that there is a cooperation or integration of IKS and WSK to have an efficient and effective tool for environmental and climate change challenges mitigation across indigenous communities, societies and the global stage. This study argues that environmental and climate change today need to be handled with maximum effort and combining efforts is the way to go. However, these combinations or integrations engender ethical issues in the way they are done which undermines the contributions and rights of the IKS and their proprietors. Therefore, the cooperation or integration ought to be guided by ethical considerations.

Ethical Gaps in Integrating IKS and WSK and Their Measures

The integration of IKS and WSK has been a topic of discussion for many years, and scholars have identified numerous ethical issues that must be considered when exploring the potential for cooperation between the two knowledge systems. One of the main arguments put forward by Wallner (2005) is that ethical considerations must be addressed when integrating IKS and WSK. Considerations

must be made towards combining scientific and traditional methods of addressing ecological problems to address the current ecological issues. For instance, Gedzi, Dumbe and Eshun (2016) established that the environmental problems facing Ghana have both domestic and international causes. The country's current environmental management model is under-resourced, including funding, human resources and associated logistics, making it less effective. The study warns that environmental degradation has cumulative effects that will eventually come back to haunt us. Their study recommends combining modern and traditional environmental protection methods to create a more efficient system.

Proprietary Rights

According to Authried (2015), Indigenous Knowledge Systems (IKS) play a crucial role in developing adaptable strategies and reducing the impact of climate change. Authried believes that IKS are the constantly evolving systems that can help mitigate the negative effects of climate change. However, the rights of the proprietors of such knowledge must be acknowledged when these integrations are done. The proprietors of IKS ought to be assured of their proprietary rights It is our position that this could result in the utilization of indigenous knowledge without obtaining appropriate consent, recognition, or engaging in benefit-sharing with indigenous communities. Awuah-Nyamekye (2013) argued that the religiously spiritual worldview for example, for the Berekum people of Ghana is important to their local ecological practices. The Berekum have the traditional methods of transmitting ecological knowledge to the youth and assess their effectiveness considering modernity and the influence of Western education and culture in the region. The Berekum people strongly believe that their indigenous ways of dealing with ecological problems remain valid and that these methods have not been lost in rural areas or Ghana as a whole. He argues that although indigenous religious beliefs and practices may be in decline and a larger proportion of indigenous people in the study area have converted to Christianity or Islam, the beliefs and practices are still active in people's lives and minds. What would be the position of these methods after integration with WSK?

Harmful hybridity

According to Langer's (2011) argument, the combination of IKS and WSK can have negative consequences by creating a harmful hybridity. Such integration can result in the loss or distortion of the unique cultural perspectives and practices of Indigenous communities, and can also reinforce colonial power dynamics. This can happen when IKS is incorporated into WSK without proper recognition and respect for its distinctiveness and validity, or when IKS is utilized to justify or legitimize Western scientific practices or policies that may not align with Indigenous values or interests. Langer's (2011) study argues that neither modern (scientific) nor traditional methods are enough to address current ecological problems and a combination of the two approaches is needed to fully address such

problems. However, worries about equal recognition of the IKS when the integration is done arise. On the Ethical dilemma of combining IKS with the Western approach, Jessen *et al.*, (2021) argue that various knowledge components that are linked to particular geographic locations are encompassed in IKS, which already exists in Western science. As a result, there is a challenge in integrating these two knowledge systems. According to them, IKS has contributed significantly to the understanding of ecology, evolution, physiology and applied ecology. They argue, however, that there are notable differences between IKS and WSK approaches. Brewer and Warner (2015) argue that to enable productive and mutually beneficial collaborations, it is necessary to establish shared conceptual foundations. Research efforts must be directed towards Indigenous communities to explore and exploit their traditional knowledge to address climate change.

Hierarchical Integration and Inequality

The integration of IKS and WSK presents both challenges and opportunities. Scholars have extensively researched and highlighted the importance of reevaluating the relationship between these two knowledge systems. Wallner (2005) and Bala and Gheverghese (2007) emphasize the need to recognize the value of indigenous knowledge as a vital source of learning. They argue that IKS can contribute significantly to sustainable development, biodiversity conservation, and climate change adaptation. On the other hand, other scholars, including Oguamanam (2006) and Coope (2020), academic researchers have explored the potential for an ethical and sustainable policy on indigenous knowledge. He emphasizes the importance of combining global indigenous knowledge and ensuring that benefits resulting from the commercialization of indigenous knowledge are distributed fairly. Coope proposes that we should reconsider the idea of hierarchical integration when it comes to IKS and techno-scientific modernity. He draws attention to the need for a shift in the current power dynamics between IKS and WSK. According to Coope, the hierarchical method of integrating IKS and WSK might cause problems as it often prioritizes WSK over IKS. This approach can lead to the commodification of indigenous knowledge, with little benefit for the indigenous communities who hold this knowledge. Therefore, it is vital to adopt a more equitable and collaborative approach to integrating IKS and WSK. This approach should aim to recognize the value of IKS, promote its preservation, and ensure equitable sharing of benefits between the indigenous communities and the wider society.

Lack of Legitimization

Bala (2007) asserts that IKS must be legitimized and that scientists have a responsibility to practice and apply science in a manner that is inclusive of the participation of indigenous peoples and ethnic minorities. Western scientific methods tend to disregard or underestimate traditional indigenous practices, labelling them as either outdated or unscientific. This can harm the cultural

importance and efficacy of indigenous knowledge in tackling environmental issues. We consider the possibility that a combination of traditional and modern approaches may have attainable feasibility because of cultural differences and conflicting worldviews. Therefore, calling for a critical examination and exploration of the best ways to combine the approaches. We suggest that having individualized combinations at cultural levels may be more efficient than a generalized combination. Langer (2011) highlights the ethical complexities of integrating IKS with WSK and stresses that a productive synthesis can only be achieved if these complexities are considered. It is important to acknowledge the cultural significance of indigenous knowledge when Western scientific institutions adopt it, or else there is a risk of cultural appropriation. This can lead to the erasure of indigenous identities and traditions. Gross (2011) also emphasizes that respecting IKS is vital and integrating IKS with WSK is crucial for addressing ethical issues related to their integration.

Marginalization and Exploitation

The knowledge and wisdom of indigenous people may not be given the proper acknowledgement, credit, or financial compensation for their valuable contributions towards finding solutions to environmental issues. This can result in the marginalization and exploitation of their knowledge. Bruchac (2014) emphasizes the importance of consulting with indigenous knowledge bearers to ensure ethical practice and avoid harm to sensitive sites and practices. Integrating knowledge systems can cause inequalities in decision-making processes, resource allocation, and the distribution of benefits between Western scientific institutions and indigenous communities. Langer (2011) also argues that integrating IKS and WSK can lead to damaging hybridity. Conflicts in decision-making processes and the implementation of environmental strategies can arise due to differences in worldview, values, and priorities between Western scientific paradigms and indigenous knowledge systems. The integration of knowledge systems may not always give priority to environmental justice, equity and the rights of indigenous communities to self-determination and control over their lands, resources and traditional practices.

Recommendations For An Ethically Sustainable Integration

Considering the undeniable need to create, promote and integrate IKS into local and global frameworks of environmental protection and climate change mitigation. This paper recommends the following means for the ethical integration of IKS and WKS for sustainable mitigation of environmental issues and climate change:

1. Acknowledging the importance of indigenous knowledge and local knowledge is crucial in understanding the impact of climate change, developing effective adaptation and mitigation plans, and governing climate

change actions. This can be done by acknowledging and valuing the knowledge and understanding of indigenous communities and individuals holding local knowledge.

2. Policymakers and agencies have a responsibility to consider different perspectives and local needs of the people when incorporating IKS and WSK into climate change measures, assessment methods and decision-making processes. They must work closely with local communities to develop more inclusive and effective initiatives that incorporate a wide range of knowledge systems. This approach will enable them to make better decisions and take meaningful action on climate change.
3. Enforcing open processes guided by principles of equity, diversity and inclusion is essential for constructing a robust evidence base, encompassing a spectrum of voices, statements and unfiltered knowledge.
4. Ethical considerations when combining indigenous and Western scientific knowledge must be prioritised through establishing comprehensive guidelines that encompass; obtaining informed consent from indigenous communities, equitable distribution of benefits and respect for cultural values and traditions. This process may ensure that the integration process is carried out with sensitivity and responsibility, promoting mutual understanding and collaboration between different knowledge systems.
5. Foster partnerships between indigenous knowledge holders, scientists, policymakers, and stakeholders. Use co-creation processes for shared decision-making and mutual learning. Ensure inclusive, transparent, and participatory decision-making that draws from diverse perspectives, including indigenous voices for fair and effective climate change actions.
6. It's vital to value and promote cultural diversity in addressing environmental issues. Educating people about merging various knowledge systems is important. Policies related to the environment and climate change should represent various knowledge systems and promote social and environmental fairness to ensure diversity.
7. Investing in capacity-building programs and promoting fair distribution of resources, benefits and outcomes resulting from collaborative projects that combine indigenous and Western scientific knowledge is crucial. It's also imperative to establish mechanisms that guarantee equitable compensation, benefit-sharing, and community development.

Conclusion

Based on the results of this study, decision-makers can prioritize strategies that promote sustainability and ecosystem well-being by combining consequentialism and utilitarianism with ethical considerations of indigenous knowledge systems and Western scientific knowledge systems. This method aligns

with African environmental philosophy, which recognizes the interconnectedness of all-natural elements and emphasizes the importance of considering the rights and interests of non-human entities in environmental decision-making processes. It is critical to carefully consider the social and cultural implications of integrating these two knowledge systems. Ultimately, a productive synthesis of IKS and WSK can only be achieved through a balanced and respectful approach that considers the perspectives and concerns of all stakeholders involved. It is essential to recognize the value of both knowledge systems and work towards an integration that is mutually beneficial, rather than marginalizing or undermining either system. Therefore, it is necessary to give fair recognition to the contributions of both systems, and researchers must engage in responsible and respectful social commitment with IKS holders, primarily through collaborative research aimed at improving the lives and well-being of Indigenous communities, governments, and nations. While it may not be feasible or practical to integrate traditional beliefs with modern approaches on a large scale, smaller efforts of IKS sub-Saharan Africa and the integration of various efforts may help protect the environment in immeasurable ways.***

References

Adeyanju, S., A. O'Connor, T. Addoah, E. Bayala, H. Djoudi, K. Moombe, J. Reed, et al. "Learning from Community-Based Natural Resource Management (CBNRM) in Ghana and Zambia: Lessons for Integrated Landscape Approaches." *International Forestry Review* 23, no. 3 (September 1, 2021): 273–97. https://doi.org/10.1505/146554821833992776.

Ali, N., Samnani, B., Khan, A. W., Khatoon, N., Ali, B., Asfundyar, S, Amirali, S. (2019). Decolonizing Nature/Knowledge: Indigenous Environmental Thought and Feminist Praxis. *Scholarship of Teaching and Learning in The South*, 3(1), 77–91. Https://doi.org/10.36615/Sotls.V3i1.80

Amin, M. N., Asaduzzaman, M., Kabir, A., Snigdha, S. S., and Hossain, M. S. (2021). Lessons from Local Indigenous Climate Adaptation Practices: Perceptions and Evidence from Coastal Bangladesh. *Local Environment*, 1–18.Https://doi.org/10.1080/13549839.2021.1937970

Apraku, A., Akpan, W., and Moyo, P. (2018). Indigenous Knowledge, Global Ignorance? Insights from an Eastern Cape Climate Change Study. *South African Review of Sociology*, 49(2), 1–21. https://doi.org/10.1080/21528586.2018.1532813

Authried, O. (2015). *The Contribution of Indigenous People's Ecosystem Management to Climate Change Mitigation Actions.* A Master's Thesis submitted to TU WIEN Continuing Education Center, June 2025, Vienna, Austria.

Awuah-Nyamekye, S. (2013, October 1). Managing the Environmental Crisis in Ghana: The Role of African Traditional Religion and Culture—A Case Study of Berekum Traditional Area. Retrieved March 7, 2024, From Etheses. Whiterose. Ac.UK Website: Https://etheses.whiterose.Ac.Uk/5780/. [Accessed: 02/03/2024].

Ayaa, D, D. and Fuchaka, W. (2016). Role of Indigenous Knowledge Systems in The Conservation of The Bio-Physical Environment Among the Teso Community in Busia County-Kenya. *African Journal of Environmental Science and Technology*, 10(12), 467–475. Https://doi.org/10.5897/ajest2016.2182

Bala, A., and Gheverghese Joseph, G. (2007). Indigenous Knowledge and Western Science: The Possibility of Dialogue. Race and Class, 49(1), 39–61. https://doi.org/10.1177/0306396807080067

Bardsley, D. K., Prowse, T. A. A., and Siegfriedt, C. (2019). Seeking Knowledge of Traditional Indigenous Burning Practices to Inform Regional Bushfire Management. *Local Environment*, 24(8), 727–745. Https://doi.org/10.1080/13549839.2019.1640667

Benson, G. "African Traditional Religion and Natural Resource Management: The Role of Totems and Deity Worship in Ghana." *American Journal of Environment Studies* 4, No. 1 (February 1, 2021): 13–37. Https://doi.org/10.47672/ajes.652.

Bentham, J. (1996). *The Collected Works of Jeremy Bentham: An Introduction to the Principles of Morals and Legislation*, (J. H. Burns & H. L. A. Hart, Eds.). Oxford University Press. https://doi.org/10.1093/actrade/9780198205166.book.1

Boaten, B.A. (1998). Traditional Conservation Practices: Ghana's Example. *Research in Review*, 14, 42-51.

Bowen, G. (2009). Document Analysis as a Qualitative Research Method. *Qualitative Research Journal.* 9. 27-40. https://doi.org/10.3316/QRJ0902027.

Brewer, P. J. and Warner, E. E. K. (2015) Protecting Indigenous Knowledge in The Age of Climate Change. *The Georgetown International Environment Law Review*. Vol, 27:585

Bruchac, M. M. (2014). Indigenous Knowledge and Traditional Knowledge. *Encyclopedia of Global Archaeology*, 3814–3824. https://doi.org/10.1007/978-1-4419-0465-2_10

Chibuye, L. And Buitendag, J. (2020). "The Indigenisation Of Eco-Theology: The Case of The Lamba People of The Copperbelt In Zambia." *HTS Teologiese Studies / Theological Studies* 76, No. 1 (October 12, 2020). Https://doi.org/10.4102/hts.v76i1.6067.

Coope, J. (2020). Indigenous Knowledge and Techno-Scientific Modernity: "Hierarchical Integration" Reconsidered. *Ecopsychology,* 12(2), 151–157. https://doi.org/10.1089/eco.2019.0050

Devall, B. And Sessions, G. (1985). Deep Ecology. Layton, Utah: Peregrinesmith.

Diawuo, F., and Issifu, A.K. (2015). Exploring the African Traditional Belief Systems in Natural Resource Conservation and Management in Ghana. *The Journal of Pan-African Studies,* 8, 115.

Eluu, P. E. (2015). "Religion and Sustainable Environmental Education in Nigeria." *Journal of Environment and Earth Science* 5, No. 12 (January 1, 2015): 128–31.

Eneji, C.V.O, Ntamu, G. U., Ajor, J. O., Ben, C. B., Bassey, J. E., and Williams, J. J. (2012). Ethical Basis of African Traditional Religion and Socio-Cultural Practices in Natural Resources Conservation and Management in Cross River State, Nigeria. 2(2), 34–43.

Fongod, A. G. N., Ngoh, L. M., and Veranso, M. C. (2014). Ethnobotany, Indigenous Knowledge and Unconscious Preservation of The Environment: An Evaluation of Indigenous Knowledge in South and Southwest Regions of Cameroon. International *Journal of Biodiversity and Conservation*, 6(1), 85–99. Https://doi.org/10.5897/Ijbc2013.0637.

Gedzi, V. S., Dumbe, Y., and Eshun, G. (2016). Environmental Reviews and Case Studies: Religious Resources and Environmental Management in Ghana. Environmental Practice, 18(3), 137–147. Https://doi.org/10.1017/S1466046616000247.

Grange, l. (2004). Western Science and Indigenous Knowledge: Competing Perspectives or Complementary Frameworks. *South African Journal of Higher Education.* Vol. 18 (3) 2004: 82-91. https://journals.co.za/doi/pdf/10.10520/EJC37104

Gross, M. (2011). Paul Sillitoe (ed.) Local Science vs Global Science: Approaches to Indigenous Knowledge in International Development, Berghahn Books: New York, 2007; 288 pp. *International Sociology*, 26(2), 274–274. https://doi.org/10.1177/0268580911026002160 4.

Holbrook, D. (1997). "The Consequentialist Side of Environmental Ethics," Environmental Values 6, No. 1, (1997): 87-96. Http://www.environmentandsociety.org/node/5716.

Jessen, T. D., Ban, N. C., Claxton, N. X., and Darimont, C. T. (2021). Contributions of Indigenous Knowledge to Ecological and Evolutionary Understanding. Frontiers in Ecology and The Environment, 20(2). Https://doi.org/10.1002/fee.2435.

Kanene, K. M. (2015). "The Environmentality of Shrines: Case of Gonde Malende (Shrine) Of the Tonga People of Southern Zambia." *Asian Journal of Social Sciences and Humanities* 4, No. 2 (May 1, 2015): 154–60.

Kanene, Kennedy M. "Indigenous Practices of Environmental Sustainability in The Tonga Community of Southern Zambia." *Jàmbá: Journal of Disaster Risk Studies* 8, No. 1 (March 17, 2016). Https://doi.org/10.4102/jamba.v8i1.331.

Kola-olusanya, A. (2012). Environmental Conservation: Espousing Indigenous Knowledge System as a Model for Caring for the Earth. *Journal of*

Educational and Social Research, vol, 2 (3) September 2012. Doi: 10.5901/jesr. 2012.v2n3p359.

Kouakou Bah, J.-P. (2013). The Contribution of The Sacred in Traditional African Societies to Environmental Ethics. Anthropology, 01(03). Https://doi.org/10.4172/2332-0915.1000110.

Kugara , S. L, Tapiwa, A., Nyasha Sakadzo, Emmerson Chivhenge, and Taona Museva. (2022). The Role of Indigenous Knowledge Systems (IKS) in Climate Change. *Advances in Religious and Cultural Studies (ARCS) Book Series*, 1–23. https://doi.org/10.4018/978-1-7998-7492-8.ch001.

Lama, R. K. (2021). Application of Indigenous Knowledge in Natural Resources and Environment Conservation in Nepal. *Journal of Population and Development*, 2(1), 165–179. Https://Doi.Org/10.3126/Jpd.V2i1.43493.

Langer, J. (2011). Indigenous Knowledge and Western Science. Postcolonialism and Science Fiction, 127–152. https://doi.org/10.1057/9780230356054_6

Leonard, S., Parsons, M., Olawsky, K., and Kofod, F. (2013). The Role of Culture and Traditional Knowledge in Climate Change Adaptation: Insights from East Kimberley, Australia. *Global Environmental Change*, 23(3), 623–632. https://doi.org/10.1016/j.gloenvcha.2013.02.012.

Leopold, Aldo (1949). *A Sand County Almanac*. Oxford University Press.

Machako, C.G. (2013). "Water Spirits and The Conservation of The Natural Environment: A Case Study from Zimbabwe." *International Journal of Sociology and Anthropology* 5, No. 8 (November 30, 2013): 285–96. Https://doi.org/10.5897/ijsa12.065.

Makondo, C. C, and Thomas, D. S. G. (2018). Climate change adaptation: Linking indigenous knowledge with Western Science for Effective Adaptation. *Environmental Science and Policy*, 88, 83–91. https://doi.org/10.1016/j.envsci.2018.06.014.

Miller, Laura, "Walking Amongst the Sacred Spines: Social and Ecological Investigation of The Fenoaivo And Zanavo Sacred Forests in Southern Madagascar" (2008). Independent Study Project (ISP) Collection. 570. Https://digitalcollections.sit.edu/isp_collection/570. [Accessed: 03/02/2024].

Oguamanam.C. (2006). *International Law and Indigenous Knowledge*. Toronto: University of Toronto Press, 2006. https://doi.org/10.3138/9781442676244.

Okeugo, O, Obioha, C, and Onyinye, J. (2020). "African Prose Fiction and The Depiction of Corruption in Islamic Society and Religion: A Critical Study of Abubakar Gimba's Witnesses to Tears and Sacred Apples." *International Journal of Applied Linguistics and English Literature* 9, No. 1 (January 31, 2020): 61. Https://doi.org/10.7575/Aiac.Ijalel.V.9n.1p.61.

Singer, P. (1986). Animal Liberation,' In Donald Van Deveer And Christine (Eds) People, Penguins, and Plastic Trees, Pp. 24-32. Belmont, California: Wadsworth.

Taylor, Paul W 1981 ‘The Ethics of Respect for Nature,’ *Environmental Ethics* 3: 197-218

Wallner, F. (2005). Indigenous knowledge and Western Science: Contradiction or Cooperation. *African Journal of Indigenous Knowledge Systems (IAJIKS).* Vol. 4(1) 2005: 46-54.

Zukya, R. I, Ramdan A, and Faiz, U. (2021). Environmental Intelligence Concept in Indigenous Knowledge. *Advances in Social Science, Education and Humanities Research*. Https://doi.org/10.2991/assehr.K.210909.073.